

JSEP will add front matter (title page and contents)

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Keynote Speakers

Opening Keynote Lecture

Persuasive technology for health and wellness

Rita Orgi, Dalhousie University

Advances in technology offer many opportunities to strategically design interactive systems that aid and motivate people toward behaviours and actions that are beneficial for them and their communities. Avoiding behaviors that pose health risks and promoting a healthy lifestyle can be facilitated by persuasive technologies (PTs). PTs can integrate into people's daily lives and support them to achieve various self-improvement goals. It is well-established that PT interventions are effective tools for promoting health and wellness. In this talk, I will share ways of designing PT interventions to promote health and wellness goals with a major focus on PTs for promoting physical activity. First, I will show ways that PT interventions can be tailored to specific populations, individuals, or health conditions in order to increase their effectiveness at achieving desired outcomes such as increased utilization, adherence, motivation, and improved health. I will then provide some examples to show that tailored PT interventions are more effective than the one-size-fits-all approach across various health behaviour contexts (e.g., physical activity) and cultural groups (e.g., people from Western culture and Non-Western culture).

Keynote Speaker: Motor Development

Lessons learned from the SPARK study: Motor and other forms of development and services offered to children with autism.

Anjana Bhat, University of Delaware

1 in 40 children in the US have an autism spectrum disorder (ASD) diagnosis. While social communication difficulties and presence of restricted interests/repetitive behaviors are considered core symptoms of ASD; general delays in motor, language, cognition, and function are also often present in individuals with ASD. General delays in cognitive, language, and functional skills are discussed as domain-specific specifiers of ASD; however, motor delays are often not considered part of the ASD definition. The SPARK study conducted by the Simons

foundation is a national US study following the development of children with ASD among with substantial data on children's co-occurring conditions and therapeutic services received. These data in a large sample of children with ASD ($N = \sim 13,887$) revealed that 88% of the SPARK sample is at-risk for motor delay or developmental coordination disorder (DCD; Bhat, 2020, 2021, 2022). The risk for motor delay did not change with age between 5 and 15 years in the SPARK sample. Additionally, motor delays in children with ASD were associated with their core and co-occurring delays (Bhat, 2021). Specifically, gross motor skills related more to children's social communication skills whereas fine motor skills related more to children's repetitive behaviors. Moreover, fine motor skills related more to children's cognitive and language delays. Last but not the least, both fine and gross motor skills were associated with children's functional delays. Even after controlling for cognitive abilities, motor skills continued to predicted core and co-occurring delays of children with ASD (Bhat, 2022). Nevertheless, the majority of children with ASD receive sedentary therapies (85% receive speech and occupational therapies) and not motor services such as physical (35%) and recreational therapies (15%). There is a clear unmet need for motor services given the fact that 88% of the SPARK sample is at risk for motor delay. Motor services should be urgently provided to children and adults with ASD through school-based/early intervention services and community-based, physical activity programs offered by physical/occupational therapists as well as adaptive physical educators and creative movement/exercise experts. Greater motor advocacy and caregiver/expert education is needed to change the mindset of caregivers and clinical experts. Lastly, there is an urgent need to improve resources and funding to promote motor services and physical activity programs for individuals with ASD with a broader goal of enhancing lifelong, mental/physical well-being of individuals with ASD.

Keynote Speaker: Motor Learning and Control

Building better social robots through embodied experience

Emily S. Cross, University of Glasgow and ETH Zürich

The ability to perceive and interact with others occurs in an effortless manner but is underpinned by complex cognitive and neural processes. In this talk, I review recent evidence from behavioural and brain imaging studies that provides deeper insights into human social cognition and brain function by using social robots as research tools. Specifically, my team examines how prolonged physical and social interactions with robots shape how we perceive and interact with these agents, and the extent to which we might be able to build social relationships with these machines and perceive them as truly social agents. Through presenting work comparing social perception of humans compared to robots, I aim to highlight the importance of examining how perception of and interaction with artificial agents in a social world can reveal fundamental insights about human social cognition.

Keynote Speaker: Sport and Exercise Psychology

Pleasures of suffering

Paul Bloom, University of Toronto and Yale University

Many psychologists and philosophers believe that people are hedonists, seeking pleasure and avoiding pain. But what about our appetites for spicy foods, hot baths, horror movies, sad songs, BDSM, and hate reading? How can we explain our choices to suffer—in pursuits such as art, ritual, sex, and sports, and in longer-term projects such as training for a marathon or signing up to go to war? Drawing on research from developmental psychology, social psychology, anthropology, and behavioral economics, I suggest that we are driven by non-hedonistic goals; we revel in difficult practice, we aspire towards moral goodness, and we seek out meaningful lives.

Senior Lecturers

Motor Development

The evolution of an author and a textbook over an academic life

Kathleen M. Haywood, University of Missouri – St. Louis

Writing and revising the 7+ editions of *Life Span Motor Development (LSMD)* has nearly spanned my academic life (no pun intended). When I originally planned this textbook, I set about writing the first text that placed motor development into a life span context. I emphasized broad concepts as much as facts, figures, and research findings and provided coordinated hands-on experiences for students in the form of a laboratory manual. At the time my only intention was to write a book but as it turned out six more editions (with the 8th edition currently in preparation) were published. The evolution of *LSMD* over 37+ years affords an opportunity to observe change in multiple aspects of textbook writing. Among those aspects I discuss in this presentation are changes in the content of the motor development discipline, theoretical perspectives of motor development, research methodology, accessibility of research to book authors, how authors work, the physical nature of books and the coming of e-books, how authors engage students in the content, and how authors service course instructors. One challenge to textbook authors today is maintaining the balance between inclusion of readily available new research and continuing to tell a story of interest to readers. Another is to think not just about writing a textbook, but rather about providing a package of instructional materials. *LSMD* is no longer just the book. Rather, it has evolved into an elaborate project consisting of book, online student activities including video content, and an instructor manual. My hope for the future is to make the transition between words and observations seamless. Throughout the evolution and expansion of *LSMD* and over my career one thing has remained – the desire to bring the motor development discipline to students in a way they find engaging, informative, and useful on a personal and professional level, that is, igniting excitement about the content.

Motor Learning and Control

The power of simplicity – How to choose and act

Markus Raab, German Sport University Cologne, London South Bank University

The question of how humans are capable of making fast decisions on what to do and how to do it fascinates researchers. Historically, motor learning/motor control theories focus on explaining how to produce movements and cognitive psychology theories focus on explaining how to choose between acts seemed to be a good strategy in research. However, in recent years this has been claimed to limit our understanding of behavior that often requires us to choose and act simultaneously under limited time and in changing environments. Here I will introduce the concept of simple heuristics that are rules of thumb to explain how in parallel we are able to make embodied choices when the body plays a pivotal role for the behavior. From a psychophysiological perspective it is often believed that the complexity of the system and the dynamic/probabilistic behavior in ever-changing environments requires a complex answer. I rather try to elaborate on fast and frugal heuristics and thus a simple explanation that advocates the power of simplicity for motor control/learning and cognitive adaptations, sometimes coined as *homo heuristicus*. Evidence for the validity of this paradigmatic change will be provided by others and our own research programs that encompass examples from simple millisecond behavior to complex sport performance behavior over time. The research agenda will focus on how experiences in interdisciplinary teams can foster new insights and how my own encounters with NASPSPA research merged with my European research. I will conclude with a proposal how research programs, designs of studies, and the use of methods could be altered. The power of simplicity may assist us towards new insights and more societal relevance.

Sport and Exercise Psychology

The most important small group variable? Repositioning cohesion in sport and exercise psychology

Mark Eys, Wilfrid Laurier University

Cohesion is a group concept of great interest to researchers and practitioners across contexts (e.g., sport, military, work organizations), and is positively related to team performance and the adherence patterns of athletes and exercisers. The study of cohesion within physical activity settings has been heavily influenced by the contributions of Carron, Widmeyer, and Brawley (1985). They developed a conceptual model and assessment tool for cohesion (i.e., Group Environment Questionnaire) that are widely accepted in our field and have instigated a robust body of literature. As a personal reflection, many of my own communications to NASPSPA and within the *Journal of Sport & Exercise Psychology* have integrated cohesion as a primary or secondary variable to address descriptive and explanatory questions as well as measurement issues. However, approaching 40 years on from Carron et al.'s (1985) influential publication, challenges persist within and external to the field of sport and exercise psychology regarding the foundations of our understanding of cohesion including its definition, conceptual framework, measurement, and correlates. In short, we need to critically assess the degree to which we are currently positioned to understand what is often referred to as the most important small group variable. In this presentation, I will highlight the prominence of cohesion both as a topic of investigation but also in terms of its impact with respect to my own experiences as a researcher (who greatly enjoys and benefits from working in teams) in sport

and exercise psychology. Furthermore, I will describe definitional and conceptual challenges of this emergent state with consideration to literature in other fields. Finally, I will attempt to position cohesion within the study of group dynamics in conjunction with other important concepts receiving research attention in recent years and describe ongoing and future research directions. Significant applied and theoretical interest remains in understanding cohesion in both sport and exercise contexts since chemistry/unity is often viewed as an influential but elusive aspect of group dynamics.

Early Career Distinguished Scholar Award

Quality fosters quantity: Reflections from an early-career journey that has come full circle

Jennifer R. Tomasone, Queen's University

My career journey began when I worked as the coordinator for a community-based exercise program for persons with disabilities. The practical experience of offering a program that provided a positive experience for members motivated me to pursue a PhD in the field of exercise psychology. My first academic conference presentation was at NASPSPA 2011 which focused on enhancing quantity of exercise participation; that is, how much, how long, and how intensely one engages. However, to optimize full and effective participation, we must move beyond quantity to also consider quality participation - one's positive subjective experiences while participating. In this talk, I will share my reflections on building a collaborative early career research program that aims to optimize full and effective physical activity participation for persons of all abilities. I will highlight how quality participation has been operationalized to consist of six key building blocks: autonomy (i.e., having independence, choice, control), belongingness (i.e., experiencing a sense of belonging to a group, acceptance/respect from others), challenge (i.e., feeling appropriately challenged), engagement (i.e., being in the moment, focused, absorbed), mastery (i.e., experiencing achievement, competence, a sense of accomplishment, self-efficacy), and meaning (i.e., contributing toward obtaining a personal or socially meaningful goal, feeling a sense of responsibility to others). I will highlight findings from my early career research program, which has examined the relationship between quality and quantity of participation in exercise and how findings have been translated to impact real-world community-based exercise programs for persons with disabilities, including one I used to coordinate. Throughout the talk, I will share lessons learned and stories from pivotal moments in my career, as well describe how mentors, colleagues, and trainees influenced my early career journey which has come full circle.

The NASPSPA Outstanding Student Paper Award Recipients

Motor Development

"The club just kind of helps me reach goals I wouldn't otherwise get to" – Exploring the lived experiences of people in adapted sports programming

Darice Brooks, Michigan State University; Dr. Janet Hauck, Michigan State University

Adapted sports and recreation programs are one environment that allows people with disabilities to be active and create a social community that is uplifting and motivating. Current research highlights adapted opportunities but rarely includes the perspectives of those who participate in adaptive sports and recreation programs and the effects these programs may have on their quality of life. Michigan State University is home to an adapted sports and recreation club for students, faculty, members of the community, and alumni to have the ability to participate in physical activity. To understand lived experiences and perspectives of others interpretative phenomenological analysis, a qualitative approach can be done. The purpose of this study was to understand the lived experiences of those who participate in the Michigan State University Adapted Sports and Recreation club (MSU-ASRC) a well-established adapted sports program in the Lansing Michigan area. Thirteen athletes (female = 5, $M_{age} = 33.5$) from the MSU-ASRC participated in semi-structured interviews consisting of nine questions related to their experience in the program, their current and prior sport experience, and their likes and dislikes of the program. Transcription of the interviews was completed by four research team members who re-listened to the interviews and corrected the Zoom transcripts. Analysis of themes was done by all research team members (five), each researcher reviewing and coding/theming content on their own, then coming together to create major connections. Many participants expressed that participating in the sport practices gave them a sense of belonging, increased their time spent doing physical activity, and increased their interpersonal wellness. While some common barriers included lack of organization, visibility of the club, and accessibility to sport practices. Understanding the lived experiences of those participating in adapted sport programming may help future programs understand what works and what does not work and how to increase involvement in program activities.

Motor Learning and Control

Ankle position sense acuity does not decline in physically active older adults

Jacquelyn Sertic, University of Minnesota; Jürgen Konczak, University of Minnesota

Ankle proprioception is essential for balance control. However, ankle proprioception can decline in older adulthood and has been linked to a higher incidence of falls. This study examined whether physically active older adults are spared from such proprioceptive decline. Using the Ankle Proprioceptive Acuity System (APAS) and applying an adaptive psychophysical testing paradigm, ankle position sense acuity in 57 neurotypical older adults (M age: 64.9 years, range: 50-80 years) and 14 young adults (range: 18-30 years) was assessed. A participants' unloaded foot was passively rotated from a neutral joint position to a reference (15 or 25 deg plantarflexion) and a comparison position (always less than the reference). Participants had to verbally indicate which position was further away from neutral. Appropriate stimulus-response functions were fitted and a just-noticeable-difference (JND) threshold and uncertainty area (UA) were derived for each participant. JND threshold is a measure of bias, while UA is a measure of precision. The main findings of the study are: first, between the ages of 50-80 years, no significant difference in JND threshold or UA were found. Median JND threshold for older adults was 1.6° (range 0.3-4.2°) and 1.8° (range 0.7-4.1°) for reference positions 15° and 25°, respectively. Median JND threshold for younger adults was 1.3° (range 0.6-3.0°) and 1.8° (range

0.7-4.1°) at 15° and 25° references, respectively. Second, median JND threshold was significantly smaller at the 15° reference relative to 25° for younger adults. This difference was not seen in older adults, nor for UA. These data indicate that active older adults may be spared from age-related decline in ankle position sense. However, older adults may demonstrate decreased sensitivity to differences in reference positions, which may be due to smaller ranges of motion in older adulthood. These findings may encourage older adults to become or remain active during aging.

Sport and Exercise Psychology

Initial validity evidence for modifying the Interpersonal Behaviors Questionnaire in Sport for youth: A mixed-methods explanatory sequential design

Meredith Wekesser, Michigan State University; Karl Erickson, York University; Andre Bateman, University of the West Indies, Mona; Jody Langdon, Georgia Southern University; Nicholas Myers, Michigan State University

The Interpersonal Behaviors Questionnaire (IBQ) in Sport assesses athlete perceptions of coach interpersonal behaviors that support or thwart athletes' basic psychological needs. While different sources of validity evidence (e.g., internal structure, relations to other variables) for responses to the IBQ have been provided for adults, only validity evidence for relations to other variables has been provided with youth. Moreover, potential problems with internal structure for youths' responses to the IBQ have recently been noted in the literature and motivated the current study. Specifically, a two-phase explanatory sequential design was employed in the current study to provide initial validity evidence for modification of the IBQ in sport for youth. In Phase I, the internal structure for youth athletes' responses to the IBQ was empirically examined using a sample of 148 youth athletes. The power estimation for model-data fit equaled .99. In Phase 2, cognitive think-aloud interviews were conducted with 14 youth athletes to identify and then modify problematic IBQ items to create the Youth Interpersonal Behaviors Questionnaire in Sport (Y-IBQ). Phase I results showed lower inter-item reliability for youth athletes on the IBQ thwarting subscales, while latent construct reliability was high. The CFA produced lower factor loadings compared to the original validation study and indicated poor model-data fit. Phase II results showed participants initially had problems with many survey items due to complex wording, item ambiguity, and double negatives. For example, the phrasing "My coach is distant..." was ambiguous because participants considered physical rather than emotional distance. After three revision rounds, participants demonstrated improved item comprehension and fewer response errors. This paper provides preliminary evidence for use of the Y-IBQ to assess youth athletes' perceptions of coach interpersonal behaviors that support or thwart basic psychological needs. Future testing of the psychometric properties of the Y-IBQ with youth athletes is recommended.

Symposia

Multidisciplinary Symposium

Sport-based positive youth development: Research, practice, and future directions

Sport-based positive youth development: Research, practice, and future directions

Dawn Anderson-Butcher, The Ohio State University

Youth sport and sport-based positive youth development (SBPYD) programs are important social settings that contribute to the healthy development of young people in the United States and globally. LiFEsports at The Ohio State University is a nationally recognized model that prepares youth (especially those from socially vulnerable circumstances) for leadership and life through sport. Over 800 youth of color and/or living in poverty are served each year in LiFEsports summer camps and clinics. These programs also serve as laboratories for innovation, providing a context to support teaching and learning among Ohio State students and for research on best practices in SBPYD programming. During this symposium, an overview of the LiFEsports model will be provided, describing specifically the program components found through research to contribute to the development of social and sport competencies and related healthy lifestyle behaviors. Upon summarizing past research, gaps, and next steps for inquiry, new research conducted on the LiFEsports model will be shared, including preliminary findings from a randomized control trial started in the summer of 2022 and a recent qualitative study exploring program mechanisms and outcomes from the perspectives of young adults who participated in LiFEsports as children and parents/caregivers. Last, a national expert in life skill development and transfer will serve as a discussant and facilitate a Q&A session with participants in relation to future directions in the field.

An overview of LiFEsports: An exemplar sport-based positive youth development program

Dawn Anderson-Butcher, The Ohio State University; Anthony Amorose, Illinois State University

Innovative interventions, programs, and implementation strategies that focus on learning social and emotional skills during out-of-school time (OST) are growing priorities in schools, after-school programs, and communities (Durlak et al., 2011; Matula, 2004). This presentation aims to overview findings associated with an exemplar sport-based positive youth development (SBPYD) program: LiFEsports at The Ohio State University. LiFEsports is a nationally recognized SBPYD program that uses sport to teach four key social skills: self-control, effort, teamwork, and social responsibility (SETS). LiFEsports serves over 800 youth each year in different social settings, including schools, afterschool programs, and through our trademark four-week summer camp. Over the last 15 years, scholars have uncovered key curricular mechanisms that promote social-emotional learning during OST (Anderson-Butcher et al., 2021) and essential design components that contribute to broader health and well-being outcomes for youth participants (Anderson-Butcher et al., 2014). Furthermore, several studies document mediators and moderators that further our understanding of for whom, under what conditions, and

where LiFEsports is most effective. This presentation will share lessons learned related to implementing LiFEsports, review curricular mechanisms and design components that promote life skill development through sport, and present new mixed methods research associated with long-term participation in this program.

Advancements in sport-based positive youth development research: Measurement and design

Samantha Bates, The Ohio State University; Obidiah Atkinson, The Ohio State University; Dimetri Brandon, The Ohio State University; Jackie Goodway, The Ohio State University

Sport-based positive youth development (SBPYD) programs are key social settings that can promote healthy development among youth participants. However, studies examining outcomes associated with SBPYD are largely cross-sectional, retrospective, and rarely utilize comparison groups (Bruner et al., 2021). The current study examined outcomes associated with a 4-week SBPYD using a randomized two-treatment two-period crossover design. In total, 120 youth participants were assigned to one of two conditions – intervention session 1 or intervention session 2. Notably, intervention session 2 served as the control group when exploring the experimental effects of the SBPYD program on youths' social and physical health outcomes. Baseline, pre-, and post-intervention measures included indicators such as the Test of Gross Motor Development (TGMD-3; Webster et al., 2017), the Social Skills Improvement Scale (SSIS; Gresham & Elliott, 1990), and a measure of youths' perceived sport-specific abilities (Sport Specific Ability; Amorose, 2022). Results demonstrate how youth participating in intervention session 1 demonstrated significant and positive growth in their parent-reported social skills ($p < 0.05$) as compared to those in the control group. Furthermore, youth who scored in the 10th percentile on the TGMD-3 at pre-test moved into the 50th percentile for their gender and age after participating in the SBPYD program. Improvements also were captured on measures assessing youths' perceived sport-specific abilities across eight sport domains. Study findings contribute to an important discussion on measurement and design approaches that advance our understanding of the impacts of SBPYD programs.

Life skills transfer: Looking back on experiences in a sport-based positive youth development program

Travis Scheadler, The Ohio State University; Sydney Mack, The Ohio State University

Sport-based positive youth development (SBPYD) programs often focus on social and life skill development and transfer. Research continues to demonstrate the value of these settings for promoting positive youth outcomes during and in the year following program participation (Newman et al., 2020). Most of the research, however, has not retrospectively explored life skill transfer and application from the perspectives of young adults who participated in SBPYD programming nor the perspectives of parents/caregivers of young adults who were involved over five years ago. Understanding stakeholder perspectives several years post-participation can shed further light on the long-term value of SBPYD programs, as well as distill further the

factors which facilitate and hinder the long-term application of skills in adulthood. To address this gap, researchers interviewed youth and families formerly involved in a SBPYD program. Fourteen young adults and 19 parents/caregivers of former participants participated in the study. Thematic analyses were used to explore how life skills learned continued to be used in different settings, such as at work, during personal health behavior practices, and at school, more than five years post-program participation. Several facilitators of transfer were noted by past participants and parents/caregivers, including factors such as peer, staff, and family support, involvement in other PYD contexts allowing for practice, and program characteristics such as quality instruction, high expectations, and accountability structures. The importance of dosage and continued involvement during later adolescence also was stressed by both groups. As both young adults and parents/caregivers look back at past experiences, findings suggest life skill application and transfer continue to occur during the late adolescent and the young adult years. As such, we argue that continued opportunities and reinforcers in late adolescence are important facilitators of long-term skill development and serve as protective factors as youth progress toward adulthood.

Sport and Exercise Psychology Symposia I thought there were 3??? Not clear when title of new one starts? Maybe put title of symposia in ALL caps and leave abstracts in abstract format?

Affective responses to physical activity and implications for future physical activity engagement

Affective responses to physical activity and implications for future physical activity engagement

Jaclyn Maher, University of North Carolina Greensboro

Despite the well-documented benefits of regular physical activity engagement, many adults do not meet recommended levels of physical activity. Over recent years there has been an emphasis to move beyond social cognitive approaches to understanding physical activity due to their modest explanatory power and explore affective experiences during physical activity as a determinant of future physical activity engagement. The exercise-affect-adherence pathway posits that engagement in physical activity elicits affective responses and that affective responses during a bout of physical activity predict future physical activity participation. Yet, questions remain regarding associations between physical activity and affect. For instance, it is unclear how motivational factors impact affective responses to physical activity. Further, there is limited work exploring how affective responses to physical activity predict subsequent immediate and long-term engagement in physical activity. This symposium is designed to investigate these critical research questions and elucidate aspects of the exercise adherence pathway. The first presentation will use data from a laboratory-based experiment to determine the psychological influence of autonomy on affective responses during self-selected and imposed exercise of equal intensities. The second presentation will use longitudinal data to determine how affective exercise experiences predict moderate- to vigorous-intensity physical

activity 6 and 12 months later. The third presentation will use data from an event-contingent ecological momentary assessment protocol to investigate relations between acute affective responses to physical activity and same day and next day moderate- to vigorous- intensity physical activity. Taken together, these presentations will advance our understanding of relations between physical activity and affect. The discussant will address the specific contributions of these presentations, implications of affective responses for physical activity promotion, and opportunities for future research.

Affective responses to self-selected adjustments of exercise intensities: Disentangling the psychological and physiological etiologies

Constanin Späth, University of Potsdam; Sinika Timme, University of Potsdam; Ralf Brand, University of Potsdam

According to dual-mode theory, at heavy exercise intensities, affective responses are determined by an interaction of interoceptive cue stimuli and cognitive appraisals. There is evidence that self-selected exercise intensity is associated with more positive affect than predetermined exercise intensities. Yet, it is unclear whether this finding is primarily due to the typically lower intensity of self-selected exercise, or whether a cognitive appraisal of exercise intensity as (more or less) self-determined also plays a role. We collected data from 78 participants (M age = 22.76 ± 2.69 , 49% female). Each participant completed two incremental exercise protocols (sessions) on a cycle ergometer. The first session started at an intensity of 25 W followed by increases of 25 W every three minutes. In the “self-selected intensity” condition, participants had the opportunity to adjust their exercise intensity by 10 W (up or down) for the last two minutes at each stage of the protocol. One minute after these self-selected adjustments, affective valence was assessed with the Feeling Scale. One week later, participants completed their “imposed exercise intensity” condition. This time, participants were told that they would follow an intensity protocol selected by the investigator; however, this was identical to the self-selected protocol created in the first session. Preliminary results from linear mixed effects modeling revealed that affective valence was on average -0.62 points more negative ($b = -0.62$, 95% CI [-0.99, -0.25], $SE = 0.188$; $p < .001$) in the imposed exercise intensity condition. Findings suggest that more pleasant feelings during self-selected heavy exercise intensity are due to the indeed psychological appraisal of this activity as (at least partly) self-determined. We consider this study to be a methodological improvement of previous research on the role of self-determination and its potential to modulate individuals’ affective responses to heavy exercise intensity.

Physical activity affective experiences are associated with step counts in older adults

Jaclyn Maher, University of North Carolina Greensboro; Kelsey Bittel, Eastern University; Derek Hevel, Boston University; Brynn Hudgins, University of North Carolina Greensboro

One’s affective experiences during physical activity (PA) have implications for future PA engagement. Recently, the Affective Exercise Experiences (AFFEXX) Questionnaire was

developed to capture the pleasant or unpleasant valence associated with PA based on accumulated experiences in which PA resulted in either pleasure or displeasure. To date, no study has evaluated the extent to which affective experiences captured by the AFFEXX questionnaire predict older adults' PA. This study was designed to examine cross-sectional and longitudinal associations between affective experiences during PA and device-based PA behavior in older adults. Older adults enrolled in a longitudinal study ($N = 174$; 62% female; M age = 70.4 years; M BMI = 26.4), completed the attraction-antipathy subscale of the AFFEXX at the 6-month assessment to assess affective PA experiences. Participants wore an accelerometer for 14 days at the time of the 6- and 12-month assessments. PA was operationalized as (a) average daily minutes of moderate to vigorous intensity PA and (b) average daily steps. PA variables were log-transformed. Two sets of regression models were tested. One set of linear regression models regressed PA at the 6-month assessment, and another set regressed PA at the 12-month assessment on affective PA experiences at the 6-month assessment. All models controlled for intentions, self-efficacy, age, and BMI. Affective PA experiences were positively associated with average daily steps such that individuals with greater attraction to PA tended to engage in more steps (6-month: $B = 0.16$, $p = 0.04$; 12-month: $B = 0.17$, $p = 0.03$). However, PA attraction-antipathy was not related to moderate to vigorous intensity PA (6-month: $B = 0.07$, $p = 0.39$; 12-month: $B = 0.11$, $p = 0.22$). In a sample of older adults, the AFFEXX questionnaire accounted for variance in step counts, but not moderate to vigorous intensity PA, beyond demographic and social cognitive factors in cross-sectional and longitudinal analyses. Modifying older adults' affective PA experiences may be a useful strategy for PA promotion.

Affective responses during physical activity predicting same day and next day physical activity: An ecological momentary assessment study

Derek Hevel, Boston University; Jaclyn Maher, University of North Carolina Greensboro

Many emerging adults (i.e., aged 18-29) do not engage in the recommended amounts despite its health benefits. In line with hedonic theories and previous laboratory-based studies, more pleasurable affective responses during physical activity predicts future engagement. However, the lack of clarity in the relation in real-world settings and across micro-timescales (e.g., days) precludes the utility of affect for physical activity promotion. The purpose of the current study was to examine how affective responses during physical activity captured in real-time and real-world settings via event-contingent ecological momentary assessment (EMA) predicted same day and next day physical activity. During a 10-day study, participants wore an accelerometer which captured physical activity and triggered EMA prompts during physical activity to capture affect (e.g., positive, negative). Additional EMA prompts captured affect during non-physical activity. Emerging adults ($N = 80$; M age = 22.8; M BMI = 25.38; 56% White, 79% female) completed the study. At the between-person level, positive affect ($b = 0.009$, $SE = 0.006$, $p = 0.012$) and negative affect ($b = 0.010$, $SE = 0.007$, $p = 0.005$) responses during physical activity were positively associated with same day physical activity. Further, negative affect ($b = 0.025$, $SE = 0.011$, $p = 0.023$) responses during physical activity were positively associated, and energy ($b = -0.016$, $SE = 0.008$, $p = 0.036$) responses during physical activity were negatively associated,

with next day physical activity. At the within-person level, energy ($b = 0.009$, $SE = 0.004$, $p = 0.041$) responses during physical activity were positively associated, and fatigue ($b = -0.025$, $SE = 0.008$, $p = 0.002$) responses during physical activity were negatively associated, with same day physical activity. Altogether, there is somewhat inconsistent evidence that affective responses during physical activity can predict same and next day physical activity. Future work should examine the affect-physical activity link among those who are insufficiently physically active and across person-specific micro-timescales.

Effective global coaching practices for creating positive athlete interactions and success

Effective global coaching practices for creating positive athlete interactions and success

Gordon Bloom, McGill University

Over the past 50 years, researchers have found that coaching behaviours influence athletes' self-perceptions, adherence to sport, and psychosocial development. Experts have shown that athlete development can be enhanced through appropriate training patterns and positive social interactions with coaches. For examples, coaches are increasingly called upon to create environments that foster positive developmental outcomes in their athletes. For example, Vella et al. (2010) postulated that effective coach leadership is more than a behavioural process but involves complex social interactions, such as interpersonal relationships that incorporate positive connections, influences, and exchanges. Given the importance of interpersonal interactions in sport, this symposium provides global perspectives about effective coaching practices used to create a positive sporting environment. Each presenter will summarize evidence-based research from around the globe that adopted various theoretical and methodological approaches to better understand factors surrounding an optimal athlete training environment. Presentation one will introduce the foundation of a sport-specific framework called transformational coaching, and how it is derived from the full-range leadership model to capture coaches' interpersonal behaviours and their influence on athletes' outcomes. Presentation two will present a model of how sport-based social-emotional growth and life skills development occur, with emphasis on the role of the coach in influencing athlete development. Presentation three focuses on parasport coaches from North America and Europe and how they created exceptional training environments that led their national teams to success. Presentation four will present research on many of the world's most successful coaches focusing on serial winning coaches' ability to strive, survive, and thrive in the elite sport context. We believe our studies collectively contribute to fostering high-quality experiences for athletes and coaches in diverse sport contexts across different countries around the globe.

Enhancing the quality of coach-athlete interactions with transformational coaching behaviours

Jean Côté, Queen's University; Jennifer Turnnidge, Queen's University

The past two decades have seen an emergence of literature supporting the idea that effective coaching is about developing better athletes and people. To achieve this critical goal, behavioural frameworks are needed to help coaches foster high-quality interpersonal relationships through their interactions with athletes. This presentation focuses on the principles of transformational coaching and how these principles can be practically implemented in real-world sport settings. Recent research suggests that transformational coaching can be conceptualized using 11 distinct coaching behaviours and can be observed systematically with the Coach Leadership Assessment System (CLAS; Côté & Turnnidge, 2019). First, we will provide an overview of the 11 transformational coaching behaviours and how they were developed through literature reviews, interviews with coaches, and observation. Secondly, we will elaborate on how transformational coaching behaviours can be measured with the CLAS for research purposes and to help coaches foster athletes' positive developmental experiences. Finally, we will offer practical strategies for incorporating transformational coaching and an applied version of the CLAS into everyday coach-athlete interactions and mainstream sport programs.

Coaching social-emotional skills

Daniel Gould, Michigan State University; Scott Pierce, Illinois State University; Emily Wright, Miami University

Research has shown that coaches have a powerful impact on athletes' social-emotional and life skills development decades after they have participated. While athletes learn life skills implicitly from participating in sport, experts have shown significant interest in understanding how to explicitly coach and foster life skills. In this presentation, a model of socioemotional and life skill sport-based learning and development will be presented. Understanding this model has numerous implications for coaching life skills. A central feature is to move beyond the limited notion of life "skills" and consider the broad spectrum of psychological concepts that make up social-emotional or life skills development, including micro skills (e.g., ability to set specific goals), macro skills (e.g., how to communicate to a group), dispositions (e.g., development of an achievement orientation), attitudes and values (e.g., showing empathy to an opponent), worldviews (e.g., meaning of sport), and existential learning and transformation (e.g., what it is like to live as an elite athlete). With this in mind, coaches play a critical role influencing athlete development. First, athletes enter sport with a number of social-emotional assets established at home, with coaches not only teaching and establishing new skills and dispositions, but reinforcing and expanding existing ones. Second, the coach-athlete relationship is a major factor influencing athlete life skills development. Third, athletes learn life skills in an athletic environment created or reinforced by a number of athletic stakeholders (e.g., administrators, parents) with coaches having a particularly powerful influence. Coaches influence life skills by defining them, talking about them, directly teaching them, modeling them, providing experiential learning opportunities, and recognizing teachable moments where athletes can apply their life skills. Finally, promoting reflection on the part of their athletes and teaching near (e.g., from sport to sport) and far (e.g., from sport to the classroom) transfer is also essential.

Effectively managing Paralympic teams: Understanding the role of the head coach in facilitating effective team environments

Gordon Bloom, McGill University; Danielle Alexander, McGill University; Marte Bentzen, Norwegian School of Sport Sciences; Göran Kenttä, The Swedish School of Sport and Health Sciences

In high-performance sport, head coaches are typically responsible for facilitating a supportive, safe, and challenging team environment for athletes and staff to succeed. In parasport, there are several individual and contextual considerations that must be considered when facilitating a positive or successful team environment, such as funding, classification, functional ability, and access to integrated support staff. To date, little information is known about how high-performance parasport coaches manage their team environments. This international study explored the role of the head coach in managing three national parasport teams from North America and Europe. Across the teams, three individual interviews with head coaches were conducted and analyzed using a reflexive thematic analysis. Among the results, coaches were responsible for managing a diverse athlete population with varying demographic and situational considerations, such as age, finances, gender, and disability. Coaches were deliberate about recruiting and managing staff members who aligned with team values and were engaged with the athletes in the daily training environment. All coaches discussed times when there was not a cohesive environment and identified coaching strategies for resolving challenges, such as utilizing assistant coaches and mental performance consultants. This study is a first step in promoting international collaboration within parasport research. Together, this study offered a rich understanding of high-performance parasport team dynamics from three countries around the world.

Serial winning coaches: Striving, surviving, and thriving

Clifford Mallett, University of Queensland; Sergio Lara-Bercial, Leeds Beckett University

Coach developers in many nations are continually seeking the holy grail in identifying, recruiting, and developing winning coaches on the “big stage.” Of course, there is no holy grail or single success profile. Nevertheless, what can we learn from those who have repeatedly experienced success on the biggest stages in the world in Olympic and professional leagues and in different contexts? Who are these serial winning coaches (SWC)? What drives them? How did they learn to survive long enough to thrive in the highly contested environment of elite sport? In this presentation, we present an understanding of the personal strivings of these SWC and why they are so invested in their coaching. We then focus on how they create stable and predictable environments that enable all social actors (including self) to thrive in these stressful settings. Indeed, we provide insights into their “art” of coaching from a psycho-social perspective that successfully contributes to superior performance and well-being of their athletes and teams.

Collegiate student-athlete health and well-being during transition from sport

Overview of current research, frameworks, and directions for promoting student-athlete health & well-being during the transition from collegiate sport

Yeongjun Seo, The University of North Carolina at Greensboro; Erin Reifsteck, The University of North Carolina at Greensboro; J.D. DeFreese, The University of North Carolina at Chapel Hill; DeAnne Davis Brooks, The University of North Carolina at Greensboro; Ling Beisecker, The University of North Carolina at Chapel Hill; Neel Rao, Datalys Center for Sports Injury Research and Prevention; Avinash Chandran, Datalys Center for Sports Injury Research and Prevention

The end of a collegiate athletic career represents a vulnerable life transition for many student-athletes. During this retirement from competitive sport, student-athletes can face a myriad of physical and mental health concerns. This introductory presentation to the symposium will (a) summarize relevant literature including a brief overview of fundamental frameworks, (b) discuss research on the impact of sport career transitions on student-athlete well-being, and (c) highlight emerging directions for future work. First, we underscore how athlete transition frameworks point to a phase-like transition process rather than an acute event model, with individual experiences factoring into the perceived adjustment of athletic transition. Second, we focus on previous research specific to the collegiate student-athlete population, including how factors such as self-perceptions, transition expectations, advanced planning, social support, and access to resources influence the overall quality of the student-athlete transition experience. We also address how these factors can have negative downstream effects on relevant health and wellness outcomes to provide a basis for understanding student-athletes' holistic well-being during and after the transition from sport. Limitations will be presented (i.e., lack of sport career transition model contextualized to student-athlete experiences) along with opportunities to address theoretical and empirical deficits to better understand former student-athletes' physical and mental health (e.g., longitudinal, mixed method approaches). Finally, we propose potential directions for adopting a nuanced, multidimensional, and integrated approach for exploring interconnected transition domains. Following this overview, symposium attendees will have a clearer understanding of the current status of the research on this topic and the implications for development and implementation of theory-informed, evidence-based strategies to promote transitioning student-athletes' holistic health and well-being.

Mental health, pre-transition planning, and facilitators/barriers to mental healthcare among collegiate student-athletes during transition from sport

Ling Beisecker, The University of North Carolina at Chapel Hill; Marzia Josephson, University of Kentucky; Avinash Chandran, Datalys Center for Sports Injury Research and Prevention; J.D. DeFreese, The University of North Carolina at Chapel Hill

University-provided mental healthcare services for collegiate student-athletes (SAs) are often discontinued as SAs transition out of sport. The loss of resources, stress of transitioning out of sport, and uncertainty in navigating SA mental healthcare needs (often for the first time) can lead to increases in anxiety and depression. There is a critical gap in knowledge on how to

support SAs mental healthcare during this transition to mitigate anxiety and depression. Thus, this cross-sectional mixed methods survey-based study examined how SAs transitioning out of sport currently and prospectively (after the current season) (a) self-reported anxiety and depression associated with protective factors (e.g., pre-transition planning) and (b) perceived facilitators and barriers to mental healthcare access. Among participants ($N = 117$, 65.2% women's sports SAs), 58.3% had a pre-transition mental healthcare plan, 39.7% reported anxiety symptoms, 14% reported depression symptoms, and 13.2% reported comorbid anxiety and depression. Analysis revealed women's sport SAs were more likely to have a pre-transition mental healthcare plan ($X^2(1, 114) = 4.203, p = .04$), depression symptoms ($X^2(1, 113) = 6.925, p = .008$), and comorbid anxiety and depression symptoms ($X^2(1, 113) = 7.370, p = .025$) than men's sport SAs. Results suggest that despite women's sport SAs planning more for their mental healthcare as they transition out of sport, they are at increased risk for depression and comorbid anxiety and depression. Qualitative thematic analysis illuminated leading facilitators to mental healthcare during transition from sport were access to mental health providers ($n = 32$) and social support ($n = 32$). Leading barriers were self-responsibility ($n = 28$), mental health provider/resource issues ($n = 26$), and cost ($n = 25$). These novel findings among SAs during transition from sport warrant further investigation on women's sport SAs unique mental healthcare needs as well as how to (a) best connect SAs with mental health providers, (b) maintain social support for SAs post-transition, and (c) reduce mental healthcare costs.

"Athletes speak": A qualitative study of collegiate student-athletes' transitions from sport

Peyton Greco, The University of North Carolina at Greensboro; Jeffrey Ives, Ithaca College; Greg Shelley, Ithaca College

Thousands of collegiate student-athletes transition from sport each year, and only a small percentage compete professionally. The transition from sport is inevitable for most, and for some, difficulties arise. There are a few inconsistent programs in place to combat these difficulties, contributing to gaps in the existing literature on this topic. This investigation examined the phenomenological experiences of former Division III student-athletes ($N = 5$) who transitioned from sport. Two research questions (RQ) were explored through participant interviews: What are the lived experiences of student-athletes as they transition out of sport? In what ways can college athletic personnel better support student-athletes as they transition out of sport? Following qualitative analyses, five themes emerged for RQ one: (a) quality, timing, and helpfulness of available resources, (b) presence of social support, (c) changes in identity, lifestyle, and culture associated with transition, (d) attempting to remain connected to sport, and (e) recognizing opportunities that exist outside of sport. Three themes emerged for RQ two: (a) providing resources for the unique needs of student-athletes, (b) helping student-athletes identify their responsibilities during transition out of sport, and (c) understanding the uniqueness of the transition process. Although this study included a small, homogeneous sample, findings are useful in helping college athletic personnel better understand what and how to provide resources for student-athletes transitioning from sport. While these participants transitioned from sport at different times for variable reasons, findings from this study suggest resources would be helpful for all student-athletes as they navigate the changes

in identity, lifestyle, and culture associated with transition from sport. Future research will further investigate existing transition programs. Unique considerations for delivering effective programming to navigate transition from sport post-COVID-19 will also be studied as we continue to adjust to life post-pandemic.

Pilates training for final-year collegiate student-athletes: A practical opportunity to support lifetime physical activity and exercise

Melinda Smith, Messiah University

Transitioning student-athletes (SAs) face unique barriers for engaging in regular exercise beyond the formal training and competition that defined their collegiate athletic experiences. Years of training for a specific sport may leave former SAs without a foundation for sustainable lifetime physical activity (PA) and exercise options. Many SAs, coaches, and athletic administrators recognize the value of practical preparation for this transition. However, implementing programming within the full academic and athletic schedules of final-year SAs is challenging. Using self-determination theory as a framework, a six-session Pilates program was developed and implemented to provide PA and exercise transition support for final-year SAs at a NCAA Division III institution. The program was designed with the proposed link between lifetime PA and intentional exposure to a new form of exercise, peer support, and effective transition preparation. SAs completed progressive Pilates training with structured opportunities for peer discussion on the transition beyond collegiate athletics. To examine the feasibility of implementing classes like Pilates to provide practical support for SAs in the transition to lifetime activity, SAs ($N = 21$) participated in, and formally evaluated, the program. With an overall adherence rate above 90%, SAs reported that the program helped them build competence in a new form of exercise beyond competitive sport that could be continued in the future. SAs valued participation and discussion with peers as it bridged a topic that had previously felt taboo. SAs noted that an even longer program would be beneficial for Pilates progression and relatedness with peers. Additional work is needed to expand collaboration between sport and exercise psychology professionals, coaches, and athletic administrators to provide sustainable PA and exercise transition support for final-year SAs. Strategies should include eliciting ongoing feedback, integrating programming within established team experiences, and sustaining transition support throughout the year.

What next? An interactive dialogue on how to support collegiate student-athletes' health & well-being during their transition from sport

J.D. DeFreese, The University of North Carolina at Chapel Hill; Kevin Carneiro, The University of North Carolina at Chapel Hill; DeAnne Davis Brooks, The University of North Carolina at Greensboro; Erin Reifsteck, The University of North Carolina at Greensboro

This symposium reflects work conducted by a multi-institutional and collaborative group of researchers and clinicians interested in the myriad of physical and mental health concerns facing collegiate student-athletes during their transition from sport. This concluding

presentation will be a structured and interactive dialogue with a panel of leaders in collegiate athlete transition research. The discussants will lead the audience through a set of pre-planned questions to spark deep conversation on the strengths and limitations of the current work on collegiate student-athletes transition from sport. The discussion will also address some broader limitations of the existing knowledge base, such as issues related to methodologies, participant availability (i.e., the high demands on time for collegiate student-athletes), and buy-in from coaches, consultants, and administrators. The symposium will highlight the emerging work in the field and areas for significant growth in research (e.g., inclusion of more culturally diverse and women-specific samples), programming (e.g., program delivery challenges), and policy (e.g., provision of athlete healthcare services) in the evolving landscape of collegiate athletics (e.g., COVID-19 impact, NIL rulings). Furthermore, the discussion will also share the unique and critical clinician perspective when caring for retired athletes and addressing their health and well-being after sport. Throughout the structured programming, the audience will be invited to ask questions and drive the discussion into new areas for exploration utilizing the expertise of the panel of discussants and fellow presenters. This active dialogue will be suitable to a range of attendees including students/trainees, researchers, teachers, athletes, coaches, and/or sports psychology practitioners.

Free Communications: Verbal and Posters

Motor Development Abstracts

Motor inhibition is impaired in children with developmental coordination disorder (DCD), regardless of their severity

Reza Abdollahipour, Palacký University Olomouc; Ludvík Valtr, Palacký University Olomouc; Kamila Banátová, Palacký University Olomouc; Lucia Bizovská, Palacký University Olomouc; Tomáš Klein, Palacký University Olomouc; Zdeněk Svoboda, Palacký University Olomouc; Peter Wilson, Australian Catholic University

Children with developmental coordination disorder (DCD) show deficits in predictive motor control, or the ability to internally model the expected sensory consequence of a goal-directed action. However, it remains unclear whether such deficits depend on the severity of DCD. The aim of this study was to examine online motor control under conditions that varied the level of inhibitory control required for goal-directed pointing movements in children with severe (s-DCD) or moderate DCD (m-DCD), compared with typically-developing children (TDC). The performance of 28 primary-school-aged children with s-DCD (M age = 9.17 ± 1.67 years), 54 m-DCD (M age = 8.74 ± 1.68 years), and 201 TDC (M age = 9.28 ± 1.52 years) was compared on a double jump reaching task (DJRT) paradigm, presented on a large 42-inch touchscreen. The task display had a circular home base positioned on a central meridian, 5 cm from the bottom of the display, and three yellow markers at radials of -20° , 0° , and 20° , 40 cm above the home base button. For the standard double-jump reaching task (DJRT), children moved from a home base button to a target stimulus as fast as possible. On 20% of trials, the target shifted at the point of lift-off to one of two lateral locations. For the anti-jump reaching task (AJRT), they were asked to touch the opposite location if the target changed position at lift-off. The session consisted of

80 trials divided into two blocks of 40 trials including 32 non-jump and 8 DJRT/AJRT, presented in a pseudo-random order. For each task, movement time differences scores between each trial type were calculated. While no group differences were shown on the DJRT ($p > .05$), a significant difference between TDC and DCD groups was found on the AJRT ($p < .05$); on the latter, the two DCD sub-groups were not shown to differ in both DJRT and AJRT ($ps > .05$). Results confirm the presence of motor inhibition deficits in DCD which are not dependent on the severity of the disorder. Funding source: GAČR Expro.

Effects of SKIPping with PAX on cognitive development in rural preschoolers

T. Cade Abrams, University of South Carolina; Emily E. Munn, University of South Carolina; Layne Case, California State University, Chico; Sally Miedema, University of South Carolina; Stephen Griffin, University of South Carolina; Ali Brian, University of South Carolina

The development of motor competence (MC) enables children to perceive, adapt, and actively explore the physical world and may be a critical antecedent for cognitive development. Activities that promote the development of MC concurrently promote the development of cognition via context-specific movement experiences that inherently require adaptive behaviors (e.g., structured and unstructured play, sports practice, and games). The ability to detect, respond, and adjust to performance errors (i.e., post-error slowing; PES) is a critical component of adaptive behavior which is essential for both motor and cognitive tasks. The purpose of this study is to examine whether an integrated MC intervention, Successful Kinesthetic Instruction for Preschoolers with PAX Good Behavior Game, promotes cognitive development as measured by PES. Preschool children were quasi-randomly assigned to either control ($n = 26$, girls = 16) or integrated MC intervention ($n = 16$, girls = 8) groups. Preschoolers completed the Test of Gross Motor Development-3 and the Flanker Inhibitory Control and Attention Test Ages 3-7 years (Version 2.0) from the NIH Toolbox Cognition Battery at baseline and following the nine-month intervention. Raw scores were converted into change scores (i.e., difference between pre-test and post-test) and used for analysis. One-way analysis of variance revealed that children in the integrated MC intervention condition demonstrated better PES ($M = 1.02s$, $SD = 2.3s$) than children in the control condition ($M = -3.0s$, $SD = 1.9s$; $F(1,42) = 4.94$, $p = .032$, $\eta^2 = .12$). Pearson correlations also demonstrated significant associations between changes in PES scores and changes in TGMD-3 scores ($r = .41$, $p = .006$, 95% CI [.12, .63]). Significant differences in PES were found between integrated MC intervention and control groups ($p < .05$). In addition, improvements in MC were significantly associated with improvements in PES ($p < .05$). Future research should examine the impact of integrated MC interventions on other measures of cognitive development in rural preschoolers. Funding source: The National Institutes of General Medical Science.

Eye tracking in children taking Embedded figures test Should Figures and Test have caps?

Venkata Naga Pradeep Ambati, California State University San Bernardino; Jason Reimer, California State University San Bernardino; Tanya Alvarez, California State University San

Bernardino; Alejandra Ramirez, California State University San Bernardino; Ivy Garcia, California State University San Bernardino

The embedded figures test assesses visual-spatial perception in typically developing children and children with developmental disorders. It is a visual search task that involves looking for a target item among an array of distractors and responding with a quick action indicating whether the target is present or not. Although prior EFT studies reported response time in children, the underlying mechanisms remain uncertain. In this explorative study eye tracking technology was used to record various gaze variables to characterize EFT performance in children. Typically developing children in the age range of 10-13 years were recruited using fliers posted at California State University, San Bernardino. A screen-based eye tracker was used to record participants' point of gaze at 250 Hz. Two cameras in the eye tracker captured images of both eyes for robust accurate measurement of eye gaze and eye position in 3D space, as well as pupil diameter. Embedded figures test was presented to the participants on the laptop using E-prime software. After calibrating the eye tracker, the participants began the embedded figures test with 20 test trials and 20 baseline trials. Test condition consisted of a target shape displayed next to a large complex figure. Participants were asked to identify if the target shape was present or absent. Baseline condition was presented in the same format, but the target shape was outlined in red within the complex figure. The target shapes and complex figures were based on the Witkin's original EFT. Results indicated that participants took significantly longer response time when the target shape was not embedded in the large complex figure. Performance accuracy was also significantly lower. However, average fixation duration and average fixation count were the same for all conditions. The results are particularly noteworthy because previous studies only reported response time in children. Gaze variables such as fixation duration and fixation count are likely to provide reasonable explanations for underlying mechanisms of EFT performance in children.

Neonatal arm stepping with and without optic flow

David I. Anderson, San Francisco State University; Marianne Barbu-Roth, University of Paris

We examined whether optic flows specifying self-displacement could induce arm stepping in newborns, similar to what we have discovered with leg stepping. The sample included 24 newborns (M age = 2.9 days, SD = 0.79). We video projected the optic flows through a transparent pediatric water mattress (81 x 60 x 4 cm) positioned on top of a Plexiglas table via a mirror inclined at an angle of 45 deg. The optic flows comprised black dots, 4.06 cm diameter, on a white background, moving at 12.2 cm/sec for one minute per trial. All the dots moved coherently towards or away from the newborn, creating a sense of forward or backward displacement, in the toward and away conditions, respectively. In the random control condition, the dots moved randomly. The experimenter held the newborns under their chest and horizontally above the mattress, while immobilizing their legs (feet held by one hand) but allowing their hands and arms to touch the surface of the mattress. The newborn looked directly at the optic flows in this position. We coded tactile steps, in which the hand left and returned to the mattress following a circular movement, from video cameras on either side of

the newborns. We saw no significant differences in crying across conditions. The optic flows specifying displacement generated more tactile arm steps than the random optic flow, $F(1.9, 44) = 4.2$, $p < .05$, partial eta squared = .16. Pairwise comparisons revealed significantly greater stepping in the away than the random condition ($p = .01$), however the away and toward condition ($p = 0.9$) and toward and random condition ($p = .31$) did not differ from each other. A non-parametric Friedman test revealed significant differences in the number of alternating steps in each condition, Chi-square = 9.36, $p = .009$. Pairwise comparisons revealed more alternating steps in the toward than the random condition ($p = .01$) and in the away than the random condition ($p = .04$). These findings show clearly that optic flows can induce arm stepping in addition to leg stepping in newborns.

Examining free-play postures during the second year of life

Amanda J. Arnold, Denison University; Lauren C. Kelly, Denison University; Laura J. Claxton, Purdue University

As children gain new motor skills, so do their options for exploration, leading to postural changes (shifts from one posture to another). While these shifts occur frequently throughout development, their purpose is not well understood. For example, new walkers will temporarily revert to crawling (Gibson et al., 1987), despite the various beneficial experiences afforded through walking (Adolph & Tamis-LeMonda, 2014). Postural changes may facilitate discovery and interaction, and their use may change with motor skill experience (Thurman & Corbetta, 2017). Currently, a description of postural changes after independent walking begins and how they are influenced by experience is lacking. Therefore, this study examined the number of postural changes and how often postures were used by new and experienced walkers. Twenty new (NW; 6 males, $M_{age} = 3$ mos, 17 d) and 20 experienced (EW; 12 males, $M_{age} = 24$ mos, 29 d) walkers engaged in a 20-minute free-play session. Using Datavyu, coders identified the child's posture at 30-second intervals for the middle 10 minutes of each session, resulting in 20 postural snapshots per child. Categories included stationary (e.g., laying down, sitting, on all fours, squatting/kneeling, standing/bending over) and locomotive (e.g., crawling, cruising, stepping) postures (Thurman & Corbetta, 2017). Neither group differed in the number of postural changes ($M_{NW}:11.2$; $M_{EW}:11$, $p = .87$). Both groups engaged in sitting, standing/bending over, and stepping significantly more than any other posture (p 's $< .01$). There was no difference in the proportion of intervals spent in these 3 postures (p 's $> .15$) and no group effect ($p > .7$). Thus, in addition to stepping, both groups spent an equal proportion of intervals in previously obtained stationary postures. Interestingly, crawling did not emerge as another prominent locomotive posture, even for new walkers. These findings suggest that walkers may primarily use postural changes for stationary exploration. Additional research is needed to investigate the factors impacting these postural shifts.

Motor skill competence and physical activity: Exploring a non-linear association across childhood

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Many studies have found evidence suggesting children with higher gross motor skill competence are more physically active. However, small samples and differences in measurement limit the power to investigate how this relationship might differ across childhood. This paper reports on 988 children aged from 4 to 11 years (50.8% boys and 49.2% girls) from the Australian Physical Activity and Motor Skills Data Pool (data pooled from eight studies conducted from 2009 until 2016). The aim was to report the association between motor skill competence and physical activity across childhood. All studies measured motor skills (Test of Gross Motor Skill Development-TGMD) and physical activity (accelerometers). The outcome variable was physical activity (moderate- or vigorous-intensity) and the predictor, total motor skills, adjusting for clustering at the study level and relevant confounders. A linear model was fitted and compared to a non-linear restricted cubic spline model. There was evidence of positive linear associations for moderate-intensity ($B [95\% CI] = 0.27 [0.19, 0.34]$, $p < 0.001$) and vigorous-intensity ($B [95\% CI] = 0.30 [0.23, 0.37]$, $p < 0.001$) activity; however, the non-linear restricted cubic spline model fitted better. Visual plots generated from the non-linear models indicate associations are positive but relatively weak in the low/mid ranges of TGMD scores, but at high ranges ($\sim >70/100$) the associations markedly increased for both moderate- and vigorous-intensity physical activity. Results suggest the greatest benefits for physical activity are seen with increasing mastery at the higher end. This means children need to reach a certain threshold of skill to really assist them to be more physically active therefore providing support for Seefeldt's (1980) hypothesized motor skill "proficiency barrier." As such, interventions need to aim to build children's skill to a critical level. Funding source: Australian Research Council, DAAD (German Academic Exchange Service), Deakin University, Hunter Medical Research Institute, National Health and Medical Research Council.

Validating the DCD-Q against the VABS in screening for motor problems in children with ASD

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Eighty-seven percent of children with autism spectrum disorder (ASD) are at risk for motor impairment in the US (Bhat, 2020, 2021). While 80% of this sample was receiving speech and occupational therapy for their communication and fine motor/sensory problems, motor delays remained underdiagnosed (i.e., $<15\%$ held a co-diagnosis of developmental coordination disorder (DCD) and only 13-31% of children with ASD received recreational/physical therapies, respectively (Bhat, 2020). There is growing evidence for using the developmental coordination disorder questionnaire (DCD-Q) to screen for motor delays in school-age children with ASD (Van Damme et al., 2021; Green et al., 2009); however, few studies have validated this tool against other standardized measures. This study highlights the value of using the DCD-Q for motor

screening in ASD and validates it against another common standardized measure used to confirm developmental delay in children with ASD, the Vineland Adaptive Behavior Scales, Second Edition (VABS-2; Wilson et al., 2009; Sparrow et al., 2016). In the SPARK study ($N = 8,446$), parents reported their school-age child with ASD's (age range: 5-15 years) risk for motor delay using the DCD-Q and the VABS-2. 87% children with ASD failed on the DCD-Q, 77.9% had moderate or more motor delays using the VABS-2. For children who completed both measures, 70.4% of children with ASD failed on both measures. These findings show the value of using the DCD-Q, a quick motor screening tool, to screen for motor problems to improve referrals for motor services for children with ASD in school settings. While there is an underdiagnosis and undertreatment of gross motor issues in children with ASD within the US (Bhat, 2020), implementing DCD-Q regularly could improve motor screening for further motor service referrals. With better motor screening, children with ASD could have improved access to gross motor services (physical, occupational, and adapted physical education/recreational therapies). Funding source: National Institutes of Health.

Locomotor predictors of perceived motor competence in children aged 4-11 years old

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Perceived motor competence (PMC) is an important variable in maintaining physical activity behaviors across childhood. Although researchers have investigated predictors of PMC, few have undertaken this work from a developmental perspective and little data has highlighted the independent role of locomotor (LOC) skills in supporting PMC. This cross-sectional study examined the extent to which a variety of process and product LOC variables predicted PMC in early childhood (EC, 4-5 yrs, $n = 133$), middle childhood (MC, 7-8 yrs, $n = 128$) and later childhood (LC, 10-11 yrs, $n = 137$). PMC was measured through the physical/athletic competence subscale (Harter & Pike, 1984, or Harter 1982). Six locomotor variables, hop sequence (HOPSQ), distance hopped, standing long jump scaled to height (%HTJump), PACER laps, run velocity and LOC standard score (LOCSS) from the TGMD2 along with BMI, age group, ethnicity, and gender were entered as predictors of PMC. A linear regression on all age groups found the variables significantly ($p < .001$) predicted 24% of the variance in PMC. Three separate linear regressions by age group demonstrated a significant developmental trend with 12% of the variance predicted in EC ($p < .01$), 21% of the variance in MC ($p < .01$) and 23% of the variance in LC ($p \leq .05$). For the combined age group model, HOPSQ ($p < .001$), %HTJump ($p < .001$), PACER ($p = .10$) and age group ($p < .001$) were the only significant predictors. Significant predictors for the EC age group were HOPSQ ($p < .01$), %HTJump ($p = .03$), and run velocity ($p = .40$); LOCSS ($p = .01$) was the only significant predictor in MC. %HTJump ($p = .02$) was the only significant predictor for the LC group. While different process and product LOC variables were associated with PMC across age groups, the strength of association generally increased across

age groups. %HTJump seems to be the most salient predictor variable for EC and LC. As we consider intervening with the PMC of children, it is important to consider the role LOC skills play in support of their perceptions of competence.

The effect of baby swimming programs on infants' perception of risk and avoidance of bodies of water

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Although teaching children to swim and survive in the water is one possible layer of drowning prevention, no evidence indicates that children younger than 2 years of age can acquire the competencies needed to survive in the water for long periods of time. Swimming lessons may not help infants to survive in the water, but do baby swimming programs impact their perception of the risks posed by water and adaptive behaviour around it? We tested 101 infants' ($M_{\text{age}} = 13.01 \pm 2.39$ months) avoidance of the water on a water cliff (i.e., sudden drop-off) and 77 infants' ($M_{\text{age}} = 12.52 \pm 2.94$ months) avoidance on a water slope (i.e., gradual slope) leading to deep water. A regression analysis revealed no effect of the total number of swimming sessions on infants' avoidance of the water cliff or the water slope. When analysing the difference between infants that attended more or less than ten swimming sessions, a significant interaction between type of entrance to the water and number of swimming sessions revealed a higher percentage of infants with more than ten sessions avoided the water drop-off but failed to avoid the slope leading into the water. These results suggest that baby swimming programs may help infants to avoid water cliffs but make them more likely to venture into the water via slopes. Because infants tested on the water cliff were from Portugal and infants tested on the water slope were from New Zealand, the cultural effect and possible different teaching methodologies need to be further investigated. Funding source: Laboratory of Motor Behaviour, CIPER, Faculdade de Motricidade Humana, Universidade de Lisboa.

Characterizing manual exploratory behaviors during infancy: A longitudinal study

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Manual exploratory behaviors afford an infant the opportunity to learn about object properties such as size, shape, and texture. Understanding how infants explore objects can shed light on the developmental processes underlying object manipulation and has clinical applications in identifying children at-risk for movement disorders and autism. However, quantifying such exploratory behaviors has been difficult to accomplish with traditional techniques. Here, as a first step toward developing automated techniques using sensor data, we analyze infant exploration with different objects to categorize the different types of behaviors involved. Infants from six- to twelve-months of age participated longitudinally, exploring 8 objects of different sizes (2" vs. 4"), shapes (cube vs. sphere), and textures (hard vs. soft). Each object was fitted internally with Bluetooth IMU sensors. Video, sensor, and motion capture data were collected simultaneously. For this portion of the study, infant's behavioral video data was coded

to characterize the exploratory behavior. Exploration was broadly categorized into actions involving the fingers, wrist, or transportation, with specific actions then identified. Behavioral analysis indicated that finger actions were most common across all ages, with transportation activities next common. Object properties influenced how the toys were interacted with, as smaller objects afforded the ability to be transferred between hands and hard objects were more likely to be mouthed. Age also influenced the infants' interaction as variety of movements increased with age, and infants began throwing objects as they approached the end of the first year of life. Overall, the video analysis reveals that infants demonstrate a range of behavioral exploration patterns that have the potential to be quantitatively analyzed through kinematic data. This next step can significantly reduce the time needed to analyze data and could potentially be used as a screening tool to assess risk for autism at an early age. Funding source: National Science Foundation.

Mapping motor competence in 1- to 3-year-old Flemish toddlers

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Recent literature indicates a secular decline in (pre)school children's motor competence (MC). Given that MC development and its influencing factors are hardly documented in 1- to 3-year-olds, the World Health Organisation pinpoints motor development research in this particular age group as a knowledge gap to address. As such, this study aimed to objectively assess the current status of MC levels (i.e., stationary performances, locomotion, object manipulation) in 1- to 3-year-old Flemish toddlers by using the Peabody Developmental Motor Scales Second Edition (PDMS-2) by comparing their outcomes with the original US and Canadian reference values. A total of 104 typically developing toddlers (49 boys, 55 girls, M age = 19.9 ± 3.03 months) recruited from 12 daycare centers in Flanders (Belgium) were assessed according to the PDMS-2 manual guidelines. For the gross motor quotient, this current sample of toddlers scored significantly worse than their counterparts from the year 2000. In our Flemish sample, the distribution of scores is situated more to the lower end of the continuum. In total, 21.2% of the Flemish toddlers scored below the average range of MC when compared to the PDMS-2 reference values. More specifically, our study sample was situated below percentile 50 for locomotion (35.77 ± 21.09) and stationary performances (39.88 ± 14.76) and exactly at percentile 50 for object control. In view of contemporary and regional normative values for MC assessment with the PDMS-2 in 1- to 3-year-old Flemish toddlers, more data are currently been collected. In addition, greater insight is needed into the associations of toddlers' MC with their cognitive and socio-emotional functioning as well as other individual (i.e., perinatal information, anthropometry and 24-hour movement behaviour) and environmental factors (i.e., socio-economic status, physical home and day care environment), which will be presented at the NASPSA conference in order to making the necessary efforts to stop the expected decline in MC development.

Motor profile of Brazilian children on the MCA instrument: A cross-cultural study

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Motor competence (MC) has been defined in the literature as a person's ability to be proficient in a broad range of locomotor, stability and manipulative gross motor skills. A good MC is important for developing a healthy lifestyle. Comparisons among different cultural contexts may help researchers to understand the mechanisms for MC development and to elaborate strategies and policy measures adapted to boys and girls in different countries. This study aimed to compare Brazilian MC levels with the normative Portuguese values. A sample of 1115 children (52.6% boys; 47.4% girls), between 5 and 14 years of age ($M = 9.80$; $SD = 2.64$ years), from different regions in Brazil, were evaluated using the Motor Competence Assessment (MCA) instrument. The results were later compared to the existent normative values of Portuguese children for the same sex and age range. For cross-cultural comparison between Portuguese and Brazilian children, the mean z-score and respective standard deviations of all MC components (stability, locomotor and manipulative) and total score were calculated. Further, a comparison of z-score mean with the zero mean reference value was carried out using the student's *t*-test. Results indicate that, compared with the Portuguese normative sample: (a) Brazilian boys have significantly lower scores on stability ($p = .005$) and manipulative components ($p < .001$) and on total MC ($p = .036$), having significantly higher scores on the locomotor component ($p < .001$); (b) Brazilian girls have significantly lower scores on stability ($p < .001$), manipulative components ($p < .001$) and on total MC ($p < .001$), having no significant differences in the locomotor component ($p = .750$). This study explored the mechanisms related to the differences in MC performance between Brazil and Portugal, highlighting the importance of devising strategies to tackle low levels of MC in target groups that seem to be at greater risk of adopting unhealthy lifestyles. Funding source: Fundação para a Ciência e Tecnologia.

Effects of virtual/digital motor interventions on motor/activity outcomes of individuals with developmental disorders: A systematic review.

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Children with neurodevelopmental disorders often display co-occurring motor, social communication, and cognitive impairments. It is well known that regular physical activity (PA) and participation in motor activities can positively impact the development of motor, cognitive, and social skills; however, children with developmental disabilities do not regularly participate in PA. Recently, virtual technologies (e.g., Zoom, virtual reality, videogaming, etc.) have been used increasingly to promote better physical, social, and cognitive outcomes. The efficacy of virtual technology in improving motor and PA outcomes for those with developmental disorders varies depending on the technology and target population, and we do not know how the effects of various technologies compare with each other. The aim of our study is to conduct a systematic review to comprehensively examine the quantitative and qualitative results of

current studies reporting the efficacy of virtual PA programs on motor skills and PA outcomes in individuals with developmental delay. 25 relevant motor articles and 14 relevant PA articles were retrieved from a search of databases such as PubMed, PsycInfo, SCOPUS, and CINAHL. This ongoing literature review will offer insights into the value of virtual technology on improving motor/PA outcomes for individuals with developmental disorders. We believe virtual exergaming could be a potentially low-cost, effective tool to extend the reach of clinician-based therapies to improve motor, social communication, and cognitive performance in individuals with various developmental disorders. The results gathered so far indicate that the use of virtual technologies can engage all age groups and may lead to better compliance and treatment effects compared to other standard of care interventions. Funding source: National Institutes of Health.

Do ROTC Cadets' motor competence, fitness, autonomous motivation and self-perceptions predict their physical fitness and combat fitness test scores?

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The aim of this study was to examine whether, and to what degree, Army Reserve Officers' Training Corps (ROTC) Cadets' motor competence, fitness, autonomous motivation for exercising, and their self-perceived strength and endurance predicted their scores on the Army Physical Fitness Test (APFT) and the Army Combat Fitness Test (ACFT). The APFT consists of three tests (push-ups, sit-ups, and a 2-mile run), while the ACFT consists of seven tests (deadlift, power throw, hand-release push-ups, a sprint-drag-carry test, leg tuck, plank, and a 2-mile run). A total of 125 ROTC Cadets from the southeastern United States (M age = 21 years) completed six product-oriented functional motor competence tests (i.e., throwing speed, throw-catch task, balance, hopping speed, standing long jump [SLJ], and supine to stand), and one fitness test (grip strength). We also measured their motivation for exercising, as well as their self-perceived strength and endurance. Linear regressions were used to examine to what degree the measured variables predicted cadets' scores on the APFT and the ACFT. When all the measured variables were entered into the models as predictors, the explained variance on the APFT ($F[9, 88] = 9.133, p < .001$) and the ACFT ($F[9, 67] = 4.528, p < .001$), was 46% and 33% respectively. A closer examination of the individual predictors revealed that balance ($t = 2.684, p = .009$) and perceived endurance ($t = 3.615, p = .001$) were the strongest predictors for APFT scores, while the standing long jump ($t = 2.107, p = .039$) was the strongest predictor for ACFT scores. As the APFT is centered around (muscular and cardiovascular) endurance tests, it is not surprising that perceived endurance was the strongest predictor. This shows that ROTC cadets most likely have pretty accurate perceptions of their endurance levels. The results also underline the predictive validity of the SLJ (a skill that requires both motor competence and explosive power) with regard to APFT and ACFT scores.

Motor and cognitive performance in children with developmental coordination disorder: A scoping review of assessment tools and the role of technology

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Cognitive and motor skills are critical components of our activities of daily living. Throughout childhood, the development of these skills is tightly linked. Early assessment of these skills is crucial to capture any indications of functional delay that may incur due to atypical development; one such condition is developmental coordination disorder (DCD). Assessments of cognitive and motor function are often performed separately using different tools and tests, making results less generalizable to real-world, ecological settings that require highly integrated sensorimotor and cognitive control. Emerging technological advances may facilitate better, more integrated assessment tools for clinicians by providing highly accurate, precise, and objective assessments of cognitive and sensorimotor functions in typically and atypically developing school-aged children; at present we have a limited understanding of the frequency and type of technology currently used in clinical assessment tools. The purpose of this scoping review was to synthesize scientific knowledge regarding the use of technological tools in the clinical assessment of sensorimotor skills and cognitive function in school-aged children with DCD. The present review retrieved sources from 1980 to the search date in peer-reviewed databases, including PubMed, CINAHL, and PsycInfo. To be included, publications had to be intervention studies, randomized, non-randomized, and/or clinical trials and include: (a) children 7-18 years old diagnosed with DCD, (b) cognitive assessments and/or sensory function assessments, (c) technological and/or non-technical assessment tools, (d) assessments of motor skills/abilities, and (e) be written in the English, French, or German languages. Methods of assessment related to cognitive learning (e.g., dyslexia) were excluded. Our research aims to determine how technology could be used to facilitate and modernize an integrated clinical assessment of cognitive, sensorimotor, and locomotor development; results and implications will be discussed.

Age-dependent relationships between children's motor competence, physical activity, perceived motor competence, physical fitness and weight status

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In their developmental model, Stodden et al. (2008) propose age-dependent relations between motor competence, physical activity, perceived motor competence, physical fitness, and weight status that can lead to a spiral of (dis)engagement. The goal of this study was to explore these relations in a large sample of Dutch primary school children. To our knowledge, this is the first study including all five aspects of the model and a large sample of children between four and thirteen years old. Cross-sectional data was collected in 2068 children (ages 4-13), divided over 9 age groups. During physical education classes, they completed the 4-Skills Test, a physical

activity questionnaire, versions of the Self-Perception Profile for Children, Eurofit test and anthropometry measurements. Correlation coefficients per age group were calculated (full information maximum likelihood) and transformed using a Fisher's r to z transformation, after which the test-statistic z was calculated. The results show that all five factors are related to each other and that a tipping point exists at which relations emerge or strengthen. Physical fitness is related to motor competence and physical activity and these relationships strengthen with age. A relationship between BMI and the other four factors emerges in middle childhood. Although the model described that physical activity stimulates motor competence in early childhood, our data showed that at a young age, both motor competence and perceived motor competence had no relation with physical activity, while they were weakly related to each other. In middle childhood, both motor competence and perceived motor competence were related to physical activity. Our findings demonstrate that children in late childhood who have higher perceived motor competence are also more physically active, have higher physical fitness, higher motor competence and lower BMI. Our results indicate that targeting motor competence at a young age might be a feasible way to ensure continued participation in physical activities throughout childhood and adolescence. Funding source: Netherlands Organization for Scientific Research.

Associations between physical activity and factors of healthy growing up in childhood and adolescence during COVID-19 pandemic: A systematic review

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There is clear evidence that the Corona pandemic had several effects on human behavior due to the severe restrictions in public life (Wilke et al., 2022), especially to habits that are related to health such as sedentary behavior, sleep or diet habits or physical activity (PA). Several research studies as well as systematic reviews deal with the effects of the pandemic on these health behaviors (for PA, Stockwell et al., 2021). Many studies and reviews confirm a change of PA due to the circumstances of lockdowns and restrictions worldwide and for different age groups, especially for childhood and youth. However, the association of these PA changes with physical, psychological and social health have not been clearly identified yet. Therefore, the research question of this systematic review was: which relationships can be found between PA and sports behavior and factors of healthy growing up in childhood and youth during the pandemic of COVID-19? A systematic review in accordance with PRISMA guidelines (Page et al., 2020) was conducted. The review followed the recommendations for ethical publishing of systematic reviews. In April 2022, 69,048 studies were identified within nine electronic databases (e.g., Web of Science, PubMed, SportDiscus, SCOPUS). The search-string was: (Corona OR COVID-19 OR SARS-CoV-2 OR Pandemic) AND ("Physical Activity" OR "Sport*" OR "Physical Education" OR games OR play) AND (Children OR Youth OR Kids OR adolescents OR "young age" OR School OR Pupils OR Students). In all, 65 studies dealing with the correlates of PA changes and health outcomes were included in the synthesis covering relations to physical health (BMI, fitness), psychological health (depression, mental health, well-being,

mood, resilience, self-concept), social health (conflicts, behavioral problems), and related health habits such as screen time, diet, media behavior or sleep. The results are discussed for differences in gender and age. They show the urgent need for post-pandemic interventions to foster physical activity behavior in childhood and adolescence.

Parent's knowledge on manual behavior and the impacts of social distancing on Brazilian infant care and stimulation practices during COVID-19 pandemic

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The pandemic of COVID-19 has affected the daily routine of many families, especially in regards to infant care. Social distance strategies and daycare center closures caused changes on infant care, social relationship, and development. The present study aimed to (a) identify the knowledge and expectations the parents have to infant manual development; and (b) verify whether and how parents offered opportunities for developmental tasks in the first 9 months of the COVID-19 pandemic. Participants in the study included 18 individual parents who answered two questionnaires (when infants were 3 and 9 months old) about their knowledge of manual behavior, care and stimulation practices. The descriptive analysis of answers showed that parents expect reach and grasp to happen about 3.5 months old. Most parents (61%) do not believe that infants would be able to identify a relationship between their own manual behavior and an environmental event before 6 months of age. Mothers were the principal caregiver during the first 3 months (94.4%) and either at 9 months old (61.1%). Most parents (72%) reported exclusive breastfeeding during first 3 months. Care practices was considered better during pandemic for 61.1% of the parents due mainly to fathers working from home. Regarding to stimulations practices during the first 3 months after birth, 71% of the parents offered toy/object to infants, but only 19% of them offered “always”. Most parents (72.2%) said that their infant spent most time on the lap instead of floor (16.7%). However, at 9 months their infants spent most time on the floor (72%). The results show that parents know about the expecting age for reach and grasp but underestimate the autonomy of manual behavior in infants. Consequently, provide to infants less opportunities for development during the first 3 months than at 9 months old. Moreover, social restrictions implemented to fight COVID-19 pandemic, positively impacted care practices as breastfeeding rates and involvement of fathers during the first 3 months after birth in Brazilian high educated families. Funding source: Paulista University.

Immediate and sustained effects of the CHAMP intervention on anthropometrics

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Fundamental motor skill proficiency is associated with improving anthropometrics in children. Moreover, both self-regulation and perceived competence influence anthropometrics. Few

studies have examined the effect of motor skill interventions on improving anthropometrics and fewer still have considered whether self-regulation or perceived competence moderate those intervention effects. Therefore, this study examined the immediate and sustained effects of the Children's Health Activity Motor Program (CHAMP) on children's anthropometrics and explored if self-regulation or perceived competence moderate anthropometric outcomes. Preschoolers ($n = 299$; 158 girls; $M_{\text{age}} = 53 \text{ months} \pm 3.7$) from three Head Start centers in the Midwestern United States completed either a CHAMP intervention (2155 mins; $n = 153$) or a control condition ($n = 146$). Anthropometrics were measured with BMI-for-age percentile (BMI%) and waist circumference-to-height (WH ratio). Self-regulation was measured with the Head-Toes-Knees-Shoulders Task (HTKS). Perceived competence was measured with the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (PSPCSA). Covariate-adjusted comparisons between CHAMP and the control groups were completed using longitudinal data analysis with three repeated measurements (pretest, post-test, 6-month follow-up). Main and dependent effects were evaluated for each variable. After adjusting for predictors, CHAMP significantly decreased WH ratio ($\beta = -0.018, p < 0.001$). Models revealed that self-regulation significantly moderated CHAMP's effect on BMI% ($p < 0.001$), where children with no self-regulation (HTKS = 0; $\beta = 0.3085, p = 0.93$) experienced no effect of CHAMP on their BMI% versus those with self-regulation (HTKS > 0; $p < 0.001$). PSPCSA significantly predicts BMI% for all children regardless of group. These results suggest that CHAMP supports healthy anthropometrics (WH ratio) but that psychosocial factors (e.g., self-regulation) moderate its effect on BMI%. Future interventions should consider manipulating self-regulation to improve children's anthropometrics. Funding source: National Institutes of Health, National Heart, Lung, and Blood Institute.

Development of motor performance and physical self-concept across primary school age – A six-year study

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Motor performance (i.e., motor competencies and physical fitness) and physical self-concept (i.e., perceived motor competence and perceived physical fitness) are important predictors of physical activity in childhood (Stodden et al., 2008). Relationships between actual and perceived motor competence (e.g., De Meester et al., 2020), as well as physical fitness and physical fitness self-concept (e.g., Dreiskämper et al., 2020), have been studied, but separately and mostly cross-sectional. This is the first study that investigates the effects between motor competencies, physical fitness, perceived motor competencies, and perceived physical fitness together in one study, including data over a six-year period. The aim of this study is fourfold. First, the stability of the constructs is investigated. Second, reciprocal effects between factors are examined. Third, differences in the development of motor performance and self-concept domains are analyzed. Fourth, age-related differences in the effects are investigated. Over a six-year period, motor performance and physical self-concept were measured once a year ($N = 1003$; $M = 8.01 \text{ yrs}$; $SD = .93$). Path models in a cross-lagged design were performed to

investigate the effects in three groups (G1: 1st to 2nd graders; G2: 2nd to 3rd graders; G3: 3rd to 4th graders). Results indicate that one model including motor competencies and physical fitness domains does not fit the data well. It can be suggested that the two constructs may not be as closely related as assumed. Separate models for both domains with their associated self-concepts were calculated. Fitness ($b = .61-.67$) appears to be more stable than motor competencies ($b = .16-.37$) in all groups. The stability of physical fitness self-concept develops from 3rd to 4th grade ($b_{G2} = .37$; $b_{G3} = .60$), whereas the stability of perceived motor competence increases slightly across grades ($b = .46-.56$). Finally, results show weak to moderate reciprocal effects between motor performance and physical self-concept. The development of motor performance and self-concept will be discussed.

Infants are sensitive to the different costs of crawling and walking postures

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Why does a crawling or walking infant choose to crawl or walk? Previous work shows that crawling and walking aren't equal. Compared to crawling, walking is faster, more energetically efficient, allows infants to cover more ground, and enables a larger field of view. However, previous work that examined effects of environmental factors on spontaneous locomotor activity focused only on how much walking infants walk. We hypothesized that crawling and walking infants are sensitive to the costs of locomotor posture over development and in real time, such that environmental factors differentially affect crawlers and walkers. Using a within-subjects design, we tested age-matched crawling and walking infants ($M = 12.7$ months; range = 11.6-14.2 months) during free play with their caregivers. Dyads played in two 10-minute conditions in which we varied the proximity of destinations (toys clustered in one spot versus dispersed around the room). Video-coding of infants' activity is ongoing. We report preliminary data from 13 crawling infants and 16 walking infants, although the full sample (20 crawling infants, 20 walking infants) will be analyzed by the time of presentation. We found main effects for locomotor status and toy condition. Averaged across conditions, walkers took more steps per hour ($M = 2296$) than crawlers ($M = 725$), $t(27) = -5.75$, $p < .001$. Averaged across infants, infants took more steps per hour in the toys-dispersed condition ($M = 1845$) compared to the toys-clustered condition ($M = 1337$), $t(27) = -2.49$, $p = .019$. Walkers moved more in the toys-dispersed condition compared to the toys-clustered condition (M difference = 774 steps), $t(15) = -2.23$, $p = .038$, whereas crawlers did not (M difference = 181 steps), $t(12) = -1.19$, $p = .259$. Preliminary analyses suggest that walkers crawl more when toys are clustered versus dispersed, and that walkers only resort to crawling for destinations at a short distance. Thus, our preliminary analyses suggest that infants are indeed sensitive to costs over development and in real time depending on environmental opportunities. Funding source: National Institutes of Health.

Agree to disagree? Motor competence assessment is not the same among experts

Ryan Matthew Hulteen, Louisiana State University; Larissa True, New Mexico State University; Edward Kroc, University of British Columbia

Assessment of motor skills is frequently performed using process-oriented tools, which rely on subjective decision making of experts to interpret and score various criteria. Despite efforts to standardize this process, pervasive issues still exist. The aim of this study was to determine levels of inter-rater reliability on motor competence scores derived from the Test of Gross Motor Development-3rd edition and how confident raters were in assigning scores. Sixteen expert raters representing 16 different universities and 8 countries participated in this study. Total score agreement (ICC = 0.363) and locomotor subscale agreement (ICC = 0.383) was 'very poor', while ball skills subscale agreement (ICC = 0.478) was 'poor'. Consistencies of total (ICC = 0.757), locomotor (ICC = 0.730), and ball skills (ICC = 0.746) scores were 'fair'. Component percentage agreement ranged from 40.5% to 96.2%. When examining raters' confidence in scoring different components, three distinct groups emerged. Raters were the least confident in assessing the one- and two-hand strike, as well as the underhand throw. Raters were second-least confident in assessing the slide, skip, kick, jump, run, hop, and gallop. Raters were most confident in assessing the dribble, catch, and overhand throw. Ensuring that motor skills are assessed confidently and accurately is imperative for the field. Valid and reliable assessment has implications for increasing the rigor of science in the field of motor development, increasing our credibility with other fields, enhancing the predictive utility of measures, and determining intervention effectiveness. Process-oriented tools play a pivotal role in better understanding motor competence levels of populations, but only if proper training and implementation is conducted.

Effects of relatively long induction of negative gender stereotypes on motor skill learning in young adolescents

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The purpose of this study was to examine the effects of relatively long induction of negative gender stereotypes on motor skill learning in young adolescents. Forty-six girls ($M = 14.02$ years old, $SD = 0.80$) practiced a futsal kicking task (i.e., kicking a rolling ball toward a target) for three days with approximately 48 hours apart from each session. Participants were randomly assigned to either a stereotype threat (ST) or nullified-stereotype threat (NST) group. Participants in the ST group randomly received related verbal, visual, or readable activation of gender stereotypes before each training session while those in the NST group did not receive them. To assess the learning outcome, two retention tests of 10 trials each, followed by two transfer tests, were conducted two and seven days later. Results showed that inducing negative stereotypes resulted in degraded kicking scores during the training sessions, the first retention, and transfer tests. Moreover, the relatively long induction of negative stereotypes degraded motor skill learning in greater depth – lower performance after the relatively long retention

interval. These findings provide the first evidence of the effects of relatively long induction of negative gender stereotypes on motor skill learning in young adolescents.

Changes in preschoolers' skill mastery following a mastery motivational climate intervention

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Fundamental motor skills (FMS) are considered as the building blocks for later participation in physical activity. Much of the FMS intervention research have focused on increasing overall FMS proficiency in their participants and have reported changes in terms of effect sizes. Few studies have described changes in FMS proficiency in terms of "skill mastery." Skill mastery is defined as the participant demonstrating all but one of the criteria for a given skill on an assessment. The purpose of this study was to describe changes in participants skill mastery before and after a mastery motivational climate (MMC) intervention. The participants in this study were 56 children (27 boys, 29 girls) ages 3 – 5. We describe changes in skill mastery in three ways: (1) overall group changes from pre- to post-test, (2) changes in skill mastery across each individual skill, and (3) changes in skill mastery by sex across the intervention. Overall, locomotor (LM) mastery increased from 11% to 46%. For ball skills, mastery increased from 3% to 33% after the intervention. When we look at mastery by individual skill, run was the most mastered LM skill at pretest at 38% followed by gallop at 16%. No other LM skills were above 2%. Post-intervention, running and sliding were both highly mastered at 75%, followed by jumping at 55%. For ball skills, very few participants showed mastery at pretest, but underhand throwing was highly mastered at 55% and dribbling at 42%. Finally, when we compare boys and girls overall, we see girls increase from 10% to 58% for LM skill mastery, and from 0 to 29% in BS skill mastery. For boys, there was an increase from 12% to 32% for LM skill mastery, and 5% to 38% BS skill mastery respectively. Overall, the MMC intervention led to significant increases in skill mastery although some skills were more likely to be mastered than others. Girls showed greater improvements and skill mastery in their LM skills. These findings can inform the design of future MMC interventions.

The association between adult physical activity and number of and age of children present in the household: A secondary analysis using NHANES

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Only one in three adults in the US meets the recommendation for physical activity (PA). The presence of children in the home may serve as a barrier for adult PA. This study examined the association between adult moderate and vigorous PA and the number of and age of children in their household. It was hypothesized that adult PA would decrease as the number of children increased, and this relationship would be stronger for children ages 0-5 versus 6-17. Secondary

data were drawn from the self-reported survey data of the National Health and Nutrition Examination Survey (NHANES) from 2007-2016. Adults with complete survey data for self-reported PA (moderate (MPA) and vigorous (VPA), number of children in the home, and other sociodemographic variables were included. The final sample included 2,034 adults from ages 22-65. We ran separate ANOVAs to test for mean differences in PA based on the number of children living in the house from ages 0-5 and 6-17. Next, separate multivariable regression analyses were used to determine if the number of children in the household ages 0-5 and 6-17 were significant predictors of PA. For MPA, adults with two or more children ages 0-5 reported ten less minutes of MPA ($p = .03$) compared to those with no children or just one child in this age group. There were no differences in MPA based on the number of children 6-17. For VPA, adults with two or more children ages 0-5 reported 15 less minutes of VPA ($p = .0004$) compared to those with no children or just one child in this age group. Finally, adults with three or more children in the household ages 6-17 reported eight less minutes of VPA ($p = .09$) compared to those with no children, one, or just two in the household. These findings highlight a need to focus on effective ways to increase PA engagement of adults with several children in the household as a majority of the family-based PA intervention studies to date have primarily focused on family dyads. More work is needed for multi-level health interventions as they may be effective in increasing PA across the entire household.

A systematic review of motor impairments in children with autism spectrum disorder

Melika Kangarani-Farahani, University of British Columbia; Myrah Malik, University of British Columbia; Jill Zwicker, University of British Columbia

Children with autism spectrum disorder (ASD) often have motor deficits, yet motor concerns are not part of the diagnostic criteria for the disorder, nor are they typically the target of therapy. While a dual diagnosis of ASD and developmental coordination disorder (DCD) has been permitted since the publication of DSM-5 in 2013, we hypothesized that DCD is under-diagnosed in this population. We conducted a systematic review to determine the prevalence of motor impairments (consistent with DCD) in children with ASD, and whether the term DCD was used after 2013. A total of 4030 articles from four databases (PsycINFO, EMBASE, CINAHL, and MEDLINE) and published between 2010-2020 were screened by two independent reviewers. Studies were included if they examined motor function of children (5-12 years) with ASD; motor difficulties that could be explained by other conditions were excluded. After abstract and full-text review, 27 articles were included. The majority of articles (92%) reported that children with ASD had significant motor impairments on standardized motor assessments and/or functional questionnaires. The prevalence of motor problems ranged from 50-88%. However, only 3/19 papers published from 2014 identified these motor difficulties as DCD, with one study reporting that only 15% of children with ASD with motor difficulties had been given a co-occurring DCD diagnosis. In conclusion, functional motor difficulties are highly prevalent in children with ASD, but most children are not receiving a DCD diagnosis. Identifying DCD in children with ASD is important so that they can receive evidence-based therapy to address motor skill deficits, which can also improve the core deficits associated with ASD.

Effectiveness of CO-OP intervention in improving motor skills of children with co-occurring autism and developmental coordination disorder

Melika Kangarani-Farahani, University of British Columbia; Jill Zwicker, University of British Columbia

Up to 88% of children with autism spectrum disorder (ASD) have motor skill deficits consistent with developmental coordination disorder (DCD), yet motor function is rarely the focus of therapy. Current best-practice to improve motor skills of children with DCD is a treatment approach called Cognitive Orientation to Occupational Performance (CO-OP); however, it is largely unknown if children with co-occurring ASD and DCD benefit from this intervention. We aimed to determine if CO-OP is effective in improving motor skills of children with co-occurring ASD and DCD, and whether motor gains are maintained 3 months after therapy. In this randomized waitlist-controlled trial, 21 children aged 8-12 years with ASD (without intellectual disability) and suspected/diagnosed DCD have been recruited to date. Children randomized to the treatment group received one-hour of CO-OP intervention once weekly for 10 weeks to work on three child-chosen motor goals. Children in the waitlist group received intervention 3 months later. Our primary outcome, the Canadian Occupational Performance Measure (COPM), captured child ratings of motor performance and satisfaction for each of their motor goals on a 10-point scale; a gain of 2 points is considered clinically significant. An occupational therapist (not involved in the intervention and blinded to pre-test and post-test) scored videos of children performing their motor goals before and after treatment using the Performance Quality Rating Scale (PQRS). Data analysis will include Mann-Whitney U-tests (pre-post), Friedman tests (pre-post-follow-up), and calculation of effect sizes. Preliminary COPM results indicate statistically significant ($p < 0.001$) and clinically meaningful improvement in motor performance (pre: 3.66 ± 2.50 ; post: 8.33 ± 2.00) and satisfaction (pre: 3.66 ± 2.58 ; post: 8.33 ± 2.67) after CO-OP (Cohen's $d = 0.87$). Data analysis is ongoing. Preliminary findings suggest that CO-OP intervention is effective in helping children with ASD learn functional motor skills. Funding source: Waterloo Foundation.

Unveiling mechanisms of hippotherapy: Is physiological coupling the answer?

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Hippotherapy (HPOT) is a therapeutic service performed to treat a variety of developmental disorders, specifically autism spectrum disorder (ASD). This is one of the first studies that aims to analyze physiological coupling between the horse and rider to determine underlying mechanisms of HPOT. It is important to unveil the underlying mechanisms of HPOT to be used in future clinical trials to assess the treatment efficacy of various HPOT intervention protocols, including differences in protocol, dosage, and duration. Thirty children participated in the study, 15 typically developing (TD) and 15 diagnosed with ASD. Six specialized sessions of HPOT were conducted at Heartland Equine Therapeutic Riding Academy (HETRA). Heart rate (HR)

monitors were placed around the upper thorax of both the rider and horse and simultaneously began collecting data at the beginning of each session. Data was collected at the first, third, and sixth sessions. Cross approximate entropy was used to calculate synchronization between horse and rider. We performed a 2x3 mixed way ANOVA, with a statistically significant level set at 0.05, and partial eta square was calculated to measure effect size. There was a significant main effect for groups with a moderate effect size, but no significant main effect for time or an interaction effect. Specifically, the group of children with TD had significantly lower CrossApEn values than children with ASD across all sessions. There was also a decrease in CrossApEn values across sessions in both groups of children, but not significant, which may indicate greater synchronization as sessions progressed. Greater synchrony between HR of the rider and horse were observed in the TD group compared to the group of children with ASD, but both groups exhibited greater synchrony across session progression. Future studies should aim at examining the effects of higher therapy doses, and if this can cause greater increases in HR synchrony of the horse and children with ASD, trending towards TD children. Funding source: National Institutes of Health.

Quantifying motor impairments with wearable sensors

Jeffrey Konrad, Washington University; Natasha Marrus, Washington University; Catherine Lang, Washington University

Motor impairments are a serious developmental issue with a profound impact on non-motor domains such as social function and cognition, which often co-occur with developmental conditions such as autism spectrum disorder (ASD) and developmental coordination disorder (DCD). Two specific motor impairments relevant to these disorders are hyperactivity and poor coordination. Hyperactivity is an excessive, developmentally inappropriate level of motor activity. Poor coordination refers to difficulty with the organization, planning, and execution of goal-directed movements. Quantifying motor behavior is difficult. We seek to determine if wearable sensors could augment existing assessment tools by passively capturing quantitative characteristics of motor impairments. Participants ages 6 to 12 wore bilateral wrist sensors during a lab visit and for 2 days thereafter. The lab visit included a structured underhand tossing activity. The sensor recording from free-living time was considered unstructured as their specific activities were not known. We collected indirect indices of motor impairments and ASD symptoms from caregiver-report as well as a direct, clinical measure of motor coordination. Multiple variables that quantify the participant's movement were extracted from both structured and unstructured sensor recordings. Then we examined their associations with the motor behavior indices. Sensor variables from the structured context were more likely to be associated with the motor indices compared to variables from the unstructured context. Variables quantifying the peak acceleration, variation, and smoothness from each limb were most prevalent. These variables were associated with both indirect and direct measures of motor coordination and reported hyperactivity score and ASD social symptoms. Passive assessment of motor behaviors with wearable sensors could enhance clinical management of neurodevelopmental disorders through improved quantification of motor impairment.

Wearable sensors could be leveraged to advance screening, determine severity, and track treatment progress. Funding source: Foundation for Physical Therapy Research.

The effects of a 6-week hippotherapy program in irritability and social behavior of children with ASD

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Hippotherapy (HPOT) is a treatment option that has shown promises for various developmental disabilities, such as cerebral palsy, developmental delay and ASD among others. The aim of this study was to determine the effects of a six-week HPOT intervention on caregiver's perception of their child's social behavior and behavioral disturbance as well as social behavior, and specifically in attention-following and initiating joint attention. Fifteen children diagnosed with ASD aged between 5-10 years old and their caregivers, filled out pre- and post-assessments for the Social Responsiveness Scale (SRS) and Aberrant Behavior Checklist (ABC) Scale. Evaluations on social play were performed pre- and post-HPOT sessions in a 10 min semi-structured play over the course of a 6-week protocol. The social play protocol involved attention-following and initiating joint attention based on Watson et al., (2003). Participants were recruited from the community. A paired *t*-test was performed on the scores from the pre- and post-assessments for all measures. The results showed that out of the 5 subscales of the ABC Scale, irritability was significantly reduced in children with ASD after the intervention ($p = 0.008$), with a large effect size (Cohen's $d = 1$). On the SRS Questionnaire, the overall score ($p = 0.01$), social cognition ($p = 0.01$), social communication ($p = 0.03$), and restricted interests/repetitive behaviors ($p = 0.03$) showed significant improvements after the intervention with moderate to large effect sizes. The 6-week program significantly improved ($p = 0.03$) attention-following and initiating joint attention in children with ASD with moderate effect size. Even a 6-week HPOT program showed improvements in social and irritability behaviors of children with ASD as exhibited with the SRS questionnaire, the ABC scale and the joint attention and initiating joint attention protocol. Funding source: National Institutes of Health.

"When we dance it's never just dancing...": A qualitative understanding of the experiences of dancers with neurodevelopmental disabilities

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Dance is a rhythmic activity that engages the physical, cognitive, and social dimensions of movement and health through creative expression. Research in dance and neurodevelopmental disability (NDD) is often focused on symptoms and behaviours, rather than individual experiences. We used a constructionist lens to explore the meaning of dance for individuals as shared through their perceptions and experiences (Crotty, 1998). The present study aimed to

deepen our understanding of the dancers' experiences in dance programming, perspectives on instruction, and the meaning of dance in their lives. Semi-structured interviews that included photo-elicitation were conducted with dancers who identified as having NDD, and those who support them. Twenty-one adults, including six support persons, participated. An iterative reflexive thematic analysis approach was used (Braun & Clarke, 2019). Three main themes evolved through the coding process and were contextualized using Newell's model of constraints (1986). An overarching theme encompassed dancers' identities as they expressed a passion for dance: "Dance is who I am, it is part of me". The theme "what dance adds to my life" included an enhanced sense of connection, self-efficacy and self-worth, ability to effectively express their emotions, and greater physical strength and body awareness. The theme "interplay in the dance environment" highlighted the interaction of task, environment, and individual constraints, including their relationship with the instructor, how instruction contributed to their sense of belonging (or lack thereof), and in turn, the importance of dance in their lives. Dance environments were also described as discriminatory resulting in dancers' feelings of isolation, unworthiness, and inadequacy. The model of constraints framed our understanding of the individual experiences of dancers with NDD as well as the elements of holistic dance instruction that led to dancers experiencing a sense of empowerment, changed perceptions of self and their abilities, and an enhanced sense of connection and purpose.

Associations among psychological skills, functional motor competence, and fitness scores in Military Reserve Officers Training Corps Cadets

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The purpose of this study was to examine associations between psychological skills, functional motor competence (FMC), and physical fitness in an Army Reserve Officers' Training Corps (AROTC) at a U.S. university. Adequate levels of FMC (i.e., locomotor skills, object control skills, and total body coordination) and physical fitness (i.e., cardiovascular, muscular strength, and endurance) are important aspects of physical military readiness. From a holistic perspective, it is necessary to examine all potential factors that may contribute to the improvement of FMC and fitness, including psychological skills. The Test of Performance Strategies-2 (TOPS-2) is an assessment of eight psychological skills in practice and eight in competition settings that positively impact mental and physical performance. A cohort of AROTC Cadets ($N = 133$, $m = 95$, $f = 38$) completed the TOPS-2, six FMC assessments (standing long jump, hopping speed, throw-catch task, throwing speed, walking backward on balance beam, and supine-to-stand time), and six common military fitness assessments (grip strength, hex-bar deadlift, sprint-drag-carry, hand release push-ups, standing power throw, and two-mile run). Raw scores were z-scored and converted to composite scores for overall FMC and fitness, respectively. Independent sample t -tests revealed males scored significantly higher than females in FMC and fitness ($p < .05$), 4/8 psychological skills in competition including automaticity, relaxation, imagery, and activation, and 4/8 psychological skills in practice including emotional control, imagery, attentional control,

and activation ($p < .05$). There were moderate to strong associations between fitness composite scores and TOPS-2 scores in females ($r = 0.498$ to 0.802 , $p < 0.05$), and weak to moderate associations between fitness composite scores and TOPS-2 scores in males ($r = .279$ to $.376$, $p < 0.05$). Low psychological skills observed in females warrant potential future research directions for improving FMC and fitness in females in military populations through better psychological skills training.

Virtual reality effectiveness on motor assessment in children with autism

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The delayed motor skills often exhibited by children with autism spectrum disorder (ASD) can significantly impact their motor function and development. A growing body of research suggests that virtual reality (VR) may offer intellectual and motor intervention benefits in individuals with disabilities, including those with ASD. Previous research in the field of health science has found VR to be effective for motor rehabilitation in individuals with ASD. The efficacy of VR environments in ASD research is a relatively novel field, but recent research on its use in intervention and assessment has been promising. The present study investigates the potential effectiveness of VR environments for motor assessment in children with ASD. We employed Unity in conjunction with the Oculus Rift to develop a VR motor assessment environment. Based on the Movement Assessment Battery for Children (MABC-2), we created animations featuring realistic child avatars demonstrating fundamental motor skills. Initially, it was challenging to develop these animations as we lacked assets to use for the avatars. We eventually discovered Mixamo, a repository of character models and avatars with premade animations for Unity. We selected two gross motor tasks from the MABC-2 (ball skills and balance) for virtualization in Unity, as they required minimal modifications to the animation clips and scripts, and provided a proof of concept for our approach. Using Mixamo, we could access a child avatar with basic animations such as aiming and catching, walking and jumping and a pre-rigged and pre-boned skeleton for animation. Results show that VR environments can help children with ASD improve their movement quality and understanding of the task requirements. Our future work involves building VR environments for the remaining tasks in the MABC-2 to examine the efficacy of VR on both fine and gross motor assessment in ASD. Funding source: National Science Foundation.

Initial effectiveness of a community-based physical activity program for families with a child on the autism spectrum: Examination of quality of life

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Children on the autism spectrum are twice as likely as their neurotypical peers to experience disparities in quality of life (QoL). Caregivers of children on the autism spectrum are also at higher risk for poor physical and mental health. Participation in regular physical activity (PA) is a

critical component of overall well-being. However, opportunities for families who have a child on the autism spectrum to engage in health-enhancing PA are relatively obsolete. A community-based physical activity intervention has the potential to address many participation barriers and represents a timely opportunity to promote positive trajectories of PA and QoL among both vulnerable populations. The aim of this study was to examine QoL trajectories during a one-year PA intervention for children on the autism spectrum and their caregiver. Twenty-six families, including children on the autism spectrum (85% male, M age = 8.7 ± 3.60) and their caregiver (96% female, M age = 39.93 ± 7.46), participated in the full intervention. Families participated in the yearlong intervention by engaging in once-weekly physical activity and nutrition education sessions. Caregivers completed questionnaires about their child (Pediatric Quality of Life Inventory) and themselves (Depression, Anxiety, and Stress Scale) at baseline and four-month intervals throughout the intervention. Caregivers reported a 13.38% improvement in depression and a 4.60% improvement in anxiety scores during the one-year PA intervention. Further, caregivers reported average depression and anxiety scores and mild stress scores. Reported emotional and social functioning improved with respective increases of 3.27% and 5.14% for children on the autism spectrum. Results provide preliminary evidence for improved QoL among children on the autism spectrum and their caregiver during a longitudinal PA program. Funding source: Michigan Health Endowment Fund.

Power mobility device use and developmental change of young children with cerebral palsy

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Mobility equity is a fundamental human right and is supported by the United Nations. Mobility access is critical to maximize the development of children with neuromotor disabilities, including cerebral palsy. Mobility may include use of power mobility devices such as motorized wheelchairs, the Explorer Mini, and modified ride-on toy cars. The Explorer Mini is a Federal Drug Administration cleared power mobility device for children 12-36 months old. Ride-on toy cars are modified through installation of a large and easy-to-press activation switch and customized seating support with low-cost and readily available materials. The purpose of this study is to understand the effect of a power mobility intervention on developmental changes of children with cerebral palsy. This study is a randomized, crossover clinical trial involving 24 children (12-36 months) at-risk or diagnosed with cerebral palsy. Children received the Explorer Mini or a modified ride-on car for 8 weeks, then received the other device for an additional 8 weeks. The Bayley Scales of Infant Development-4 was administered at baseline, mid-study, and end-of-study. Raw change scores were used for analysis. Total minutes of device use was categorized as low or high use for analysis. Explorer Mini: The high use group exhibited significantly greater positive change scores compared to the low use group on receptive and expressive communication, and gross motor subscales ($p < .05$). Modified ride-on car: No significant differences between low and high use groups. Regardless of device, low use was associated with no developmental change and high use was associated with positive developmental changes. This study addresses the potential effect of low and high device use on

developmental outcomes for young children at-risk or diagnosed with cerebral palsy and may have implications for the development of evidence-based guidelines for power mobility use. Funding source: National Institute of Child Health and Human Development, Permobil.

Exploration of an online family-implemented physical activity intervention for children with autism spectrum disorder

Yuemei Lu, East China Normal University; Janet Hauck, Michigan State University

Low participation in daily moderate-to-vigorous physical activity (MVPA) and delays in motor skills are common in children with autism spectrum disorder (ASD). Although there are emerging interventions created to support physical activity (PA) and motor development in children with ASD, there is a dearth of online programs which could be more accessible and flexible for this population. This study was conducted during the COVID-19 pandemic during which online programs were even more needed. This study provided a family-implemented online PA intervention for children with ASD and aimed at investigating its preliminary effectiveness and examining the extent to which it was delivered as prescribed. Twenty-four families (the parent, the child with ASD, and the neurotypical [NT] sibling) were recruited and randomly assigned to three intervention conditions: (a) both the parent and the NT sibling served as intervention agents, (b) only the parent served as an intervention agent, and (c) no PA intervention was given (sedentary play activities were provided instead). Descriptive analysis and a repeated-measures ANOVA were used to investigate differences in PA, parental perceived motor competence, and social outcomes in the three groups over time. Results indicated, among families who completed more than 60% of the intervention, significant differences were found in scores of object control skills ($F(1,6) = 17.163, p = 0.006$), fundamental motor skills ($F(1,6) = 7.385, p = 0.035$), and parental perceived motor competence ($F(1,6) = 6.914, p = 0.039$) over time across the three groups ($F(2,6) = 6.838, p = 0.028$), ($F(2,6) = 13.507, p = 0.006$), and ($F(2,6) = 6.844, p = 0.028$). Group A showed more significant improvements. Moreover, participants in all three groups showed improvement in parent-ASD interaction across time ($F(1,6) = 6.964, p = 0.039$). The process evaluation indicated high fidelity and level of enjoyment. This study should provide new clues for the design of the future online sibling-guided motor and PA intervention for children with ASD. Funding source: Michigan State University.

Does physical literacy enhance the likelihood of children meeting the physical activity guidelines?

Emiliano Mazzoli, Deakin University; Jingwen Xu, Deakin University; Lisa M Barnett, Deakin University

Despite the benefits of physical activity, children's compliance with physical activity recommendations is very low and this situation worsened during the coronavirus disease pandemic (COVID-19). Physical literacy has been theorized to enhance and sustain children's engagement with physical activity. This study aimed to investigate whether self-reported

physical literacy enhanced the likelihood of children meeting the physical activity guidelines during COVID-19. Data for this cross-sectional study were collected from 648 Australian children (60% boys) aged 7–12 years (M age 10 years ($SD = 1.7$)) and their parents/guardians during the pandemic in 2020. Recruitment was conducted through social media and panel sampling. Self-perceived physical literacy was measured using the pictorial Physical Literacy in Children Questionnaire (PL-C Quest). Children's adherence to physical activity guidelines was collected from parents/guardians using a two-item questionnaire (the number of days children were active for at least 60 minutes in a typical week before and during COVID-19). The association between physical literacy (predictor) and physical activity (binary outcome: meeting/not meeting guidelines during COVID-19) was tested with logistic regression and adjusted for relevant confounders. Most parents spoke English at home (91%), over half had a university education (62%) and three quarters had paid employment (75%). Children's physical literacy scores ranged from 32–120 (mean score 94 ± 16). Physical literacy was associated with significantly higher (albeit small) odds of meeting the physical activity recommendations during COVID-19 ($OR = 1.03$, 95% CI [1.02; 1.05]). These findings indicate that self-perceived physical literacy may be a protective factor for physical activity behavior. Further research could confirm this relationship using objective measures of physical activity and explore whether interventions designed to improve physical literacy can benefit physical activity. Funding source: Deakin University.

Influence of adiposity and maturity status on motor performance in boys and girls 2-18 years old

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Recent reports indicate the number of children who are overweight or obese is high and increasing. Excess body fat may impact children's motor performance. The purpose of this study was to examine (a) if adiposity impacted performance in the flexed arm hang (FAH) and the agility shuttle run (ASR), (b) if maturity status impacted performance in both tests, and (c) the interaction of maturity status and adiposity on motor performance. Participants ($N = 1,084$) were boys and girls aged 2 to 18 years old with anthropometric and motor performance measurements over the course of study participation. Adiposity was assessed at the triceps, subscapular, and umbilical sites, and summed for an overall adiposity score. Multilevel modeling was used to assess intra- and inter-individual change in motor performance over time. Overall, motor performance improved with age (FAH $\beta = 2.30$, $p < .001$; ASR $\beta = -0.46$, $p < .001$). Children with greater adiposity showed poorer performance on both motor skills assessments (FAH $\beta = -3.28$, $p < .001$; ASR $\beta = 0.01$, $p < .001$), and slower rates of improvement in motor performance over time compared to their leaner peers (FAH $\beta = 2.23$, $p < .001$; ASR $\beta = -0.37$, $p < .001$). Maturity status did not significantly affect motor performance over time for boys or girls on either motor skills test. A significant interaction was found for maturity status and adiposity for girls on both motor skills tests. Upon examining results from simple slopes analyses, only late maturing girls with low adiposity performed better than average maturers

with low adiposity on the flexed arm hang ($\beta = -0.60, p = .027$). Only early maturing girls with high adiposity performed better than average maturers with high adiposity on the shuttle run ($\beta = -0.06; p = .027$). The interaction between maturity status and adiposity was not significant for boys ($\beta = 0.04, p = .227$). Results indicate the interaction between maturity status and adiposity may impact youth's motor performance differently across skills tests.

SKIPping with PAX: An ecological approach to motor skill and social-emotional development

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Preschool is a crucial time for the development/learning of social-emotional and fundamental motor skills. Improving the development of the mental and physical domains during early childhood can impact the overall trajectory of a child's health and well-being. However, researchers often address these domains independently, leaving a gap for a more integrated approach to addressing development. The purpose of this study was to explore the effects of an integrated approach on changes in preschool-aged boys' and girls' motor skills (object control, locomotor) and social-emotional (social skills and problem behaviors) skills. Preschoolers ($N = 475$; girls = 220, boys = 255) ages 3-6 years completed the nine-month intervention (SKIPping with PAX) and were randomized into control ($n = 148$) or intervention ($n = 327$) groups. The intervention integrated the use of Successful Kinesthetic Instruction for Preschoolers (SKIP) and the PAX Good Behavior Game both within the classroom (five days per week) and during recess (two days per week). The control group participated in their regular activities. There was a significant condition x time interaction for social skills ($F[1, 386] = 8.511, p < .005, \eta^2 = .02$), object control skills ($F[1, 364] = 103.534, p < .0001, \eta^2 = .22$), locomotor skills ($F[1, 370] = 71.393, p < .0001, \eta^2 = .16$), and total TGMD Score ($F[1, 364] = 145.681, p < .0001, \eta^2 = .29$). There were no significant improvements in problem behaviors ($p > .05$). Additionally, there was a main effect of sex for social skills, object control, and TGMD; the boys had better scores than girls regardless of time. However, boys and girls improved at the same rate in object control, locomotor, and TGMD. These results suggest that an integrated intervention can improve preschoolers' social skills and motor skills with no differential effects for sex. Future research and implications will be discussed. Funding source: National Institute of General Medical Sciences.

Attendance fails to predict changes in motor skills across CHAMP

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Motor skill interventions are an effective means of improving skills in young children. Data support that intervention dosage (i.e., total intervention minutes) does not predict changes in skill. However, less is known about how participants' attendance relates to intervention

outcomes. This study aimed to determine if children's attendance in the Children's Health Activity Motor Program (CHAMP) was a significant predictor of changes in skill across the program. Seventy-one children ($M_{\text{age}} = 53.2 \pm 3.7$ months, 29 boys) were recruited from two Head Start Centers in a small city in the United States. All participants were enrolled in a 16-week CHAMP intervention (48 sessions total, 1940 min), and attendance was recorded as the number of sessions attended. Motor skills were assessed before and after CHAMP using the Test of Gross Motor Development-3 (TGMD-3; Ulrich, 2019). TGMD-3 raw scores for total (0-100), locomotor (0-46), and ball skills (0-54) were examined separately. Data were analyzed using correlations and linear regression. Models were fit with a predictor of attendance, outcomes of post-test motor skills, and control variables of pretest motor skills and sex. Separate models were fit for total, locomotor, and ball skills. On average, children missed 6.43 sessions ($SD = 4.89$, range 0-19). Controlling for pretest skills and sex, attendance did not predict post-test locomotor skills ($p > 0.05$), ball skills ($p > 0.05$), and total skills ($p > 0.05$). These preliminary results support that child attendance does not predict changes in motor skills across CHAMP. These results should be interpreted with respect to how attendance was assessed, and future work should examine if different conceptualizations of attendance (e.g., minutes/partial attendance) are better predictors of change. This work adds to our ongoing research on the "black box" of motor skill interventions and how children's engagement and attendance in interventions relate to outcomes. Funding source: National Heart, Lung, and Blood Institute.

The effect of space at home on motor skills and physical activity in parent-child dyads

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Indoor and outdoor space(s) at home may support physical activity (PA) and enhance motor skills (MS) in parent-child dyads. However, little is known about the effect of indoor and outdoor space at home on PA and MS in children, and no studies have examined how space at home affects PA or MS in parents. Thus, this study examined whether indoor and outdoor space at home affects MS and PA in children and their parents. Due to the COVID-19 pandemic, MS (limited to catch, kick, throw, and jump; scored using the Test of Gross Motor Development-3) and moderate to vigorous PA (MVPA; Actigraph GTX3 +) were self-assessed in 43 and 48 parent-child dyads, respectively (parent $M_{\text{age}} = 39.87 \pm 5.8$ years; child $M_{\text{age}} = 9.77 \pm 1.1$ years). Indoor and outdoor space at home were self-reported through an online questionnaire where parents responded to the questions "Do you have a specific indoor space for physical activity (i.e., gym, exercise room, play space)?" and "Do you have an independent outdoor space?". Parent responses were recorded as 0 (no) and 1 (yes) for indoor space, and responses for outdoor space were recorded on a 5-point scale with anchors at 0 (we do not have an independent outdoor space) and 4 (large yard or garden). Four multiple regression models were built to determine the effect of indoor and outdoor space on MS and PA in children and parents separately. Controlling for significant covariates, outdoor space at home was positively associated with parents' ($b = 1.52, p < .05$) but not children's MS ($b = 1.25, p = .08$), although a positive trend was noted. Indoor and outdoor space at home did not affect children's MVPA,

but the effect of indoor ($b = 12.46, p = .07$) and outdoor ($b = -5.92, p = .09$) space at home nearly reached significance for parents. The effect of space at home on PA and MS differed between children and parents. Further, indoor and outdoor spaces play unique roles in supporting PA and MS. These findings should be probed in future studies as they may have important implications for developmental interventions involving parent-child dyads.

Mother parenting skills, clinical, and contextual factors: Neurodevelopment of preterm children in the first two years of life

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Preterm children constitute a critical risk group for atypical neurodevelopment; interactions with their mothers may be a protective factor. To examine in the first year of life the associations between risk and protective factors with cognitive, language, motor, and social development of preterm children and the factors in the first year of life that predict the children's development in the second year of life. Parenting skills, and mother/child dyads in preterm children from the first to the second months of corrected age. Participants were 47 preterm children and their mothers assessed at the first (M age/months = 10.4, $SD = 3.6$) and second (M age/months = 26.2, $SD = 8.5$) years of life. The Bayley Scale of Infants and Toddler Development-III and the Interaction Rate Scale were used. Cognitive and language scores decreased from the first to the second year of life, and children's motor and social skills, parenting skills, and mother/child interactions remained stable. In the second year of life, children with delays showed lower social skills, their mothers had lower parenting skills, and the mother/child dyads of interactions were also less evident. The significant factors that influenced child neurodevelopment in the first year of life were: the number of children at home, NICU stays, mother's age, and parenting foster child cognitive growth; whereas, in the second year of life, neurodevelopment was mainly influenced by mother/child interactions dyads and breastfeeding. Furthermore, the number of children at home, child autonomy and responsiveness to the mother, breastfeeding, and family income were the factors in the first year of life that predicted neurodevelopment in the second year. The results reinforce the need for stronger mother/child interaction dyads and parenting skills to promote the neurodevelopment of premature children, especially the ones with delays. Funding source: CAPES and CNPq.

Risk factors associated with developmental coordination disorder at preschool age: A Brazilian preterm cohort study

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The etiology of developmental coordination disorder (DCD) in preterm children is still unclear, with divergent results in the literature. Also, the preterm Brazilian population has not yet been investigated in relation to the incidence of DCD and risk factors. This study investigated the association of biomedical and environmental risk factors and later diagnosis of DCD at preschool age in Brazilian preterm children. A total of 63 preterm children from a follow-up clinic for high-risk infants participated in the study. The MABC-2 was used to assess motor performance at preschool age, the neurologist in the follow-up clinic assessed neurological conditions, parents reported children's difficulties at home or school, and delays in motor milestones were directly assessed in the first year of life. Pre, peri, and neonatal data during hospital stay were prospectively collected. Biomedical data, socioeconomic, and environmental information were also collected during the first year of life in each follow-up appointment. A multivariate logistic model was used to explore the associations between risk factors and DCD. The prevalence of DCD was 52.38% ($n = 33$), and differences between groups were found in sex, bronchopulmonary dysplasia, ventilatory support, and family income. The multivariate logistic regression model was significant ($X^2(4) = 31.391$; $p < .006$) and showed that sex, bronchopulmonary dysplasia, and family income were predictors of DCD. The DCD diagnosis was related to biomedical and environmental risk factors in the first year of life. Subtle motor difficulties should not be overlooked when these risk factors are present. Funding source: CAPES and CNPq.

Examination of physical activity levels between Special Olympics athletes and unified partners during 2022 Special Olympics Unified Cup gameplay

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Special Olympics Unified Sports joins persons with and without intellectual disabilities as teammates in competitive sports to cultivate friendship, compassion, and social inclusion. A criticism of Unified Sports is that gameplay by athletes without intellectual disabilities may reduce opportunities for participation among Special Olympic athletes. The purpose of this study was to investigate differences in gametime physical activity (PA) among Special Olympics (SO) athletes and their unified partners during the 2022 Unified Cup. Participants included 147 SO athletes ($n = 84$; 32 females and 52 males) and unified partners ($n = 63$; 26 females and 37 males) representing 14 of 22 international teams competing in the 2022 Unified Cup. PA during gameplay was monitored objectively using Actigraph accelerometers and classified by Freedson et al., (2011) vector magnitude cutpoints. Games were 60 and 40 minutes in duration for males and females, respectively. Data were cleaned to remove non-gameplay, sideline, and goalie minutes from gameplay time. ANOVA, controlling for minutes of gameplay, was used to examine differences in PA levels between SO athletes and unified partners. For female athletes, unified partners had significantly more minutes of vigorous PA than SO athletes (5.51 vs. 4.81 minutes; $F(1, 214) = 4.85$, $p = .029$, Cohen's $f = 0.13$). For male athletes, unified partners had significantly more minutes of very vigorous PA (10.16 vs 8.60 minutes; $F(1, 252) = 14.42$, $p < .001$, $f = 0.23$), but SO athletes had significantly more vigorous PA than unified partners (9.63 vs

8.03 minutes; $F(1, 252) = 11.80, p = .001, f = 0.21$). When combined as moderate-to-vigorous PA (MVPA), no significant group differences ($p > .05$) were found for females (19.96 vs 19.89 minutes) or males (37.18 vs 37.53 minutes). Results suggest that SO athletes and unified partners contribute equally to gameplay, except for small differences at the highest intensities of PA. These findings have implications for the continued promotion of Unified Sports as an initiative of Special Olympics.

Step-by-step: Examining foot targeting precision in children versus adults

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When walking within a complex environment, such as stone-stepping, individuals rely heavily on visual and somatosensory feedback to maintain their balance. Any deviation from an expected foot placement location results in adults sacrificing accuracy of foot placement to maintain balance control. It is unknown whether children, who produce highly variable actions during obstacle crossing, possess similar adaptive strategies as adults during stone stepping. Specifically, are children able to adjust their locomotor strategies to accurately step towards displaced foot targets, similar to adults? The current study had middle-aged children (8-12Y, $n = 10$) and young adults (18-25Y, $n = 10$) step on nine rectangular steppingstones, evenly dispersed ($L = 50\text{cm}$, $W = 10\text{cm}$ apart) along a 5m pathway. Once participants began walking, a virtual steppingstone, 3.5m along the pathway, was set to remain in the same location or displace 10cm anteriorly, posteriorly, medially, or laterally. Furthermore, the virtual steppingstone either remained visible throughout the trial or disappeared 200ms following the shift in location. Participants completed 20 trials of each visual condition in a counter-balanced, block randomized design. We hypothesized that children would have greater trunk variability and greater errors in foot placement when the virtual steppingstone disappeared compared to adults. As expected, children had greater trunk pitch variability ($X = 2.86$) during the stone stepping task compared to adults ($X = 1.77$; $F(1,17) = 7.95, p = 0.012, f = 0.47$). Accuracy of foot placement was influenced by the amount of visual information provided ($F(1,17) = 5.94, p = 0.027, f = 0.35$), with greater error in foot placement with lack of visual information, but was not influenced by age group ($p > 0.05$). The results from the current study suggest that middle-aged children use visual feedback in a similar manner as adults during a stone stepping task. Overall trunk control may not be fully developed by 8-12 years old, resulting in an increased risk of injury during complex tasks and/or environments. Funding source: National Sciences and Engineering Research Council of Canada

A dynamic system's approach to understanding adaptive locomotion in individuals with developmental coordination disorder: A systematic review

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Developmental coordination disorder (DCD) is common but under-recognized neurodevelopmental disorder that significantly affects a person's ability to learn motor skills and perform daily activities. Current literature suggests that DCD may be caused, in part, by problems in perception-action coupling, resulting in difficulties in adaptive locomotion. To date, adaptive locomotion literature has not been synthesized within a framework that may shed light on factors contributing to functional difficulties experienced by individuals with DCD, or strategies to improve their motor function. Using dynamic systems theory as a framework, our systematic review (PROSPERO ID: CRD42022383963) aims to understand how motor behaviour during adaptive locomotion differs in individuals with DCD compared to similar-aged peers. We searched eight databases (PubMed, EMBASE, Medline, Web of Science, Scopus, CINAHL, Cochrane Library, PsycINFO) over a 20-year period (2002-2022). Following systematic screening by two independent reviewers, 29 articles were included for data extraction. Of the 29 studies, 4 studies examined adults, 23 studies examined children (5-17 years), and 2 studies included adults and children with DCD during adaptive locomotion. Eight studies examined obstacle avoidance, circumvention, or crossing, 4 studies used a dual task walking paradigm, 3 manipulated visual information, 2 involved obstacle targeting, 2 assessed road crossing abilities, 1 manipulated somatosensory information, and 1 study looked at stair negotiation. Further data extraction regarding the individuals, tasks, and environments of each study was completed and study quality was assessed using the Appraisal tool for Cross-Sectional Studies (AXIS). This systematic review is the first to synthesize evidence of problems in perception-action coupling as highlighted by adaptive locomotor tasks in children and adults with DCD. Findings will inform targets for intervention to improve function and safety of individuals with DCD to successfully navigate obstacles in their surroundings. Funding source: Natural Sciences and Engineering Research Council of Canada

Grip force improved following assisted cycle therapy (ACT) in in children with Down syndrome

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Almost 60% of children with Down syndrome (DS) do not meet the recommended aerobic activity each week. In the past, exercise has been difficult for children with DS, however, assisted cycle therapy (ACT) is an innovative technology which is a stationary bicycle with a motor that moves the children's legs at a rate greater than they could produce on their own and for a longer time so they can achieve the benefits of exercise. Thus, the purpose of this study is to examine a 2x/week for 8 weeks 30 minute ACT intervention on fine motor control in children with DS. It was hypothesized that grip strength measured with a hand dynamometer and manual dexterity as measured by the Purdue Pegboard test would improve following an 8-week ACT intervention. Paired sample *t*-tests were conducted pre and post for each measure. The results showed significant improvements in grip force following ACT. One explanation for improvements from pre to post in fine motor control may be due to the fact that the prefrontal cortex has a role in global motor function and was activated during 8 weeks of ACT leading to

cortical changes that were evident in improvements in fine motor control. Our results are discussed with respect to their future implications for the benefits of exercise for young children with DS.

Relationship between motor competence, weight status, and cardiorespiratory fitness from 7 to 16 years of age.

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Strong evidence has been found for a negative relationship between motor competence (MC) and weight status (WS), and a positive one between MC and health related fitness (HRF). Nevertheless, most of the instruments used for determining MC do not include information about the three major components (stability, locomotor, and manipulative), or their specific relationship to WS or HRF. Using the motor competence assessment (MCA), that entails the three components of MC and specifically designed to assess MC throughout the life span, we aim to disentangle some of these questions from 7 to 16 years-old. A sample of 1103 participants (539 girls) from 7 to 16-years of age, were tested on the MCA and on the 20-m shuttle run test (PACER), and had their weight and height measured. All values were normalized according to age and sex. Relationship between these variables were analyzed by bivariate correlations. ANOVA analyses were applied to contrast the MC level between three weight status conditions (normal weight, overweight, and obesity), and three cardiorespiratory fitness (CRF) conditions (low CRF, average CRF, and high CRF). Results show a gender diversity on the relationships between MC, WS and CRF. Linear correlation between total MCA and BMI was inexistent for girls (-0.01), and very low for boys (-0.19), but returned moderate values between MCA and CRF (0.41 and 0.46 for girls and boys). Boys showed stronger relationships between CRF and locomotor and manipulative components, while girls had a stronger correlation between stability and HRF. Nevertheless, when divided according to weight status, normal weight boys and girls showed significantly better MC levels than their overweight and obese counterparts, and the same happened for the group of high CRF when compared with average or low CRF groups. Different MCA components had different association profiles with BMI and CRF, showing that MC should be treated as multivariate trait composed of stability, locomotor, and manipulative components, as presented in the MCA assessment. Funding source: European Regional Development Fund.

“Learners” and “non-learners” use visual anticipation during the learning process of a contingency learning paradigm in infants

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An examination of visual behavior during a motor learning paradigm can enhance our understanding of how infants use vision to learn motor skills. The aim of this study was to determine if infants who learned a robot-mediated contingency learning paradigm (CLP) demonstrated visual anticipation on the robot's reinforcement behavior (clapping) linked with their own leg movements. In this study, learning was defined as a 50% increase in movement of the infant's right leg during the contingency phase following a baseline period (no contingency). Fifteen infants with typical development (6-9 months) wore eye-tracking equipment for recording their gaze as they sat supported facing an infant-sized humanoid robot. A sensor placed on their right ankle recorded their leg movements and activated clapping by the robot (contingency reinforcement). The video frame by frame analyses identified gaze shifts that preceded (predictive), occurred (reactive), or did not occur (non-looks) in response to robot reinforcements. A Wilcoxon signed ranked test was used to test whether the proportion of predictive gazes was statistically different from random chance (i.e., 33.3% for 3 types of gaze). A Wilcoxon ranked sum test was used to test if the gaze behaviors differed between learners and non-learners. Results showed that 6 infants learned the contingency and anticipated robot kicks at greater than random chance ($p = 0.028$). Gaze shifts preceded the robot kick by 0.31 sec (median). Learners and non-learners had similar visual and motor behavior during the contingency, but learners moved less during the baseline period ($p < 0.01$). Defining learning based on baseline performance may misclassify participants due to similarities in visual motor behavior while engaged in the contingency portion of our paradigm. Therefore, we conclude that infants try to learn the paradigm through using visual anticipation and further work is needed to examine if visual anticipation results in retaining the learned connection between the infant's behavior and the reinforcement. Funding source: National Science Foundation.

Examining patterns of explicit and implicit learning during a contingency learning paradigm in infants

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Learning in contingency learning paradigms (CLP) in the infant literature has historically operationalized learning as the increased production of a reinforced behavior. In this study we examined the visual-motor patterns of infants during a CLP for evidence of explicit and/or implicit motor learning strategies. Thirteen infants with typical development (6-9 months) were seated in front of an infant-sized humanoid robot that was programed to clap to reinforce the infant's right leg movements. The session (12 min) was video recorded and analyzed frame-by-frame to identify the type of gaze (predictive, reactive, no gaze) and number of gazes for each 1-minute block of the recording. Consistent predictive gazes were considered evidence of explicit learning (EL). An increase in robot claps in at least one of block after the EL was identified as evidence of implicit learning (IP). Results showed that all infants exhibited EL. Eleven infants (85%) displayed IL during the next block. Two infants (15%) did not exhibit IL after the EL. However, these two infants did increase overall kicking throughout the recording. These results provide evidence that infants, like adults, may utilize both explicit and implicit

learning during a CLP. The two infants who did not exhibit IL following an EL event may have been using both learning strategies in unison. Together, these results indicate that like most motor learning paradigms, there are two types of learning to be examined in infant CLP's. Pediatric clinicians therefore should focus on establishing behavioral connections during early learning and then focus on motor practice in the later phases of learning. Funding source: National Science Foundation.

What matters most for children with intellectual and developmental disabilities: Time spent in physical activity or physical activity with others

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On average, children with intellectual and developmental disabilities (IDD) do not meet the daily recommendations of moderate-to-vigorous physical activity (MVPA). Increasing physical activity (PA) has been shown to have positive implications on health status but there is a lack of research to understand the factors of enjoyment of PA and social skill development during PA. The purpose of this study was to examine time spent in MVPA, levels of enjoyment of PA, and with whom most of PA time was spent with. Participants included 35 children (25 boys, 10 girls) with intellectual and developmental disabilities (IDD) between ages 7 and 12 years ($M = 9.39 \pm 1.89$). The average BMI percentile of children with IDD was 59.40, with 3 (8.6%) who were considered underweight and 10 (28.6%) who were considered overweight or obese. Time spent in MVPA was objectively measured for 7 days using ActiGraph GT3X accelerometers. The Children's Assessment of Participation and Enjoyment (CAPE) was used to examine enjoyment during PA and with whom the children participated. On average, children with IDD spent 34.14 minutes per day engaged in MVPA with only 3 (8.6%) of the children meeting the daily recommendation of 60 minutes. Analyzing specifically the PA category of the CAPE, the children participated in an average of 3.5 of 13 activities (0 to 7). However, participation in these activities averaged only once per month. Of the PA the children participated in, an average of 68.6% indicated they very much enjoyed or loved participating in that activity and an average of 55.5% indicated participation in PA occurred with family. This study highlights the need for additional research to understand the importance of enjoyment in PA and the potential for PA to improve both health status and levels of MVPA. Additionally, engaging in PA with others needs to be considered a gateway to improving health and developing social skills and competencies in individuals with IDD as social skills are also required for successful participation in PA.

Are fundamental motor skills more impaired among children with autism spectrum disorder than is expected based on IQ scores?

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A hallmark characteristic of autism spectrum disorder (ASD) is the heterogeneity of the population, particularly when it comes to the intelligence quotient (IQ). The latest prevalence estimate is that 35.2% of 8-year-old children with ASD experience intellectual disability. Motor impairment is another characteristic of ASD that is present early and persists throughout development. However, there is a recent debate whether motor impairment is a core characteristic of ASD or if motor impairment is more prominent among children with ASD who also have an intellectual disability. Much of this debate has been based on large data sets with parental reports of both motor and intellectual impairment. The purpose of this study was to understand IQ relative to the performance of fundamental motor skills among children with ASD using norm-referenced and standardized assessments. Participants included 48 children with ASD (37 boys) ages 3 to 9 years. Depending on the age and level of language, the Mullen Scales of Early Learning (MSEL) and Wechsler Abbreviated Scale of Intelligence (WASI-II) and Leiter International Performance Scale (Leiter-3) were used for estimating the IQ of children with ASD. Overall, 33% of children with ASD in this sample were estimated to have IQ scores below 70 and were classified as having an intellectual disability. The Test of Gross Motor Development (TGMD-3) was used to assess the performance of 6 locomotor and 7 ball skills of children with ASD. Raw scores were converted to scaled scores to provide a clear indication of performance across motor skill subtests. The locomotor skills of 68.7% and the ball skills of 79.2% of children with ASD were described as below average, borderline, or impaired ($M_{LM} = 20.15 \pm 11.01$; $M_{BS} = 17.73 \pm 11.40$). Based on this sample, disproportionately more children with ASD experience motor impairment than intellectual disability. However, further research is needed to better understand the role that IQ plays in the development of fundamental motor skills.

How motor and social skills contribute to participation of autistic children

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Participation levels of autistic children in social and physical activities are generally lower than neurotypical children. The range of activities that autistic children engage in is also reportedly less diverse. Qualitative insights from caregivers and instructors support the notion that proficiency in motor and social domains are integral to autistic children's motivation, confidence, and competence to participate in social and physical activities. To further investigate the associations between motor skills, social skills, and participation in autistic children, the current research implemented a quantitative approach. Parent perceptions of their children's social skills (Social Responsiveness Scale – Second Edition [SRS-2]) and participation levels (Participation and Environment Measure – Children and Youth [PEM-CY]) were assessed in conjunction with a performance-based measure (Bruininks-Oseretsky Test of Motor Proficiency – Second Edition [BOT-2]) of children's motor competence ($N = 16$, M age = 7.2 years [range: ages 5-10], 13 male, 3 female). Multiple regression analyses were conducted to investigate whether motor (BOT-2 short form) and social skills (SRS-2 total score) would significantly predict participation levels (frequency and engagement) at home, school, and in the community. Variables predicted participation frequency at home ($F(2, 15) = 4.019$, $p = .044$), with social skills adding to the prediction ($\beta = -.589$, $p = .047$). Engagement in the

community was also significantly predicted ($F(2, 15) = 3.801, p = .050$). No other significant results were revealed. While it is important to acknowledge the small sample size when interpreting results, findings do support the consideration of experiential aspects of autistic children's participation in future research. A person-centered approach capable of partitioning between-person difference from within-person differences is recommended. Funding source: Social Sciences and Humanities Research Council of Canada.

Object control predictors of perceived motor competence in children aged 4-11 years old

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As children become older, perceived motor competence (PMC) plays a more important role in supporting physical activity behaviors across childhood. Object control (OC) competence has been associated with PMC and physical activity behaviors in childhood. However, few scholars have examined how OC competence predicts PMC using a developmental perspective and a broad view of OC competence. This study examined the extent to which a variety of process and product OC variables predicted PMC in early childhood (EC, 4-5 yrs, $n = 133$), middle childhood (MC, 7-8 yrs, $n = 128$), and later childhood (LC, 10-11 yrs, $n = 137$). PMC was measured through the physical competence sub-scale (Harter & Pike, 1984, or Harter 1982). Four OC variables (kick mph, throw mph, OC standard scores [OCSS] from the Test of Gross Motor Development 2, throw developmental sequence [ThrowSQ]) along with BMI, age group, ethnicity and gender were entered as predictors of PMC. A linear regression on all age groups found the variables significantly ($p < .001$) predicted 14% of the variance in PMC. For the combined age group model, kick mph ($p < .05$), ethnicity ($p < .01$) and age group ($p < .001$) were the only significant predictors. Three separate linear regressions by age group demonstrated a developmental trend with 10% of the variance predicted in EC ($p = .053$), 14% of the variance in MC ($p < .01$), and 17% of the variance in LC ($p < .001$). The only significant predictor for the LC age group was OCSS ($p < .01$). Significant predictors for the MC age group were ethnicity ($p < .05$) and BMI ($p < .01$). Although the model for the EC age group was not significant, BMI ($p < .01$) was a significant predictor of PMC. It can be concluded that both process (OCSS) and product (kick mph) OC variables along with age, ethnicity and BMI significantly predicted the variance in PMC with the strength of association increasing with age. As we consider intervening with the PMC of children it will be important to consider the role that OC skills play in support perceptions of competence across childhood.

Caregiver satisfaction with new service delivery formats of various ASD services over the course of the COVID-19 pandemic: A SPARK dataset analysis

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Children with autism spectrum disorder (ASD) receive a multitude of educational, medical, and therapeutic services. At the onset of the COVID-19 pandemic, all ASD services came to a complete halt following strict lockdowns (Bhat, 2021). Services resumed in various delivery formats – remote, in-person, or hybrid over the first year. Caregivers of children with ASD from the SPARK study ($N = 6,393$; ages 19 months – 18 years) completed an online survey on the impact of the pandemic on access to services and their satisfaction with service delivery (remote, in-person or hybrid) for various services (special education, speech, occupational/physical therapies, ABA, mental health, and medical). ASD services had not recovered fully to an in-person format in the first year. Certain service types, (e.g., special education, ABA, speech therapy, and PT/OT) had recovered to in-person formats to a greater extent (% recovery = 24-46.3%) compared to mental health or medical services (% recovery = 15-20%). This was also associated with an increase in caregiver satisfaction with services (SLT, PT/OT % improvement in satisfaction = 7.1-7.3%) showing slightly greater improvements compared to mental health and medical services (MH and MED % improvement in satisfaction = 4.6-5.7%). The relationship between caregiver satisfaction and service delivery format seemed to evolve in that newer formats were more accepted over time. Nevertheless, in-person format of service delivery was consistently associated with greater satisfaction followed by hybrid followed by online formats of service delivery. Caregiver satisfaction with services also varied as a function of service type/format. In conclusion, healthcare services for children with ASD were evolving rapidly during the course of the pandemic and was associated with caregiver satisfaction with services received. These findings have important implications for how service delivery formats need to be suited to the type of services offered and directly influence parent's overall satisfaction about service quality. Funding source: Department of Health and Human Services, Health Resources and Services Administration.

Cognitive orientation to occupational performance in very preterm preschool-age children with developmental coordination disorder: A pilot study

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Developmental coordination disorder (DCD) is a common neurodevelopmental disorder. DCD significantly interferes with an individual's ability to learn and execute daily motor skills, such as tying shoelaces, printing, and catching a ball. Compared to children born at term, those born very preterm (≤ 32 weeks gestational age) are at increased risk for developing DCD. The Cognitive Orientation to Occupational Performance (CO-OP) approach, a goal-oriented individualized treatment approach to improve motor skills, is currently the best treatment for DCD. As CO-OP was specifically designed for children aged 7-12 with DCD, its effectiveness in younger children or in children born very preterm has limitedly been explored. This pilot study examined the efficacy of CO-OP for improving motor skills and movement quality in very

preterm-born preschool-aged children. Four children born very preterm ($M_{age} = 5.0 \pm 0.7$ years) who scored $\leq 5^{th}$ percentile on the Movement Assessment Battery for Children-2 and diagnosed with DCD participated in the 10-week CO-OP intervention. Our primary outcome, the Canadian Occupational Performance Measure (COPM), measured parent ratings of performance and satisfaction of three chosen functional motor goals before and after CO-OP; an increase of ≥ 2 points is considered clinically significant on this 10-point scale. An occupational therapist (not involved in the intervention and blinded to pre-test and post-test) assessed changes in movement quality using the Performance Quality Rating Scale (PQRS). Results of this pilot study showed that COPM performance scores increased for all children (pre-COPM performance score range: 0-1.7; post-intervention range: 6.3 – 8.0). COPM satisfaction scores showed similar increases (pre-COPM satisfaction range: 1.3 – 3.7; post-intervention range: 4.7 – 8.3). Therapist ratings of movement quality closely matched parent ratings of performance and satisfaction. Findings suggest that CO-OP is a promising intervention for preschool-age children with DCD and that further investigation with a larger sample is warranted.

Cortical activity in response to visual motion in infants receiving extra motor stimulation, full-term control infants, and infants born preterm

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High-density electroencephalography (HD EEG) was used to investigate the effects of extra motor stimulation and preterm birth on the development of visual motion perception during early infancy. Infants receiving extra motor stimulation in the form of baby swimming, a traditionally raised control group, and preterm born infants (GA < 33 weeks) were presented with an optic flow pattern simulating forward and reversed self-motion, and unstructured random visual motion before and after they achieved self-produced locomotion. Extra-stimulated infants started crawling earlier and displayed significantly shorter evoked N2 latencies in response to visual motion than their full-term and preterm peers. Preterm infants could not differentiate between visual motion conditions, nor did they significantly decrease their latencies with age and locomotor experience. Differences in induced activities were also observed with desynchronized theta-band activity in all infants, but with more mature synchronized alpha-beta band activity only in extra-stimulated infants after they had become mobile. Compared with the other infants, preterm infants showed more widespread desynchronized oscillatory activities at lower frequencies at the age of 1 year (corrected for prematurity). The overall advanced performance of extra-stimulated infants was attributed to their enriched motor stimulation. The poorer responses in the preterm infants could be related to impairment of the dorsal visual stream that is specialized in the processing of visual motion.

Motor behavior and specific language impairment

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Following Bronfenbrenner's ecological systems theory (1977), human development throughout the life span presupposes continuous interaction between the growing individual and the changing social settings and contexts in which it is embedded. Social interaction in turn implies behavior, which can be distinguished in a verbal (i.e., language) as well as a nonverbal (i.e., motor) component. In order to foster a better understanding of social interaction from a developmental disability perspective, the aim of this research is to elaborate the nature, origin and impact of motor issues in individuals with specific language impairment (SLI). For this purpose, the essence of significant reviews, meta-analysis and selected recent original works on motor control, motor learning, and motor development related issues in SLI will be highlighted within a narrative research overview. Reviewed findings on motor control related issues clearly support the idea that motor deficits in SLI are not restricted to face and mouth movements. From the perspective of cognitive science research, identified issues in balance, speed, timing and sequencing indicate impairments of procedural (motor) learning in SLI. When transferring the findings on the linkage between cognition and action in the chronological dimension of our meta-theoretical framework, reviewed research indicates that individuals with SLI display delayed motor development and that respective deficits turn out to be a contributing factor in the development of language difficulties. The findings on motor issues reviewed within this research confirm that comorbidity represents the rule rather than the exception also in case of SLI. Following this observation, motor and inherent language impairments in SLI are assumed to share a common etiology grounded in the procedural memory system. However, leading approaches in the field need to be further challenged in respective replication studies before we can answer the question whether and if so, how a strengthening of procedural skills should be addressed in clinical practice.

Understanding levels of physical activity among children with autism spectrum disorder: Time spent in support services versus participation

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Children with autism spectrum disorder (ASD) spend less time engaging in physical activity (PA) than children with typical development (TD) of the same age. While lack of time is a common barrier to PA participation for all children, for children with ASD consideration must also be given to the time they spend in support services. Support services available for children with ASD are vast, yet there is limited understanding of the impact they have on PA. This study's purpose was to better understand how levels of PA and participation are impacted by time spent receiving ASD support services. Participants included 26 children with ASD (M age = 7.96 years, 22 boys) and 23 children with TD (M age = 7.94 years, 18 boys) between 6 and 9 years. ActiGraph 3T3X-BT+ accelerometers were used to provide an objective measure of moderate-to-vigorous physical activity (MVPA). Parents reported the frequency and time spent participating in organized PA and support services per week in the previous 6 months. Time spent in MVPA (minutes) was not significantly different between children with ASD ($M = 62.54 \pm 24.64$) and children with TD ($M = 71.65 \pm 24.47$; $t(1,47) = -1.296$, $p = .201$); however, only 14

(53.8%) children with ASD engaged in 60 minutes. Children with ASD ($M = 39 \pm 48.6$) and children with TD ($M = 70.2 \pm 69$) did not differ statistically on time spent participating in organized PA per week ($t(1,47) = -1.794, p = .081$); however, 13 (50%) children with ASD participated in 0 minutes of organized PA and only 5 (19.2%) spent more than 60 minutes per week. This data contrasts with children with TD of whom 9 (39.1%) spent more than 60 minutes in PA per week. Regarding services, 23 (88.5%) children with ASD and only 2 (8.7%) children with TD received weekly services. Furthermore, 16 (61.5%) children with ASD received 3 or more weekly services. This study's findings highlight the need to better understand the impact of services on PA. Although objective data did not differ significantly, additional research is needed to discern if accelerometry is measuring health-enhancing PA.

Children with ADHD: Are we missing a co-occurring diagnosis of developmental coordination disorder?

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The prevalence of co-occurring attention deficit hyperactivity disorder (ADHD) and developmental coordination disorder (DCD) is reported to range from 35% to over 50%. Individuals with DCD experience secondary social and emotional consequences over their lifespan, yet DCD remains under-recognized and under-diagnosed. This systematic review (PROSPERO CRD4202186923) aimed to summarize the current body of evidence for motor impairment consistent with DCD among school-age children with ADHD. We searched four electronic databases (CINAHL, PsycINFO, PubMed and EMBASE) and selected articles that met the following inclusion criteria: (a) published in English in a peer-reviewed journal from 2013-2021; (b) participants included children ages 6-18 years with an ADHD diagnosis; (c) a standardized motor assessment was used. Quality of studies was assessed using the Joanna Briggs Institute checklist for prevalence studies. Of 3,115 articles retrieved, 41 studies met our inclusion criteria. Overall, 51.6% of children with ADHD had clinically significant motor impairment consistent with DCD, but few were diagnosed. Among the papers that compared typically developing children and children with ADHD, 94.4% reported that children with ADHD had poorer performance on standardized motor assessments. In conclusion, children with ADHD have a high prevalence of co-occurring motor impairment consistent with DCD. Children with ADHD should be routinely screened for DCD and receive evidence-based intervention to address functional motor deficits.

Motor Learning and Control Abstracts

Predicting basketball shooting outcome from visual-motor control data using machine learning

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of North Carolina at Chapel Hill; Derek Panchuk, Chiron Performance; Adam Kiefer, University of North Carolina at Chapel Hill

Quiet eye (QE) indexes the amount of time a visual fixation is maintained on a task-specific target before a critical action begins. Across sports, increased QE duration coincides with increased task performance. QE is also trainable, but it is unknown whether QE is a direct predictor of performance, and this has implications for both assessment and training. The purpose of the current study was to determine if basketball shot outcome (i.e., make or miss) could be predicted from one or more QE-related measures (i.e., onset, offset, absolute duration, relative duration, shot location, and/or relative arm extension time) via decision tree models. We hypothesized that shot outcome could be accurately predicted (>80% sensitivity) and that relative QE duration would be the strongest predictor. A subset of data ($N = 7$) were analyzed from 11 club basketball athletes (5 females, 19.9 ± 0.9 yrs) who performed 200 shots from 6 locations on a standard collegiate court. Gaze and first-person video were recorded with a mobile eye tracker (50 Hz), and a 2-D sideline camera captured external video. Absolute (ms) and relative (%) QE duration were calculated from QE onset (gaze stable on target within 3° of visual angle for 3 or more frames before arm extension) and offset (gaze deviated off location for 3 or more frames). Training ($n = 5$) and holdout testing ($n = 2$; i.e., 70:30 split) datasets were used for modeling six predictors for comparison via a standard, evolutionary, and conditional inference (CI) decision tree model. Standard and CI tree models equally predicted 84% of makes and 32% of misses, with relative QE duration the strongest predictor. The evolutionary tree model had higher sensitivity (85%) but more difficulty predicting misses (28%), with relative arm extension time the best predictor followed by relative QE duration. In all models, a make was predicted if relative QE duration was over 15.5%. These findings indicate relative QE duration is an important skill for improved shot outcomes.

Preference for deliberate or playful practice affects motor skill performance and learning differently

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The current study examined if personality, trait affect, and/or general self-efficacy predicted participants' preference for practicing a novel stick-flipping and catching task deliberately or playfully. It also examined whether practice type led to better practice, retention, and transfer performance and whether it influenced state affect, intrinsic motivation, and task-specific self-efficacy. We assigned 16 participants (9 females) to a deliberate practice (DP) group and 17 (8 females) to a playful practice (PP) group based on their stated preference. All participants completed the trait version of the Positive and Negative Affect Schedule – short form (PANAS-SF), a big-5 personality inventory, and the General Self-Efficacy Scale (GSE). Both groups completed three 10-min practice blocks followed by 50-trial retention and transfer tests 7 days later. They also completed the state version of the PANAS-SF and the Intrinsic Motivation Inventory (IMI) after practice. Finally, participants completed the state PANAS-SF and rated

their task-specific self-efficacy prior to retention/transfer. Neither personality, trait affect, nor general self-efficacy predicted participants' preference for deliberate or playful practice. A 2 (group) x 3 (practice block) repeated measures ANOVA revealed significant effects of group and practice block and a significant interaction between the two, $F(2,62) = 5.94$, $p = .004$, partial eta squared = .16. Pairwise comparisons revealed the deliberate group made significantly more catches on practice block 3. We found no group differences in stick flipping and catching on retention or transfer. The deliberate group had significantly higher IMI scores after practice, $t(31) = 2.67$, $p = .012$, Cohen's $d = .93$, but we found no group differences in task-specific self-efficacy prior to retention/transfer and no differences in state affect after practice or prior to retention/transfer. In summary, psychological variables did not predict preference for practice type but practice type influenced acquisition and retention/transfer performance differently.

The influence of mental fatigue on explicit and implicit contributions to visuomotor adaptation

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The impact of mental fatigue on the processes underlying visuomotor adaptation has yet to be established. This experiment sought to determine how mental fatigue impacts the contribution of explicit (i.e., conscious strategy) and implicit (unconscious) processes to visuomotor adaptation. Participants were divided into a mental fatigue and control group. Mental fatigue was induced through a time load dual back task, in which participants were required to respond as quickly as possible to digits displayed in a choice reaction time task, as well as recall letters previously displayed on the screen for 32 minutes. The control group watched a documentary for the same duration. Subjective feelings of mental fatigue for both groups were established through a self-report questionnaire. All participants then reached in a virtual environment in which visual feedback of a cursor on the screen was rotated 40 degrees clockwise relative to their hand motion. Participants completed 4 blocks of 45 reach training trials. These trials were followed by reaches in which no cursor was displayed, and participants were instructed to reach will using any strategy they had employed previously to assess explicit adaptation or reach directly to the target to assess implicit adaptation. Results indicated that the fatigue group experienced increased fatigue compared to the control group. This fatigue resulted in a lower rate of adaptation in early reach training trials when the cursor rotation was first introduced. Both groups of participants then demonstrated a contribution of explicit and implicit processes to visuomotor adaptation. Thus, preliminary results suggest that mental fatigue does not influence the contribution of explicit and implicit processes to visuomotor adaptation. Funded by Natural Sciences and Engineering Research Council of Canada.

Perception of affordances in female volleyball players: Serving short versus serving to the sideline

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In volleyball, players adjust their serves according to game situations, such as scoring points by hitting the ball towards an open area. Previous research has documented refined perception of affordances for kicking a soccer ball through narrow gaps. We asked whether volleyball players could perceive affordances for serving the ball into narrow gaps. Eleven volleyball players with more experience ($M = 4.6$ years) and thirteen players with less competitive playing experience ($M = 2.1$ years) participated in this study. Using the method of adjustment, participants adjusted markers on the court to create the minimum gap into which they could serve the ball. They separately created gaps for short serves (i.e., servers close to the net), and sideline serves. We predicted that gaps would be smaller for sideline serves than for short serves. Later, we assessed their actual ability to serve the ball into their self-created gaps. Consistent with our prediction, gaps for sideline serves ($M = 1.93$ m, $SD = 0.71$ m) were smaller than for short serves ($M = 3.66$ m, $SD = 0.67$ m). The mean proportion of successful serves for the more experienced group ($36\% \pm 31\%$) was greater than for the less experienced group ($26\% \pm 25\%$), confirming that experience was associated with greater serving skill. The interaction between experience groups and serve types was significant, revealing that the effect of experience on actual serving performance was greater for sideline serves than for short serves. Our results confirm that competitive volleyball players accurately differentiated affordances for short versus sideline serves. Our results suggest that 2 years of competitive experience was sufficient for players to acquire refined perception of affordances for serving.

The effectiveness of attentional focus instructions on sprinting performance

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Attentional focus (AF) has been categorized into an external focus (EF) directing attention to the effects of the movement on the environment, and an internal focus (IF) directing attention to the movement. Research has consistently proven that an EF is more beneficial for learning and performance. Research for sprint running has supported the AF literature suggesting adopting an EF instruction produces a faster overall sprint time. However, limited research exists specific to what AF instructions are used during sprint training and how that affects retention. This study investigated the effects of attentional focus instructions utilized during sprinting trials and retention. Healthy adults were randomly assigned to one of three groups: EF ($n = 5$, 22.40 ± 1.95 yrs), IF ($n = 5$, 21.80 ± 1.48 yrs), or control ($n = 4$, $21.75 \pm .96$ yrs) group. Participants completed 20m sprints. Baseline consisted of three trials without AF instructions. During acquisition, participants received AF instructions prior to each trial. The EF group was told to “focus on driving forward as powerfully as possible while clawing the floor with your shoe as quickly as possible” whereas the IF group was told to “focus on driving one leg forward as powerfully as possible while moving your other leg and foot down and back as quickly as possible. The retention test consisted of three trials with no AF instructions 20-minutes following acquisition. A 3 (Group) x 3 (Time) repeated measures ANOVA was performed to

examine if AF instructions influence sprinting performance. Alpha was set at .05. Significant differences were not observed by trials ($F = 2.19, p = .175$) and by trial and condition ($F = 2.60, p = .076$). Overall, the EF group demonstrated a faster average sprinting time from baseline to acquisition. The findings suggest that a larger sample size is needed to increase statistical power and the participants' skill level with sprint training needs to be considered. In addition, more practice trials across multiple days is needed with AF instructions prior to an immediate retention test.

Visuomotor adaptation is adversely affected by body awareness and negative self-conscious emotion in men, but not women

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Attention to the body and self-conscious emotions can impair motor performance, which may reflect the reallocation of cognitive resources from the task to monitoring the body. Little is known about the potential impact of these body-related factors on motor adaptation and learning. The present study investigated the effects of recalling positive or negative body-related emotions on visuomotor adaptation and explored potential gender differences in these effects. Data were collected online from 100 women and 47 men (M age = 24.8 years), who were randomized to pride ($n = 69$) or embarrassment ($n = 78$) conditions. Participants completed a relived emotion (narrative writing) task designed to evoke body-related emotions of pride or embarrassment. Participants then completed a visuomotor adaptation task, using a mouse to move a cursor towards peripheral targets located around a central point on the screen. Baseline trials were completed with the mouse in its typical orientation. During the subsequent adaptation phase (4 blocks of 64 trials), the mouse was rotated by 90° counter clockwise from the baseline orientation. Performance was tested immediately following the adaptation phase and retention was tested 24 hours later. Movement time was analyzed using linear mixed-effects modelling for adaptation (block 1 vs. block 4) and retention (post-adaptation vs. 24-hour). Analysis of interaction effects revealed that men in the embarrassment condition had longer movement times in the first adaptation block and showed reduced retention, compared to men in the pride condition. There were no significant effects of condition for women. Relived emotion scores, trait self-conscious emotions, and current affect did not contribute significantly to movement time. These results suggest that visuomotor adaptation may be adversely affected by recalling embarrassment-related scenarios, particularly in men. Further investigation is needed to understand the role of self-conscious emotions and body awareness in the observed effects. Funding source: Social Sciences and Humanities Research Council of Canada.

Consolidation of explicit motor memory following immediate and delayed post-practice mindfulness meditation in inexperienced meditators

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Heightened wakeful consolidation following post-practice meditation has been demonstrated with explicit motor memory in experienced meditators and implicit motor memory in meditation naïve individuals. We investigated if explicit motor memory consolidation can be augmented with immediate or delayed post-practice meditation in inexperienced meditators. Fifty-two meditation naïve participants, aged between 18 and 35 years, first practiced an explicit motor sequence task with the non-dominant hand for 12 trials. The task goal was to repeatedly complete a 5-key press sequence in each 30-second trial. Three post-practice conditions involved control, immediate meditation or 2-hour delayed meditation. Control was based on listening to a 20-minute nonfiction audiobook while immediate and delayed meditation consisted of a 20-minute audio-guided body scan and breath awareness mindfulness technique. Motor task performance was then assessed at wakeful and post-sleep tests with 5 and 24-hour post-practice delays, respectively. Bayesian single-sample t-tests with the sample indicated extreme evidence of sequence completion increase across practice and moderate evidence of no change in performance over wakeful and sleep consolidation periods. Bayesian analysis of variance did not support presence of group differences in practice performance or improvement. There was no support for group differences in wakeful or sleep consolidation. The present findings indicate that in meditation naïve adults, memory consolidation of newly acquired explicit motor memory is neither enhanced or suppressed by immediate or delayed post-practice meditation. However, any conclusion is precluded by the presence of methodological differences with previous work with respect to the explicit motor task, volume of practice and the absence of an interfering sequence introduced after practice. Further research is needed to evaluate the extent to which meditation-based motor memory consolidation is influenced by the type of motor task, practice conditions, and meditation experience.

Constraints on reaching kinematics in virtual environment

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Object size (large vs. small) and task goal (reach as fast as possible vs. comfortable pace) are well-accepted task constraints that influence reaching patterns, even in a virtual environment (VE). Differences between children and adults and hand use while reaching in a VE is unknown. The purpose of this study is to systematically examine the effects of size, goal, age (children vs. adults), and hand (dominant vs. non-dominant) in VE. Forty-one healthy adults and 38 children (6-12 years old) participated. All were asked to play bubble popping games via our virtual reality (VR) platform (SuperPop VR), which precisely measures reaching kinematics (duration, straightness, jerkiness, and speed) in real time. Subjects were blinded to the study purposes and 2 task constraints were manipulated: bubble size and goal. Subjects began with their

dominant hand and alternated hands after each condition was tested 3 times. A mixed ANOVA was used for analyses. For size effect: reaching for small bubbles showed longer duration, jerkier, and slower speed than large ones ($p < .001$). In adults, small bubbles had a less straight path than large ones in both hands, but only in children's dominant hand. For goal effect: children showed no difference on any of the variables between 2 task goals, but adults demonstrated longer duration and slower reaching at a comfortable pace compared to fast ($p < .001$). Adults showed no difference in straightness except when using dominant hand to pop small bubbles, comfortable pace created a straighter path than fast. For age effect: children generally had longer duration, jerkier and less straight paths than adults (all $p = .003$ or $< .001$). With further examination of average speed, children demonstrated slower speed in reaching than adults during fast pace. There was no significant hand effect on any of the kinematic variables. Our findings confirmed that object size, task goals, and age affected reaching kinematics during VR games. When conducting a VR intervention or assessment, it is important to consider these factors as they influenced participant performance.

Aborting practice trials – A preliminary investigation

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In some instances, athletes make the decision to abort, rather than complete a practice trial when a movement pattern or performance deviates from the intended goal. Examples are slalom racers who ski off course and divers who terminate their takeoff. While coaches frown upon this approach, the arguments against it are anecdotal. This study examined whether choosing to abort practice trials adversely affects skill acquisition and performance. Participants ($N = 31$) were randomly divided into condition 1 where they could choose to abort any trials they were not satisfied with or condition 2 which required the completion of all trials. The task was the 3-6-3 stack in sport stacking. Participants attended 3 sessions. Sessions 1 and 2 were the acquisition phase and were separated by a 48-hour period. In session 1, participants performed 20 untimed practice trials focused on learning the pattern followed by 40 timed trials with KR provided. All participants were required to complete all trials. A five-trial post-test followed. In session 2, 60 timed trials (with KR) were performed according to condition assignment followed by a five-trial post-test. Five days later a five-trial retention test was conducted followed by a five-trial transfer test using "shortie" cups. Participants in condition 1 were also probed about why they decided to abort trials or not. A significant effect for test indicated improved performance from acquisition to retention overall. No other significant results were found, however, the number of aborted trials in Condition 1 varied considerably across participants (range = 0-17/60). Explanations for whether to abort were also diverse with participants often initially citing their personality then expanding on their reasoning which fell under several categories (a) nature of the error, (b) when/where error was made, (c) desire to correct rather than reinforce a bad trial and (d) desire to practice learning to fix errors/wanted to work way through it. Future investigations need to consider the propensity of participants to either choose to abort or not.

Real-time auditory feedback improves aging balance in immersive virtual environments

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Normal aging is often associated with the decline in postural stability and balance in older adults. Consequently, many older adults may face difficulties when using virtual reality (VR) systems, where users often experience imbalance effects. Age-related deficits in balance and the imbalance effects caused by VR systems presents a challenging limitation for older adults and general VR usability. We recruited 20 older adults (> 50 years) and 20 young adults (18-24 years) to investigate and compare the effects of four audio-based feedbacks on postural stability and balance while in an immersive virtual environment (VE). The audio-based feedbacks consisted of spatial, static, rhythmic, and center of pressure-based feedback and a no feedback in VR condition. Participants performed a non-VR standing balance task and a standing reach-to-grasp task. Then, using a head-mounted display (HMD), each participant performed a virtual replication of both the standing balance and standing reach-to-grasp task in VR. A force plate was used to calculate the participants mean center of pressure (CoP) velocity for each audio-based feedback condition during each balance study task. The within-subject results indicated that when spatial feedback was available, older adults exhibited significantly decreased CoP velocity and therefore increased postural stability for both the standing balance task and standing -reach-to-grasp task. However, we did not find significant differences in CoP velocity for the static, rhythmic, and CoP-based feedback conditions, nor did we find significant differences in CoP velocities within the young adult participants. Results suggest that spatial feedback techniques appear to be useful in improving postural stability and balance in older adults using immersive VR environments. Funding source: National Science Foundation.

Relationship between gait fractal dynamics and physical function in older adults

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The variability of timing from stride to stride during walking is not random, but rather patterned. In healthy adults, variability at short timescales (e.g., 5 strides) correlates with variability at longer timescales (e.g., 50 strides). This variability structure (i.e., fractal dynamics) is thought to represent healthy, adaptable gait. Given that measures of physical function correlate with fall risk, the purpose of this study was to determine if fractal dynamics correlated with physical function across a range of walking speeds. Eighteen healthy older adults (age = 72 ± 4.1 year; height = 1.6 ± 0.13 m; mass = 72 ± 16.9 kg) performed the short physical performance battery (SPPB), which is a series of 5 brief tests that quantify physical function. After obtaining each participant's self-selected preferred walking speed (PWS), they then walked on a treadmill

at 5 randomly ordered speeds (50%, 75%, 100%, 125%, 150% of PWS). Kinematics at the heel were collected at 200 Hz to obtain foot strike timing, and stride time was defined as the timing between subsequent ipsilateral foot strikes. Each walking trial lasted for 3 min, followed by a ≥ 2 min rest. Fractal dynamic values were obtained using detrended fluctuation analysis. Overall, participants displayed relatively high physical function (SPPB scores = 10.7 ± 1.3). Fractal dynamics did not correlate with SPPB scores during any walking trials. However, fractal dynamics at 50% PWS did exhibit a negative correlation with the 'chair rise time' component of the SPPB ($R^2 = 0.38$, $p = 0.009$). Individuals with higher chair rise times (lower physical function) displayed lower fractal dynamic scores (indicating lower adaptability). Chair rise time is a test of leg strength and thus is a strong indicator of physical function. While fractal dynamics did not predict physical function using the SPPB across a range of walking speeds, walking at extremely slow (i.e., 50% of PWS) speeds did illuminate discrepancies in chair rise time. The slower (arguably more challenging) walking speed was apparently required to reveal differences in fractal dynamics. Funding source: Ministry of Science and ICT (The Republic of Korea).

The quiet eye in children and adolescents: A systematic review

Cornelia Frank, Osnabrueck University; Sophia Ryll, Osnabrueck University

The quiet eye (QE) refers to the fixation of a specific point or area immediately before the execution of a motor task, and is believed to reflect the cognitive processes involved in planning a motor action. While previous research has shown that the QE plays a critical role in the control and learning of motor actions in adults, little is known about whether results consistently found in adults transfer to the young population. We conducted a systematic review to extend knowledge on the QE to children and adolescents. We analyzed and synthesized existing literature according to PRISMA guidelines by including studies that examined the QE in 0- to 17-year-olds in motor tasks. Our search yielded 14 studies published between 2013 and 2022 that investigated the QE in 7- to 15-year-old participants, including both healthy ones and participants with developmental coordination disorder or autism. The QE was examined in a variety of motor tasks ranging from fundamental skills such as grasping, catching and throwing to sport-specific skills including kicking, shooting, table-tennis, and golf-putting. The studies conducted so far focused on comparisons across skill levels, health conditions and anxiety/stress levels, while learning studies examined QE training, observational learning and/or attentional focus. The majority of studies operationalized the QE within 3° of visual angle using a minimum fixation duration of 100ms. From the findings to date, robust evidence from adult studies such as differences across skill level and health conditions hold for children, while findings on other questions such as whether the QE relates to performance remain ambiguous. Our review furthermore revealed a paucity of studies in younger children and on sport-specific tasks in older children. Future research is needed to systematically investigate the QE, its relation to performance, and its role for action control and learning across childhood, thereby drawing on developmental aspects and related theories to approach its specific mechanisms in the young.

Just imagine throwing the ball? The influence of imagery training on motor learning in children

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Imagery training is well-established in sports, rehabilitation, and work settings. Meta-analyses confirm that it can improve motor performance and promote motor learning in adults. A recent meta-analysis with a focus on children and adolescents revealed a medium overall effect, showing that imagery training can affect motor performance in the young. It also revealed a paucity of evidence in children younger than ten years. It is thus still unclear whether and how imagery training can be used in young children. Research on instructions indicates that children benefit from analogies when learning a motor action, but the question whether children benefit from analogies during imagery training remains to be addressed. The aim of the study was to examine the impact of imagery training in young children, and to compare imagery content based on analogies vs. explicit instructions during mental practice. For this purpose, sixty-one 7- to 9-year-old elementary school students practiced throwing as part of their regular school-based physical education over the course of three teaching units, performing 24 throws during each unit. Children practiced either with analogies or explicit instructions, with or without imagery training. Prior to and after the intervention as well as after a retention interval of two weeks, we measured throwing distance. Analyses of variance on relative changes from pre to retention (overall learning), pre to post (acquisition) and post to retention (retention) revealed no differences for overall learning and acquisition, but a significant interaction for retention, with gain after analogy-based imagery training and loss after imagery training based on explicit instructions. The results partly demonstrate the relevance of the imagery content: Imagery training with children seems to be beneficial for retention when it is based on analogies, but not when it is instructed in an explicit manner. We will discuss our findings in the light of theories of imagery, developmental aspects, and the heterogeneous setting of school-based physical education.

Stretching different ankle muscles does not alter associated proprioception or balance

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Short term benefits of static muscle stretching include increased flexibility and range of motion (ROM), while such benefits on balance and proprioception remain controversial. A potential explanatory difference across study results involves varied proprioception associated with stretching different muscles, as reductions in proprioception and not force reductions explain greater postural sway with fatigue. We wanted to determine if stretching opposing ankle muscles or single sided, non-opposing ankle muscles altered sway and proprioception compared to each other and a pre-stretched (control) state. Twenty-four barefoot young adults (16 F/8 M; age 22.13 +/- 3.53 years) performed 3 trials of static stance and proprioception tasks

in each condition (control, opposing, non-opposing). Participants received passive stretching to discomfort in opposing (plantar- and dorsi-flexion) and non-opposing (dorsi-flexion) conditions. Participants stood as still as possible with eyes closed and a narrow base of support for 45 sec. on an ATMI force plate (100 Hz) to determine sway (center of pressure—COP) variables of interest. We used a hand-held goniometer to measure ankle proprioception, in which participants actively matched remembered ankle angles. Flexibility differences split participants into a limited ROM (limROM) and full ROM (fullROM) groups. Repeated measures ANOVAs revealed no significant group effects across conditions for absolute proprioception error or for COP velocity, displacement in the anterior-posterior and medio-lateral directions, path length, and area95 ($p > 0.05$). Correlation analysis showed those with greater proprioceptive sense did not sway less ($p > 0.05$). Interestingly, participants with the greatest ROM and largest proprioceptive error swayed less ($p = 0.038$) and with less variability ($p = 0.045$) in the mediolateral direction. Short term static stretching does not impact proprioception or associated postural sway, as observed with muscle fatigue. Apparently, increases in postural sway only correspond to more extreme reductions in proprioception.

The effects of a secondary motor task in early and late movement preparation on cross education

Daniel Gwon, Montclair State University; Robert Horn, Montclair State University

Cross-education (CE) is a phenomenon in which training with one limb benefits the untrained, homologous limb. Research suggests that the mechanism behind CE occurs upstream to the primary motor cortex (M1) since disruption of the supplementary motor area (SMA) during movement preparation prevents CE (Perez et al., 2007). Another way to assess upstream and M1 involvement in CE is to use a secondary motor task (SMT) in timelines associated with their activity (e.g., Rektor et al, 1994). The purpose of the present study was to examine the effects of a finger-tapping SMT during movement preparation on non-dominant (ND) to dominant (D) limb skill transfer in a self-initiated, computer mouse aiming task. The dependent measure was a composite score based on movement time and clicking accuracy. We predicted that compared to a control condition without a SMT, an early SMT (between -2000 to -1000ms before the “go” signal) would negatively impact CE while the same task performed late in movement preparation (between -1000 and 0ms) before “go” would not. Participants completed five total visits (1 initial test and training visit, 3 training visits, and 1 retention test visit) over the course of two weeks. Thirty-nine right-handed participants were matched and assigned to the three groups based on their pretest scores. All participants performed 400 training repetitions with their ND hand. Each training repetition consisted of moving the mouse cursor from a standardized starting position to a randomized target location. Auditory beeps cued the SMT periods and “go” signal. As predicted, repeated measures ANOVA showed that participants practicing with no SMT and late SMT demonstrated CE through retention of improvements in the untrained limb ($p < .05$). In contrast, participants practicing with early SMT did not show CE. Our results support the findings of Perez et al. (2007), and further imply that processes upstream to M1 account for CE.

The effect of cognitive load on visual strategy during upper and lower extremity motor tasks across older adults with varying attentional capacity

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Well-documented motor impairments in older adults may critically depend on visual attention. In two experiments, we examined the effect of cognitive load on visual strategy and associations with attentional deficits in older adults. Eye movements of 21 older (age 65-90 years) adults were recorded during a finger force-steadiness task with and without a cognitive task (experiment 1). Performance on standardized tests of attention was also measured. Eye movements of 28 older adults (age 67-91 years) were also recorded during a modified Timed Up and Go (TUG) task with and without a cognitive task (experiment 2). In both experiments, gaze was analyzed to examine changes in visual strategy with varying cognitive load. During the force-steadiness task, all participants gazed near the target line and made saccadic eye movements from left to right. Most participants used this same visual strategy when performing the cognitive task, though a subset of older adults ($n = 7$) used an altered visual strategy; gaze did not stay near the target line or travel exclusively left to right. Performance on measures of attention was impaired in this subset. In experiment 2, older adults spent less time gazing at relevant targets during the TUG when there was an added cognitive task versus walking alone ($p = .003$). A cluster analysis revealed a subset of older adults ($n = 6$) whose gaze at relevant targets decreased to a greater extent than the other participants. The addition of the cognitive task preferentially impaired TUG completion time in this subset ($p = .035$). Results provide evidence for a subset of older adults that used suboptimal visual strategies with increased cognitive load, which could negatively impact motor performance. Given that this subset demonstrated attentional deficits, the altered visual strategy could indicate motor or cognitive impairments. This finding is robust across precision upper extremity and gross motor locomotion tasks. The heterogeneity in performance across older adults suggests cognitive assessments may be indicated when evaluating motor function.

Attentional focus in race walkers: A preliminary thematic analysis

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Attentional focus (AF) is often categorized as external (EF), on the effect of the movement, or internal (IF), on the movement itself. Generally, EF has been shown to be more beneficial to learning and performance of motor skills. There is a lack of research, however, applying AF to race walking, which requires constrained movement and adherence to technical rules in order to avoid disqualification by judges. The purpose of this study was to examine what race walkers focus on during racing and training. Since this was an exploratory study, there was a nondirectional hypothesis. Participants ($n = 17$, $M_{age} = 46.6 \pm 22.1$ years) that had previously competed in an officially judged race completed a survey. Data was categorized and coded by AF and theme (mechanics, performance, exertion, endurance, bodily sensation other, and

judging). Overall mode indicated that IF was most used in both training and racing. When isolating to the primary foci, IF was the mode in training and EF was the mode in racing. Participants used a combination of AF strategies during training (53%) and racing (50%). Although participants reported several areas of focus (65% used a combination in training and 69% used a combination in racing), the primary theme was mechanics for both training and racing. Cramer's V was performed to test for association between AF and theme for the primary foci, which showed a significant strong association in training ($V = 0.922, p = .000$) and racing ($V = 0.866, p = .001$). Throughout a race, modes shifted from EF and performance to IF and mechanics. These qualitative findings show patterns with respect to how focus strategies may shift throughout the race. Further analysis should examine relationships between AF and other training and racing modes that affect performance.

Testing the association between frequency of mental practice used in sport-specific training and action prediction ability

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Mental practice (MP) is broadly defined as skill rehearsal in the absence of physical movement (e.g., mindfulness, motor imagery). MP results in positive effects on athletic performance, yet less is known about the association between MP and action prediction (AP; important in precision sports, such as volleyball). We examined the association between frequency of MP used in training and AP of a volleyball serve (viewed from both the 1st- and 3rd-person perspective). We expected that increased frequency of MP would be associated with greater AP accuracy, and further modulated by video perspective. Fifty-three participants (38 female) ranging from novice to skilled volleyball athletes (2.71 ± 4.98 years played) completed the Imagery Use Questionnaire to index the frequency of MP used in training (/91). All participants then completed an AP task where they watched temporally occluded videos of a skilled model perform volleyball serves and predicted where the ball landed. Serves were observed from both the 1st- and 3rd-person perspectives (54 trials/perspective) in a blocked, counterbalanced order. Mean proportion of correct responses on the AP task were calculated across participants for each video perspective. A linear regression was conducted on proportion correct with MP frequency score, years played, and video perspective included as predictors. Mean frequency score was 57.2 ± 18.6 . Mean proportion correct for the AP task was 0.32 ± 0.08 and 0.39 ± 0.13 for 1st- and 3rd-person perspective videos. The regression conducted on proportion correct ($F(3,102) = 4.14, p = 0.008$) revealed that only video perspective significantly predicted proportion correct ($\beta = 0.074, p < 0.001$). A large resultant effect size ($d = 0.61$) revealed that performance was greater for 3rd- vs. 1st-person perspective videos. Findings show that AP accuracy was not associated with frequency of MP used in training, yet AP accuracy was modulated by video perspective. Further work testing the type of MP used in training is required to elucidate the effects of MP on improving AP in a sport setting. Funding source: Natural Sciences and Engineering Research Council of Canada.

Sources of variability in police officers' motor responses to a deadly use-of-force encounter

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For police officers, limited exposure to dynamic, high-stress encounters in the workplace (see Ducrose et al., 2007) and relatively short academy training (see Reaves, 2016) make it unlikely that they have the requisite experience to support expertise (see Chi, 2011; Ericsson, 2008). This inexperience could be reflected in the variability of the officers' responses to the same dynamic scenario. If officers respond in similar ways, this implies their use of shared cognition, through acquired in-common tactical knowledge. In this study we examined three questions: do officers show consistency in responses; does experience constrain their variability; and what else affects their variability? Officers ($N = 42$) responded to a live-acted scenario in which a belligerent assailant ultimately discharges his weapon. Triangulated camera positions assessed officers' movement patterns, final positions, and weapon responses relative to when the assailant fired his weapon. We assessed their experience and restfulness (hours awake, rest scores) through a survey. We also looked at the impact of being the first versus second arriving officer, and of their visual search type (high- versus low-scan rate). We found extensive variability in all aspects of the response. Experience did not impact when the officers drew, aimed, or discharged their weapons, or where they were when the assailant fired. In contrast, officers with low visual scan rates were constrained to a more consistent final position, closer to the threat. In terms of restfulness, officers who were awake longer before testing were less prepared to respond; they were further away from the assailant when he fired his weapon and showed slower response times. Those reporting being more rested also drew their weapons earlier (all $p < .05$). We conclude that officers had insufficient training and experience to demonstrate in-common knowledge and that hours awake needs more attention as a variable in police research. Funding source: Force Science Institute.

Performance and perception in walking versus throwing: Variability, accuracy, and practice effects

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Successful motor performance requires accurate perception of possibilities for action—in Gibson's term, "affordances"—by detecting the moment-to-moment relations between body and environment. But performance is often variable, even in the same task. We tested 30 adults in a walking task (where we expected performance variability to be relatively low) and in a throwing task (where we expected performance variability to be relatively high). In each task, participants walked or threw a beanbag through a doorway varying in width from trial to trial. We defined performance variability as the slope of the success function for each participant in each task (smaller slopes indicate less variable performance). Participants judged affordances

for walking and throwing before and after performance. We compared performance variability, judgment variability, and judgment accuracy between tasks and tested whether practice influenced judgment variability and accuracy. Participants displayed greater performance variability for throwing than for walking, $t(29) = 7.81, p < .001$. Similarly, participants displayed greater variability in perceptual judgments (coefficient of variation of judgment trials) for throwing compared to walking at pretest ($t(29) = 2.72, p = 0.01$) and post-test ($t(29) = 4.74, p < .001$). Participants also displayed larger errors in judgments (difference between mean judgment and threshold) for throwing than for walking at pretest ($t(29) = 3.77, p < .001$) and posttest ($t(29) = 2.84, p = .008$). Practice had no effect on judgment variability, $F(1,116) = 0.25, p = .62$. However, a two-way ANOVA on error showed a main effect for phase, $F(1,116) = 37.14, p < .001$, a main effect for task, $F(1,116) = 23.60, p < .001$, and an interaction between phase and task, $F(1,116) = 5.11, p = .03$, with post hoc tests indicating that error decreased more dramatically for throwing than for walking. Results indicate that perceptual judgments are more variable and less accurate for tasks where performance is more variable, and practice is more informative for more variable tasks. Funding source: National Institutes of Health.

Learning outcomes from a focus of attention workshop for Canadian physiotherapists

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Research with individuals experiencing musculoskeletal dysfunction has shown that an external focus of attention (EFOA) leads to enhanced movement outcomes. Despite this, previous research has revealed low EFOA provision by physiotherapists. One-on-one interviews with Canadian physiotherapists revealed barriers to EFOA statement use and a focus of attention (FOA) workshop was proposed as an immediate solution. Thus, a two-part FOA workshop was designed to include asynchronous website modules followed by a synchronous virtual group meeting. In accordance with Level 2 of the Kirkpatrick model, participating physiotherapists' knowledge of FOA concepts, and skill in creating EFOA statements, was assessed through questionnaires delivered 1-week pre- and immediately post-synchronous workshop. For the knowledge assessment, participants responded to 23 questions to obtain both percent correct and "I don't know" scores. For the skill assessment, physiotherapists watched four videos and created as many EFOA statements per video as possible. Physiotherapists' responses were coded independently by two researchers who met to reach a consensus for both the number of EFOA statements produced, and the ratio of EFOA to total FOA statements. The workshop was completed by five groups of physiotherapists ($n = 2-5$ per group; $N = 15$ total; $M_{age} = 44.5 \pm 11.4$ years; $M_{experience} = 18.9 \pm 12.7$ years). Paired sample t -tests revealed that participants significantly (all $p < 0.001$) increased (a) their knowledge of FOA concepts ($51 \pm 22\%$ pre to $84 \pm 11\%$ post) while decreasing their response uncertainty ($23 \pm 18\%$ pre to $1.2 \pm 2.0\%$ post), (b) the number of EFOA statements on the skill assessments (3.9 ± 2.9 pre to 7.6 ± 3.0 post), and (c) the ratio of EFOA to total FOA statements ($18 \pm 13\%$ pre to $68 \pm 25\%$ post). Overall, the FOA workshop successfully improved physiotherapists' immediate knowledge and skill pertaining to FOA. Subsequent analysis of additional workshop outcomes will serve to determine whether these improvements yielded changes in the physiotherapists' FOA use with their clients.

Focused-attention meditation states promote sequence-specific learning when practice provides increased processing time

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Focused-attention (FA) meditation establishes a state of heightened cognitive control that acutely influences subsequent motor learning. For example, when FA precedes the serial reaction time (SRT) task, learners use stimulus-driven planning over sequential planning. As a result, performance improves due to general practice effects as opposed to sequence-specific learning. However, in this work, SRT task processing time has been constrained with short, 50-millisecond, response-stimulus intervals (RSI). We tested whether longer processing times might allow for greater opportunity to undertake sequential planning and therefore, derive increased sequence-specific learning following FA. Sixty-four participants (38 females, 20.5 ± 0.7 years) completed a 15-minute session of FA ($N = 32$) or audiobook listening as control. Next, each group completed the SRT task with either a short (50 ms) or long (500 ms) RSI. While long RSI resulted in significantly shorter reaction time across practice, meditation and RSI did not significantly influence practice improvement. Similarly, meditation and RSI did not significantly influence performance slowing between practice end and a novel sequence block. However, a significant meditation by RSI interaction was observed for sequence interference, which was based on the change in performance between practice end and a final block, with the novel sequence block occurring between these blocks. Under short RSI, FA and control groups did not significantly differ while under long RSI, FA demonstrated significantly higher interference than control. Only FA and long RSI conditions exhibited interference due to novel sequence introduction, which lends support to the notion that providing additional processing time following FA provides greater opportunity for sequence-specific learning. A sequence generation test did not reveal any influence of meditation and RSI conditions on sequence recall and overall, recall performance was below chance level indicating sequence information was implicit.

An embodied choices perspective on decision-making paradigms in sport

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The embodied choices perspective has recently been introduced to decision-making research in sport, highlighting the need to reconceptualize the relationship between decision and action. Embodied choices of what to do and how to do it are affected by the current and previously stored sensorimotor information. Hence, the action component is considered a crucial part of the decision-making process rather than its sole outcome. This conceptualization differentiates the embodied choices perspective from the classic serial approach to decision making, which hardly accounts for the dynamic, uncertain nature of decision tasks in sports. An embodied choice perspective may therefore allow us to answer research questions such as how continuous movements affect decision sequences and to what degree decision makers' physical

attributes influence their choices. As novel theoretical approaches may require adaptations or development of new methodologies, the aim of this presentation is two-fold: (a) to review existing decision-making paradigms that use sport-specific stimuli and (b) to determine to what extent these paradigms account for the dynamic cognition-action interaction. Upon screening 10,325 records, it was found that simplified, static computerized tasks were still frequently used, while few paradigms assessed decisions through task-relevant actions and considered past motor experiences. We propose that new paradigms need to assess continuous movements and their impact on sequential decisions to account for the complex decisions that athletes execute in highly dynamic environments. The development of such decision-making paradigms is particularly timely given the recent technological advancements, including portable tracking devices and augmented reality, which enable the investigation of more ecologically valid decision situations, while maintaining scientific rigor.

Effects of instructional and motivational self-talk: A meta-analysis

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Motor learning researchers have examined the relationships among internal focus, external focus, and performance in a manner that may have relevance to the instructional self-talk literature. This meta-analysis examined whether self-talk (instructional or motivational) would enhance motor performance compared to no self-talk and compared instructional to motivational self-talk. More importantly, this meta-analysis also examined the effects of different types of instructional self-talk to explore whether there would be a different effect depending on the types of instructional self-talk (but only had the data to compare externally focused to a mixture of internally focused, and “unclear” self-talk conditions). After searching databases, 16 studies met the inclusion criteria for quantitative analysis. A risk of bias assessment (RoB2; Higgins et al., 2019) was performed for the individual studies. Twenty-one effect sizes were calculated as one of the following categories: instructional self-talk, motivational self-talk, and control. Results showed that all the studies were at high-risk of bias. Both instructional self-talk ($g = 0.60$, 95% CI [0.30, 0.90], $n = 16$) and motivational self-talk ($g = 0.35$, 95% CI [0.11, 0.58], $n = 10$) enhanced motor performance compared to no self-talk control groups. However, the overall effects may be overestimated due to the presence of underpowered studies and small-study effects in the sample. Moderator analysis revealed that the effect of external instructional self-talk on motor performance was significantly larger than other combined groups of instructional self-talk ($\beta = -0.56$, 95% CI [-1.12, -0.00]). Findings suggest both instructional and motivational self-talk can enhance motor performance and future research should investigate role of attentional focus as a moderating effect of instructional self-talk when designing self-talk research and interventions.

Physical practice, mental practice or both: A systematic review with meta-analysis

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Previous research has reached positive conclusions regarding the effects of mental practice in performance and learning of a motor skill. The purpose of this study was to use the aggregate data meta-analytic approach to assess the impact of physical practice (PP), mental practice (MP), and the combination of both (combined practice, CP) on acquisition, retention, and transfer tests in motor skill performance. Twenty-seven studies published up to 2022 were included by searching six databases. Random effects model using the standardized mean difference effect size (ES) was used to pool results with OpenMEE software. Of the included studies 48.15% presented low risk of bias assessed using Cochrane's RoB 2 tool. A total of 42 ES, were calculated and separated into pairwise comparisons for acquisition, retention, and transfer. In the acquisition phase, it was found that MP was more effective than no practice (ES = 0.508, $n = 25$, CI [0.29,0.72]), PP was more effective than no practice (ES = 1.78, $n = 15$, CI [0.97,2.60]), CP was more effective than no practice (ES = 1.16, $n = 12$, CI [0.57,1.75]), PP was more effective than MP (ES = -1.16, $n = 23$, CI [-1.88,-0.45]), PP had similar results as CP (ES = -0.01, $n = 16$, CI [-0.31,0.28]), and CP was more effective than MP (ES = 0.61, $n = 12$, CI [0.17,1.04]). In the retention phase, it was found that MP was more effective than no practice (ES = 1.11, $n = 5$, CI [0.44,1.79]), PP was more effective than no practice (ES = 1.03, $n = 4$, CI [0.08, 1.99]), PP was more effective than MP (ES = -1.29, $n = 9$, CI [-3.12,0.54]), PP had similar results as CP (ES = 0.16, $n = 8$, CI [-0.29,0.63]), CP had similar results as MP (ES = -0.06, $n = 3$, CI [-1.22,1.09]). In the transfer phase, it was found that MP was more effective than no practice (ES = 1.12, $n = 5$, CI [0.01,1.59]), PP had similar results as no practice (ES = 0.41, $n = 5$, CI [-0.02,0.85]), and PP was more effective than MP (ES = 0.50, $n = 6$, CI [0.12,0.87]). In conclusion, mental practice does not replace physical practice, however, under some conditions, PP can be complemented with MP.

Effects of yoga on pd patients' postural control in static and dynamic tasks SHOULD PD be capital

Alicia Jones, Eastern Michigan University; Kayla James, Wayne State University; Qin Lai, Wayne State University

Previous research showed that yoga practice generally yielded improvement in overall motor functions, balance, and mobility in clinical tests (see Ban, et al., 2021 for meta-analysis). The purpose of this study was further to investigate whether a six-week yoga program facilitated postural control in patients with mild to moderate Parkinson's disease (PD), using computerized static and dynamic tasks. Patients ($n = 20$) aged 58-78, signed an informed consent before being randomly assigned to experimental group or control group. All participants underwent pre-testing and post-testing of unilateral standing and tandem walking on a balance platform (NeuroCom). Patients in experimental group were admitted into a six-week yoga program administered by a certified yoga instructor within one week after the pretests. Post-tests were conducted within one week after the completion of yoga program. During the tests, participants placed their feet on an identified area of the platform and maintained unilateral

standing 10 s for three trials each side. Body sway in unilateral stands was measured for static balance. After that, tandem walking on the platform was performed for three trials. Walking speed, lateral step width, and end sway were measured to index dynamic balance. A 2 (Group: Yoga vs. Control) x 2 (Test: Pretest vs. Post-test) ANOVA with a repeated measure on test revealed the interactions between group and test on body sway of the right leg standing ($F_{(1,18)} = 20.86, p < .01$), lateral step width ($F_{(1,18)} = 14.01, p < .01$), and end sway of tandem walking ($F_{(1,18)} = 39.14, p < .01$). Simple mean effects indicated that the yoga program significantly decreased body sway with static standing balance, and produced a smaller base of support with lateral step width, and a more controlled posture with a center of pressure end sway during tandem walking from the pretest to the post-test. The results indicated that the 6-weeks yoga program facilitated postural control for the static and dynamic tasks in patients with mild to moderate PD.

How movement similarities influence the perception of emotional body language

Johannes Keck, Justus Liebig University Giessen; Julia Bachmann, Justus Liebig University Giessen; Britta Krüger, Justus Liebig University Giessen; Jörn Munzert, Justus Liebig University Giessen

When we observe affective body movements, information from the whole body (e.g., kinematic and postural features) is transformed into an understanding of the expressed emotion. It is assumed that the observer integrates the observed actions of others with their own motor repertoire to understand observed action intentions. Thus, understanding someone else's emotional expressions might be achieved by performing a simulation based on one's own motor programs. Studies have shown that the perception of emotions is influenced by individual characteristics such as expressivity or one's own movement kinematics (e.g., walking speed). However, up to now it is unclear how the subjective understanding of other people's bodily actions and emotions is related to individual movement characteristics. Our study aims to characterize participants' emotional expression regarding predefined movement features in order to explain how this individual expression modulates the perception of emotional body language in others. Therefore, 28 participants (11 male, \bar{X} age 23.4 ± 4) completed one experiment with two different sessions. In the first part, they were instructed to perform scripted emotional scenes (happiness, affection, sadness, anger) while their movements were recorded with a motion capturing system (VICON). In the second part, short videos (point-light-displays) of the same emotions were presented and participants subsequently rated the emotional content as well as the perceived emotional intensity of the scene. Representational similarity analysis on a within- and a between-subject level was conducted. Our analysis showed a high degree of commonalities between expression and perception across subjects. Nevertheless, the perception of a scene is influenced by similarities between the individual motor performance and the observed scene. More specifically, our data revealed that perceived intensity of emotions is more sensitive to one's own emotional expression than emotion recognition. Funding source: IRTG 1901 – The Brain in Action.

Effects of simulated microgravity on bimanual force control

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Adapted changes in sensorimotor function with exposure to altered gravity can result in poor manual coordination along with spatial disorientation and motion sickness. The ability to accurately coordinate actions between the limbs is critically important for many activities associated with spaceflight (e.g., landing a spacecraft, controlling a rover). However, much of the research investigating manual control in microgravity have focused on unimanual performance (e.g., controlling joystick with dominant limb). The current experiment was designed to determine the effects of simulated microgravity on bimanual control. A head-up tilt (HUT)/head-down tilt (HDT) paradigm was used to simulated microgravity (0 g). Right limb-dominant participants ($N = 10$) were required to coordinate patterns of isometric forces in 0°, 90°, and 180° patterns by exerting force with their right and left triceps brachii muscles. Lissajous plots and force templates were provided to guide performance. For each pattern participants performed 12 practice trials and two test trials. Muscle activity from the triceps brachii muscles were recorded on the test trials. EMG-EMG coherence between the two EMG signals was calculated using wavelet coherence. The results indicated very effective temporal performance of the goal coordination tasks in both gravity conditions. However, absolute error (AE) and variable error (VE) was significantly smaller during the 0° task than the 90° and 180° tasks. No differences between gravity conditions for EMG-EMG coherence measures were observed in the 0° task while differences were observed in the 90° and 180° tasks. During the 90° and 180° tasks, significantly higher coherence was observed in the alpha and beta bands for the microgravity condition compared to the Earth condition. Results are consistent with previous research attributing manual control deficits in altered gravity environments to cognitive and perceptual constraints. Funding source: NASA.

Increasing the distance of an external focus of attention improves golf putting performance

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For more than a decade, experimental findings have demonstrated that directing a learner's conscious attention externally rather than internally improves motor skill learning and performance. The purpose of this study was to measure if increasing the distance of an external focus of attention improved learning and performance of a golf putting task compared to a baseline condition. We predicted that motor skill performance would increase as the distance of an external focus of attention also increased in relation to the participant. Participants ($N = 40$) were randomly assigned to one of four experimental conditions (i.e., control, putter, ball, target). Participants in the control condition were not provided attentional directing instructions. Participants in the putter condition were instructed to focus their attention on the putter when performing the task. Participants in the ball condition were instructed to focus on the ball when performing the task, and participants in the target condition were instructed to

continually focus on the target for the duration of the task. Volunteers performed a total of 60 practice trials in one day. During the practice phase of the experiment, participants were asked to repeat the prescribed instructions after every 10 trials. Participants returned after a 24-hour period of no practice for post testing. An analysis of post-test performances indicated that all of the external focus conditions (i.e., putter, ball, target) performed significantly better than the control condition (i.e., baseline). Further analysis indicated that putting performance increased as the distance of the external focus also increases, thus the experimental hypothesis was supported. The results of this experiment provide converging evidence with previous research that increasing the distance of an external focus of attention improves motor skill learning and performance.

How do baseball batters perceive and hit a rising fast ball?

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Baseball batters occasionally feel that a fastball rises or hops suddenly when it approaches the home plate. The present study was aimed at investigating the factors that determine this perceived rise. Some physical parameters of the pitched ball, such as the ball speed, generate this rising perception by possibly changing the ball trajectory. Additionally, other parameters, particularly the pitching motion, may cause the rising perception, since the batters observe the pitching motion to predict ball behavior under severe time constraints. However, the effect of the pitching motion on the perception of the pitched ball remains unclear. We performed two experiments to clarify the effect of the pitching motion on the rising ball perception of semi-professional baseball players using a head-mounted display-based virtual reality system, which enabled the batters to virtually hit the ball with the actual bat. In the first experiment, the batters performed a two-alternative forced choice (TAFC) task in which they observed two consecutive pitches with different pitching motion durations and the same ball behavior, and indicated which ball was rising higher. The batters evaluated the ball for which the pitching motion was shorter to be rising higher, indicating that when the pitching motion speed changes, the batter perceives different ball trajectories even when the physical features are the same. In another experiment, they were asked to adjust their swing to hit each pitch in the same TAFC paradigm instead of reporting their perception. When the pitching motion duration was shorter, the bat swing trajectory was higher. This response was related to the rising perception behavior. Our findings thus suggest that the temporal structure of a pitching motion generates illusory ball trajectory (i.e., trajectory illusion) and modifies the corresponding batting action, independent of physical ball features, thereby providing a hint for the pitching strategy.

Modelling baseball hitting success as a function of gaze location

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The act of hitting a baseball is an interceptive task, often deemed one of the most challenging tasks in all sports. To be successful, the batter is required to forcefully intercept a moving baseball with great temporal and spatial precision, placing great demand on integration of the neuromuscular and visual systems. Several studies have examined visual-motor control to understand the gaze behavior strategies used by hitters to overcome the temporal constraints of hitting. However, literature investigating the spatial location of batters' gaze during hitting is scarce. The purpose of this project was to determine the relationship between gaze location and hitting performance. We hypothesized that gaze location would be a significant predictor of hitting success. Seven elite batters participated in a live-batting scenario consisting of 30 pitches thrown by elite pitchers. Participants were fitted with eye-tracking glasses and were instructed to hit as many pitches as they could within the session as would be typical in competition. Hit success was determined using baseball hitting technology. A custom R script was used to extract and process gaze location in the horizontal and vertical direction. A multivariate logistic regression model was employed to determine whether gaze location predicts hitting success. The overall model was found to be statistically significant (Chi-squared value (2) = 1107.49, $p < 0.01$), with Nagelkerke R^2 of 0.04. Horizontal gaze location (Chi-squared (1) = 853.13, $p < 0.01$) and vertical gaze location (Chi-squared (1) = 27.48, $p < 0.01$). Specifically, the odds of a batter successfully hitting the ball will be increased by 0.1% for every additional increase in horizontal (OR = 1.001, 95% CI [1.001 – 1.001]) or vertical gaze units (OR = 1.001, 96% CI [1.001 – 1.001]). These results suggest that hitting success may not be predicted from simply horizontal and vertical gaze location. Further exploration into other variables potentially impacting hitting success is warranted.

The relationship between visual abilities and sports skills

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Vision is a dynamic physical sense. Specifically, visual abilities have been found to influence the acquisition of motor skills and sport performance. Researchers have asserted that 85-90% of the sensory input that an athlete receives comes from vision. Athletes have exhibited better visual abilities compared to nonathletes (Erickson et al., 2011). Further, optimal vision skills have been found to be a factor in successful performance and reaching higher levels of competition (Miller & Clapp, 2011). With the importance that vision plays in athletes' success, many still do not realize that visual skills can be improved with training. This study was designed to assess the range of visual skills used by college students in their sports participation and that those who report higher levels of sport participation will have better scores in the various visual skills tests. Study participants were recruited through posted flyers, college course announcements, and word of mouth. Participation lasted about 30 minutes and included screening assessments using a Senaptec tablet to assess visual clarity, contrast sensitivity, depth perception, near-far quickness, perception span, multiple object tracking, and reaction time. Additionally, individual data was gathered using a Qualtrics survey that included items regarding the different sports played (e.g., basketball, volleyball, soccer, etc), number of years of sport experience, highest level competed at (i.e. recreation, high school, college, etc.), GPA,

and other demographic questions. Higher levels of sport competition an individual competes at is related to higher visual skills. Findings from this study can be useful to highlight the relationship between success in sport and visual skills. Coaches and athletes can assess how including visual training in the overall regimen can improve success in sport participation and beyond. Future studies should include assessments of a variety of visual skills and participation from a more diverse array of sports, locations, and individual socio-demographic backgrounds.

Are you sensitive to your co-actor's response predictability?

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In a recent study, Campos-Moinier and Brunel (2021) modified the joint Simon task to demonstrate that shared online information was not essential to represent actions. The participant and co-actor sat side-by-side, each restricted visually to their own display. The stimulus was presented on one of the two displays. Participants responded as quickly as possible to their assigned stimulus, even when it appeared on the co-actor's unseen display. A joint Simon effect (JSE) was elicited even when online information was not shared. Furthermore, the magnitude of the JSE was correlated with the variability of the co-actor's RTs on compatible trials. The authors reasoned that in the absence of shared information, participants relied upon external feedback of the co-actor's responses (hearing them respond) to code their actions and resolve self-other discrimination. Moreover, the predictability of their co-actor's responses was used to make decisions about their own responses. We propose that the authors substantially changed the nature of the joint Simon task. Incompatible responses would always be longer than compatible responses because participants must wait for the co-actor's response-produced auditory feedback. The reported "JSE" was not even contingent on performing the task with another person. We examined whether Campos-Moinier and Brunel's "JSE" could be replicated when participants completed the same task with a computer co-actor. In addition, we directly controlled the variability ("predictability") of the computer-generated RTs to examine whether a co-actor's response variability modulated the "JSE". Participants were randomly assigned to a (a) less variable co-actor or (b) more variable co-actor group. Results replicated the expected compatibility effect (so-called "JSE"), $F(1,38) = 299.4, p < .001$. However, the variability of the computer co-actor's RTs did not influence the size of the compatibility effect (no effect for group, $F(1,38) < 1, p = .994$, and no interaction, $F(1,38) < 1, p = .886$). Funding source: Natural Sciences and Engineering Research Council of Canada.

Action-effect priming on a ball tossing task: The influence of quality and quantity of movement-contingent sensory feedback on performance

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The learned associations between a movement and its perceptual consequences (i.e., movement-contingent sensory effects) are considered important for the initiation and control of human action. Recent research indicates that when a movement is consistently associated with a specific sensory effect during learning, these movement-contingent sensory effects can subsequently be used to prime and facilitate performance of that action (i.e., action-effect priming; Land, 2018). The aim of the present study was to determine whether the quality (sensory feedback anchored to tosses that landed near or far from the target) and quantity of learned associations between a movement and its sensory effect influences the degree of action-effect priming on a ball-tossing task. During a training phase, participants ($N = 27$) performed an underhanded ball toss to a short (3.4m) and long (5.8m) target ($n = 180$ each distance). Participants assigned to a near feedback condition heard an audible tone immediately following tosses that landed near the target, with unique tones associated with each target distance (high or low pitch tone). In contrast, participants assigned to a far feedback condition only heard auditory tones when tosses landed far from the target. During a test phase, the auditory tones were used as imperative stimuli and preceded each toss. Findings indicated that participants in the near feedback condition were significantly more accurate when tossing the ball to a target when cued by the tone previously associated with the target during training compared to a no-tone control test. Moreover, improvement in toss accuracy was significantly correlated with the number of associations between the task and auditory feedback experienced during training. Although not significant, the tossing accuracy of participants assigned to the far feedback condition tended to be less accurate when primed during the test phase. Overall, findings indicate that the quality and quantity of sensory feedback experienced during learning impacts the extent of action-effect priming.

A somatic movement intervention for older adults to improve body awareness and spinal mobility: A pilot study

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Older adults commonly experience loss of spinal mobility and associated impairments in physical function; however, few empirically-tested interventions exist to improve spinal mobility in this population. We developed a somatic movement (SM) intervention to improve spine and pelvis awareness and movement based on body-mind centering. This single arm mixed-methods longitudinal intervention sought to: (a) assess the feasibility/acceptability of delivering the SM intervention online; (b) measure the effects of the intervention on mental imagery (MI), body and posture awareness, spinal mobility, balance, and balance confidence; and (c) better understand participants' experience integrating MI, body and posture awareness, and spinal mobility through a qualitative approach. The online SM intervention consisted of two weekly 1-hour classes for 10 weeks delivered in real time during the spring of 2022. Fourteen older adults (13 female, age = 72.6 ± 7.7 years) completed pre and post online physical assessments and questionnaires, including the Multidimensional Assessment of Interoceptive Awareness, the Postural Awareness Scale, and the Activity Specific Balance Confidence scale. A paired t -test revealed a significant improvement in spinal mobility, measured by the Back

Performance Scale, $t(13) = -3.38$, $p = .005$, Cohen's $d = -.90$. We observed no improvements in body and posture awareness and balance confidence scores. However, an inverse relation between baseline scores and post-intervention scores indicated greater improvements in those with lower initial scores. Qualitative findings revealed changes in visual imagery of the spine from a rigid to a fluid structure and changes in kinesthetic awareness of the spine, with an increase in positive sensations. Over 50% of participants identified benefits of taking the SM classes online compared to in-person. The study indicates a 10-week online SM intervention can benefit spinal mobility, MI and kinesthetic awareness among older adults who have limited experience with somatic movement approaches.

The effects of mental imagery type on attentional focus performance effects

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Previous research has shown that individuals with higher visual imagery dominance demonstrate better motor performance with an external focus of attention. Likewise, individuals with higher kinesthetic imagery ability perform better while adopting an internal focus of attention (Sakurada et al., 2016). The current body of literature has not investigated the degree of imagery dominance and the effects of attentional focus use. One concern within this literature is the use of median splits to separate groups into imagery dominance groups as many participants score high in more than one imagery type. Therefore, our aim is to further investigate the relationship between imagery ability and attentional focus on motor performance. Forty-five college-aged students completed the Movement Imagery Questionnaire-III (MIQ-3) to measure their ability to use kinesthetic, intrinsic-visual, and extrinsic-visual imagery. Participants performed a dart throw and Purdue Pegboard tasks under an internal, external, and holistic focus of attention. For the Purdue Pegboard we analyzed the number of pins placed and for the dart throw we analyzed mean radial error (MRE) and bivariate variable error (BVE). Pearson bivariate correlation was used to investigate the relationship between imagery ability and task performance for both the pegboard and dart throw. We observed a positive relationship between extrinsic visual imagery and external focus for the pegboard task, $r(44) = 0.340$, $p < 0.05$. We also observed a negative relationship between kinesthetic imagery and an internal focus with the dart throw, $r(44) = -.366$, $p < 0.05$, which is in line with previous research (Sakurada et al., 2016). Based on the results it is plausible that imagery dominance and attentional focus type interact differently with various task types. Despite the need for future research, we recommend motor imagery dominance be considered when investigating the effects of attentional focus on motor performance.

More expert-like on-court gaze behavior in tennis players as a result of VR gaze training

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Skilled athletes use distinctive gaze patterns to pick-up task-specific information that underpins their advantage over others. For instance, in interactive hitting sports such as tennis, skilled players use specific gaze patterns to pick-up information from an opponent's kinematics when anticipating their serve direction. Perceptual training offers promise as an off-field means of acquiring expert gaze patterns, but it remains unclear whether off-field gains will alter gaze behaviour on-field. The aim of this study was to examine the degree to which an expert-like gaze pattern could be learned off-field to provide an on-field performance advantage in an interactive hitting sport. Nineteen recreational tennis players were divided into a gaze-training ($n = 10$) or control-training group ($n = 9$). All participants completed a three-day training intervention in VR where they anticipated the direction of serves hit by an avatar with the ball-flight occluded. After responding, the serve was replayed to show the ensuing ball-flight. Using a guided-discovery approach (Smeeton et al., 2005), participants in the gaze-training group were shown a typical expert gaze pattern after every five trials whereas those in the control-training group were not. All participants took part in an in-situ pre and post-test against a real server on-court to assess changes in gaze and return-of-serve performance (response time and accuracy). Results revealed that the VR gaze-training was effective in changing the gaze patterns of participants both in VR and in-situ (on-court). Improvements in on-court response times were seen for both groups ($p < .01$), without any change in the response accuracy ($p = .19$), and with no specific advantage for the gaze-training group (no interaction, $p = .22$). The findings show that VR gaze-training is effective in producing more expert-like gaze behaviour in VR and, more strikingly, that the changes are retained when returning serves on-court. The findings demonstrate the utility of VR for altering behaviour in the performance environment. Funding source: ZonMW SportInnovator (Netherlands Organisation for Health Research and Development).

Muscular fatigue increases the negative effects of an internal focus

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Attentional focus studies have shown that directing attention internally results in inferior performance compared to directing attention externally or neutrally. Additionally, movers may direct their attention internally when they experience symptoms of physical fatigue. To that end, this study aimed to examine the interaction between attentional focus and physical fatigue. It was predicted that the performance differences between internal and external focused conditions would be greater when participants were fatigued compared to when they were not fatigued. Participants ($N = 32$; $f = 16$) performed a hand grip dynamometer strength test under five conditions. During each condition, participants performed three trials for a total of 15 trials. During conditions 1-2 and 4-5, participants received attentional focus instructions in a counterbalanced order. Condition 3 was a control, where participants received no attentional focus directing instructions. Conditions 1-2 were non-fatiguing (90s rest between trials) and conditions 3-5 were meant to induce fatigue (10s rest between trials). Given the purpose of the study, the control condition was not included in the analysis. Following a 2 (order) x 4

(condition) repeated measures ANOVA, the results revealed a marginally significant main effect for condition, $p = .058$, $\eta_p^2 = .079$. Additionally, a significant order x condition interaction was revealed, $p = .021$. Pairwise comparisons revealed a significant difference during the fatigued state when internal ($M = 34.92$) followed external ($M = 38.14$, $p = .007$), but not when external ($M = 38.529$) followed internal ($M = 37.84$, $p = .516$). These results partially support the hypothesis and suggest that the negative motor performance effects of an internal focus of attention are magnified during a physically fatigued state. Given that the study was underpowered, future research should continue to examine the effects of fatigue, both physical and mental, and its interaction with attentional focus.

Investigating transfer of learning and neural activation of extended VR practice

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Previous studies have provided empirical evidence that practice in an immersive virtual reality (VR) environment results in similar performance improvements compared to physical practice in a real-world (RW) environment. A current limitation within the VR literature is the comparison of motor performance and learning improvements between VR and RW environments as a product of an extended period of practice. Studies testing the practice specificity hypothesis suggest that if information discrepancies exist between two environments, transfer of learning effects may only become apparent following moderate to large amounts of practice. Therefore, the purpose of this experiment was to practice a motor skill across several days in VR and RW environments to compare the transfer of learning effects, and possible neural differences. It was predicted that no performance differences would be observed on day 1 but that differences would exist by day 3, and that there would be differences in neural readings between practice groups. Participants ($N = 42$) were randomly assigned to a VR ($n = 22$) or a RW ($n = 20$) practice condition. On days 1-3, participants performed a 10-trial golf putt pre-test followed by a 60 golf putt practice phase while wearing an EEG headset. A 10 trial post-test was conducted on day 4. Analyses revealed that both groups significantly reduced radial error (i.e., accuracy), $p < .001$, $\eta_p^2 = .303$, and bivariate variable error (i.e., precision), $p < .001$, $\eta_p^2 = .232$. However, there were no between group performance or neural activation differences. These findings partially support the predictions made and are consistent with previous work. In sum, this study suggests that practicing motor skills in VR and RW results in similarities in both motor performance improvements, learning effects, and brain activity readings.

Manipulations in contextual interference failed to impact tennis serve performance in experienced players

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Contextual interference (CI) in motor skill learning involves creating practice schedule manipulations or tasks which can lead to distinct learning and performance effects. Interestingly, a rather counterintuitive effect occurs with practice schedule manipulation, such that higher levels of CI often lead to subpar practice performance but superior retention performance as compared to lower levels of CI (e.g., Magill & Hall, 1990). While the CI effect has been largely supported in the literature, the research has primarily been conducted in laboratory settings. Little work has examined how this learning effect may transfer to tasks posing larger motor demands in applied settings. Therefore, this study examined the effect of CI on tennis serve performance, a complex, sport-specific skill, in skilled athletes. Twenty-seven collegiate varsity tennis players ($N = 5$ female, M age = 19.5 ± 1.4 years) were randomly assigned to one of two CI groups (blocked or random practice). The experimental design involved two sessions: (a) pretest + practice, and (b) post-test (48 hours later). The pre-/post-test involved 12 serves, while the practice session included 4 sets of 15 serves (60 total) to designated targets based on the AAHPERD Tennis Skills Test (Hensley, 1989). Participants' tennis serve accuracy was recorded (3 = designated target, 2 = adjacent target area, 1 = service box, 0 = missed serve). The repeated-measures ANOVA revealed no significant main effects or interaction (p 's > 0.20). No differences in serve accuracy between the two CI groups or from pre- to post-test were found. Previous work has suggested that practice schedules may be partially responsible for differences in learning outcomes, with a high CI context promoting more robust neural activity evidenced by larger movement planning (Wright et al., 2016). This neural adaptation mechanism may have been negligible in participants given their high skill level coupled with the relatively short practice intervention of this study. Additional research is warranted to further understand the generalizability of the CI effect.

Bias and precision in two-dimensional accuracy tasks remain mostly ignored in motor behavior research

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Accuracy is a primary task-demand in a broad sample of human behavior and substantial research has focused on the acquisition and retention of accurate performance. Accuracy is frequently assessed with a static target that affords two dimensions of error. While accuracy can be measured in one-dimension as the average distance from the target, a richer understanding of performance in such tasks requires measurements of bias and precision. We recently reported that one-dimensional measures for two-dimensional tasks were popular in motor learning research published between 2016 and 2020. Yet, in a critique of motor learning research, Fischman (2015) illustrated that bias and precision in two-dimensional tasks were regularly ignored or measured inappropriately. Fischman urged the field to adopt appropriate

two-dimensional measures and avoid misleading measures of precision from one-dimensional scoring systems. To explore the impact of Fischman's commentary, we updated our previous investigation and expanded our search period to include the two years preceding Fischman's commentary and the seven years subsequent. We searched the Web of Science and PubMed databases for experiments involving a motor task with an outcome that had exactly two-dimensions of error. We coded a total of 117 papers that met our inclusion criteria. Over 60% of articles both before and after Fischman's commentary ignored precision and bias in their analyses. Although 23% of studies between 2013 and 2014 included appropriate two-dimensional measures, only 12% of studies did so in the years following the commentary. Further, the inappropriate use of one-dimensional data to calculate two-dimensional precision increased from 3% to 8% following the commentary. Our results highlight that Fischman's commentary has gone largely unheeded. One barrier to increased uptake of two-dimensional error scores may be the added time cost to perform these measurements manually. We strongly recommend the use of technology to streamline this process to facilitate richer data in motor behavior research. Funding source: Natural Sciences and Engineering Research Council of Canada, McMaster University.

Variations in Biodex motor control balance test scores in college students

Ben Meyer, Shippensburg University

The purpose of this project was to assess the proficiency of collegiate students in the Biodex motor control balance test. Balance tests such as the BESS and m-CTSIB have been used previously (Moran et al., 2019) to examine the differences between male and female college athletes. The present study aims to add results from the Biodex motor control balance test to the existing body of literature. Seventy-eight males and fifty-eight females (79 +/- 18 kg, 1.74 +/- 0.10 m, 21 +/- 3 years) performed the Biodex motor control balance test. The test required participants to shift their weight (while standing on a static platform) to move a cursor from a center target to a blinking target and back as quickly and with as little deviation as possible. After remaining in the target for at least 0.25 seconds, the process was repeated for the remaining targets. The order of targets was randomized for all participants. A Biodex Balance System SD (Biodex Medical Systems, Shirley, NY) was used to measure the efficiency and time to completion for each test. A composite value (the average of all tested directions) was also computed for each participant. The efficiency values were not significantly different ($p > 0.05$) between males and females (nor between athletes and non-athletes) in any of the tested directions. However, the efficiency value for the forward direction was significantly larger (47%) than the backward direction (32%). The time to reach the forward target (4.7 s) was significantly larger than the backward target (3.4 s). The results of this study revealed no gender differences in efficiency values or test completion times for all test directions. Previous work by Moran et al. (2019) found that females had better balance scores on the m-CTSIB assessment. The composite efficiency (36%) and composite time (39 s) values from the present study can serve as a baseline for future work in this area.

Batter's perceptual bias of ball trajectory induced by pitcher's handedness correlates with batter's eye movement

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We previously found that baseball batters perceive the ball trajectory of a four-seam fastball as straight, even though it is actually deflected horizontally by approximately 20cm (Nasu et al., 2020). This visual illusion was proved by showing that the direction of the perceptual bias for ball deflection is reversed depending on the handedness of the opposing pitcher. We consider this illusion to be the result of the integration of the visual information obtained in the current trial (i.e., the ball trajectory) with the prior prediction from the probability distribution in the context of the pitcher's handedness. Therefore, we hypothesized that the amount of bias for this illusion for each batter would be related to the amount of time spent acquiring the visual information (i.e., the amount of time of spent gazing at the ball). Thirteen baseball batters viewed the delivery of balls launched from a pitching machine synchronized with videos of the pitchers' movement. They then responded verbally whether they perceived the trajectory as deflected or not. The machine delivered balls that were deflected in 5 directions at 130 km/h. Two types of pitcher footage were displayed: L = left-handed pitcher, R = right-handed pitcher. Each batter underwent a total of 150 trials (5 pitches × 5 deflections × 2 videos × 3 sessions). The results confirmed that, depending on the pitcher's handedness, batters perceived the ball trajectories that were actually deflected as 'straight' (R: -2.4 ± 4.3 cm, L: 2.7 ± 3.9 cm, $t(12) = 2.87$, $p < .05$, 95% CI [1.12 8,15]). In addition, the degree of bias (the difference between R and L) was negatively correlated with the mean amount of time spent gazing at the ball between individuals ($r = -0.579$); in other words, the batter who gazed at the ball longer had the lower bias. The results prove that batters perceive the ball trajectory by integrating the obtained visual information with the prior prediction, and further, provide fundamental insight into how implicit prediction and visual processing influence performance in fast-ball sports.

The effects of IQ and dual-task interference on gait in young adults

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When individuals simultaneously perform two motor tasks, such as walking while carrying a tray, they can experience significant decrements in the performance of one or both tasks. While several studies have indicated that basic measures of gait performance are influenced by the complexity of the secondary task, it remains unclear whether gait variability is also influenced. Further, the relationship between cognitive ability, as measured by IQ and dual-motor performance, has not been fully elucidated. To address these gaps, we asked 16 neurotypical young adults (10 male, $M = 24.55 \pm 1.2$ years) to walk across a Zeno Walkway™ (4.87m). They performed ten trials in each of four motor tasks: (A) simple, overground walking, and walking while (B) carrying an empty tray, (C) carrying a tray with unstacked wooden blocks, and (D)

carrying a tray with stacked wooden blocks. From our data, significant main effects of task complexity were found on gait parameter variability, specifically for step length ($F = 7.819$, $p < 0.01$), with significant differences between conditions A and D ($M_A = 2.288$, $M_D = 4.750$; $p_{A,D} < 0.01$), percentage of time in double-limb support ($F = 9.574$, $p < 0.001$), with significant differences between conditions D and all other conditions ($M_A = 0.041$, $M_B = 0.052$, $M_C = 0.051$, $M_D = 0.095$; $p_{A,D} < 0.001$, $p_{B,D} < 0.01$, $p_{C,D} < 0.01$), velocity ($\chi^2 = 12.225$, $df = 3$, $p < 0.01$), with significant differences between conditions A and D ($M_A = 3.395$, $M_D = 7.650$, $p_{A,D} < 0.001$), and cadence ($F = 3.585$, $p < 0.05$). Furthermore, correlations between IQ score and gait performance were strongest for gait velocity ($R^2 = 0.416$), with a significant negative correlation with composite IQ score in condition D ($p < 0.001$), and velocity variability ($R^2 = 0.322$), with a significant positive correlation with composite IQ score in condition D ($p < 0.001$). Overall, our results suggest that increasing the complexity of a secondary task performed while walking results in less consistent gait, with cognitive ability as a predictor of gait speed during a dual-task. Funding source: University of Wisconsin-Madison.

An assessment of the construct validity of a performance test for visually impaired tennis players

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Athletes with vision impairment (VI) who compete in para sports are typically placed into one of three “sport classes” to compete against others whose impairment has a similar impact on their sport performance. The International Paralympic Committee is committed to adopting an evidence-based system that is sport-specific. Currently, VI classification is based on the definitions of low vision and blindness defined by the World Health Organisation and is the same across most para sports, including VI tennis, and therefore is not sport-specific or evidence-based. Since VI tennis involves several adaptations compared to able-bodied tennis (e.g., smaller court, allowing multiple bounces, sound-emitting tennis balls), existing tennis performance tests are not suitable for assessing performance. Therefore, we developed a new performance test compatible with the adaptations of VI tennis. The aim of this study was to assess the construct validity of our performance test for VI tennis. The performance test evaluated serve return performance, awarding higher scores for returns that landed farthest from the server within bounds, analysed eye movements during the serve return, and measured spatial awareness by requiring participants to locate the baseline with their eyes closed. We recruited 18 VI tennis players (ten national-level and 8 club-level) and compared their performance on the test to establish construct validity. The results showed a significant difference between the national-level group and club-level group for the serve-return score and on distance perception. Although the analysis of the eye movement data did not reveal any differences, the data quality was compromised by the limited ability to calibrate the eye-tracker on the players with VI. Our findings suggest that the serve-return and distance perception scores can discriminate between national-level and club-level players. These aspects of the performance test can be used to establish the impairment-performance relationship required

to develop a sport-specific classification system for VI tennis Funding source: European Union Horizon 2020.

Effects of Alexander technique-based instructions on young adult gait

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A growing body of evidence reveals the Alexander technique (AT) has beneficial effects on chronic pain, symptoms of stress, motor performance, and postural tone. Recent studies report that verbal instructions based on the AT can have immediate effects on various postural control tasks in older adults and people with Parkinson's disease. Here we investigated the effects of AT-based verbal instructions on steady state gait in young adult participants. Forty-four participants (M age = 23.4, female = 29) completed 10 repetitions on a 0.61m x 7.92m instrumented carpet (Zeno Walkway) in a no-instruction control condition followed by 10 repetitions in three randomly ordered instruction conditions: (a) lighten up (AT-based), (b) pullup, and (c) relax. RM ANOVAs revealed significant differences across conditions in mean stride length and coefficient of variation (CV), $F(1.6, 129) = 28.2, p < .001, F(1.9, 129) = 4.2, p = .019$, mean stride time and CV, $F(1.1, 129) = 5.5, p = .021, F(1.6, 129) = 4.5, p = .021$, mean stride velocity and CV, $F(1.7, 129) = 24.9, p < .001, F(1.9, 129) = 6.4, p = .003$, and mean single support % and CV, $F(1.3, 129) = 15.9, p < .001, F(1.4, 129) = 5.1, p = .018$. In general, participants took shorter strides, walked slower, spent more time in double support and had the highest variability during the relax trial compared to the other trials. RM ANOVAs on participants' subjective ratings of the instructions revealed significant effects for mental effort, $F(2, 43) = 16.3, p < .001$, physical effort, $F(1.6, 42) = 23.4, p < .001$, remembering instructions, $F(2, 43) = 4.3, p = .017$, confidence applying the instructions, $F(2, 41) = 3.9, p = .025$, familiarity, $F(2, 41) = 3.7, p = .029$, and perceived speed, $F(1.8, 43) = 32.3, p < .001$. Participants reported the relax instructions as less effortful, easier to remember and apply, more familiar, and resulting in slower speed. In contrast to expectations based on previous studies, lighten up instructions had minimal effects on gait, whereas relax instructions compromised gait significantly.

Gait variability in spatiotemporal gait parameters in young adults

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Virtual reality (VR) is an emerging technology with applications in assessment and rehabilitation. Within VR, visual feedback about self-movement ranges from no representation, to stick and ball figures, to full body avatars. Before we can use VR as an assessment or rehabilitation tool, we must first understand whether and how the presence of a representation of the body influences movement in VR. The primary aim of this study was to assess whether absence of visual feedback of the lower limbs influences gait variability during an obstacle negotiation task. Twenty-four young adults (ages 18-35) walked over a Zeno gait

mat under three different visual conditions: (a) overground (OG)-natural environment/normal vision (b) basketball goggles (BG)- natural environment/occluded lower body; (c) VR-immersive virtual environment/no representation of lower body. On some conditions, participants stepped over an obstacle (4" x 6" x 9") positioned at 25%, 50%, or 75% of the Zeno Walkway. A 3 x 3 repeated measures ANOVA was used to examine the effect of visual condition and obstacle location on the variability of spatiotemporal gait parameters. There were significant main effects of visual condition on the variability of stride width, stride length, and double support time (%) ($p < 0.001$). Post-hoc analysis indicated that variability was greater in the VR condition than the OG and BG for both stride length and double support. For stride width, variability in the VR condition was significantly different from the OG condition only. There were also significant main effects of obstacle location on the variability of step length, stride length and double support time (%; $p < 0.001$). These significant effects indicated that both the presence and location of the obstacle influenced gait variability across the Zeno mat. The results of this study suggest that having a visual representation of the lower limbs influences gait stability as individuals walk in VR and has important implications for the design and development of VR tools for assessment and rehabilitation. Funding source: National Science Foundation.

Effects of intentionality and frequency on maintaining a learned dyadic coordination

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Previously, studies on learning bimanual coordination have found that learning a 90° coordination is modality- and frequency-specific, and the intention to correct performance that has drifted from 90° is required to maintain the coordination. Dyadic coordination differs from bimanual coordination in that only visual, not kinesthetic, coupling is available, and two people must both intend to correct. Therefore, the learning of dyad coordination should be more difficult, and once learned, the coordination should be less stable with variation of frequency and intention to correct. 30 participants were randomly paired (15 dyads) to learn the 90° coordination pattern using a computer-joystick system. Each person moved a dot on the computer screen by moving a joystick laterally so that the two dots on the screen (positioned top and bottom) would move left and right rhythmically at 0.75Hz at 90° relative phase. Each pair practiced daily until their performance (measured by proportion of time on task) reached an average of 60% in a practice session. Subsequently, each dyad was tested on the ability to maintain 90° coordination with increasing frequencies with and without correction. The frequency changed from 0.5Hz to 2Hz by increments of 0.25Hz, and pairs were first tested with intent to correct and then without intent to correct. The results showed that it took a long time for the pairs to learn the 90° coordination, and post-training performance was significantly affected by both frequency ($F(1,14) = 16.16$, $p < 0.01$) and intentionality ($F(6,84) = 34.37$, $p < 0.001$) with no interaction between them. The post-hoc comparisons revealed that the performance was best at the training frequency, worse at the frequencies neighboring the training frequency, and worst at the highest frequency, replicating results of a previous study of

bimanual coordination. Additionally, when 90° coordination could not be maintained due to moving at high frequency or lack of intent to correct, the dyadic coordination switched to intrinsic coordination patterns of 0° or 180°.

Across-task binding in movement sequence learning: The role of visual information during sequence execution

Stefan Panzer, Saarland University; Christina Pfeifer, Saarland University; Luca Daniel, Saarland University; Charles Shea, Texas A&M University; Robert Gaschler, FernUniversitaet in Hagen; Hilde Haider, Cologne University

Across-task binding (ATB) is defined as the stimulus of one task being linked to the response of another task. If both tasks are consistently combined, an integrated representation will be developed. In past research, a visual-manual key-press sequence and an auditory-vocal task were linked. The present experiment investigated if ATB and the development of a sequence representation depends on visual information available during movement sequence learning. The task was a sequence of extension/flexion movements of the elbow. To induce ATB the sequence task was paired with an auditory-vocal discrimination task. Participants ($N = 22$) were randomly assigned to conditions termed visual information available (VIA; visual information about the spatial position of the limb) and visual information not available (VINA, visual information was withdrawn). On day 1, participants were instructed to discriminate between high (1000 Hz) or low pitch (300 Hz) tones (lasting 60 ms) during sequence execution. The low pitch tone was positioned at the second reversal point where a flexion movement was required. The high pitch tone was positioned at the fifth reversal point where an extension movement was required. Day 2 consisted of a retention test and inter-manual transfer tests. The mirror transfer test required the same pattern of muscle activation and joint angles (motor coordinates) in the contralateral limb as experienced during the acquisition phase, while in the non-mirror transfer test the visual-spatial locations (spatial coordinates) of the target waveform were reinstated. Both transfer tests were conducted under the same conditions compared to acquisition and when the spatial position of the 'high' and 'low' pitch tones were switched. The analysis indicated that transfer performance on both tests was not provided for the VINA group when the spatial position of the tones was changed. This suggested a generation of associations across the two tasks and the two representations (spatial/motor) in a movement sequence when visual information was withdrawn. Funding source: German Research Foundation.

An examination of the evidence for the role of motivation in motor learning

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Motivation is commonly recognized by researchers and practitioners as a key factor for motor learning. However, its role in motor skill acquisition was only recently formalized in a theory that described predictions of the short- and long-term effects of motivation for skill acquisition. The OPTIMAL theory of motor learning (Wulf & Lewthwaite, 2016) claims that practice

conditions that enhance learners' expectancies for future successful outcomes or that are autonomy supportive are motivating, and thus lead to better learning. To examine the current evidence of the direct association between motivation and motor learning, we searched the literature for motor learning studies that manipulated enhanced expectancies and/or autonomy support as proposed by OPTIMAL theory. Specifically, our goal was to assess the number of experiments that measured motivation and, among those that did, the percentage of experiments that observed group differences in motivation and reported better learning in the groups showing increased motivation. Results showed that out of the 52 experiments assessed only 25% ($n = 13$) included at least one measure of motivation and, among those, 84.62% ($n = 11$) found no differences between groups on levels of motivation. In the remaining experiments ($n = 2$), the groups with higher motivation also showed better performance on a retention test. Overall, we found that the vast majority of experiments investigating enhanced expectancies and autonomy support manipulations did not measure motivation, even though this is the main underlying factor proposed by OPTIMAL theory to explain the potential effects of these manipulations on learning. Additionally, only a trivial number of experiments that assessed motivation showed group differences in motivation levels. Together, our results question whether the manipulations proposed by OPTIMAL theory are indeed motivating and highlight the lack of enough evidence in the literature to support the relationship (or lack thereof) between motivation and motor learning.

Does a bike computer attenuate visual attention to detect hazardous traffic situations?

Christina Pfeifer, Saarland University; Johannes Puhl, Saarland University; Stefan Panzer, Saarland University

Bike computers are an important equipment on road bikes where athletes monitor output parameters. Literature reports that attentional resources are limited in capacity. An open issue is if the visual control of performance parameters on a bike computer attenuates athletes' attention from the cycling or the traffic task and induces dual-task interferences. The purpose of the present experiment was to determine the effect of monitoring two parameters, the cadence, and heart rate on a bike computer, and simultaneously detect hazardous traffic situations. Individuals ($N = 20$) were instructed to ride a road bike that was fitted onto a roller trainer. The traffic environment was projected on a 2 m X 2 m screen positioned 2 m in front of the individual's eye level. A bike computer was fixed on an extended handlebar mount. Traffic situations were presented in three one-minute video clips for each condition. The traffic task was to name hazardous traffic situations. The cycling task was to maintain a prescribed cadence of 70 or 90 RPM and to maintain the heart rate in an individual range of 50-70% of the maximal heart rate. Individuals were instructed to perform the cycling task in two single-task conditions (only watching the traffic) and two dual-task conditions (monitoring the bike computer and observing the traffic) and one control condition (without instruction). Dwell time of the eye movements, the deviation from the target cadence (constant error [CE]), the frequency of the deviating heart rate, and the detected hazard traffic situations were analyzed. The analysis indicated that the CE significantly differed between the 70 RPM and 90 RPM and the heart rate was significantly more often outside the range for the 90 RPM condition. Further, the dwell

time for the bike computer was increased in the dual-task condition. However, no significant difference in detecting hazardous traffic situations in a dual-task or single-task situation was observed. These findings suggest that monitoring traffic hazards was prioritized over maintaining a prescribed cadence and heart rate. Funding source: Saarland University.

The spatial context of directional cues impacts movement planning success when initiating a step

Jenna Pitman, University of Guelph; Lori Ann Vallis, University of Guelph

Anticipatory postural adjustments (APAs) performed prior to step initiation are essential to transfer body weight between the feet and accelerate the center of mass forward. Typically, APAs for step initiation include small posterior and lateral movements of the center of pressure (CoP) initially toward the future swing and then stance limb. APA errors such as incorrect lateral movements of the CoP first toward the stance limb would require corrective weight shifts and suggest errors in step movement planning. In the upper limb, past research has reported slower response times when a visual cue's spatial context is incongruent with the spatial context of the response (e.g., visual direction cue presented on right side of fixation point, cuing a left reach or button press). To our knowledge, it is not fully known how spatial context of a visual cue impacts the ability of young adults to plan and execute effective step initiation. We hypothesized that more APA errors would be shown when initiating a step following a spatially incongruent visual cue, suggesting that the spatial context of a cue has a direct influence on step initiation behaviors. Thirteen young adults (24.2 ± 2.2 years; 7 female) were instructed to stand on a force plate in front of a large projector screen and to "step forward with the foot indicated by the arrow's direction as soon as you see an arrow appear, ensuring that you are stepping with the correct limb." ML CoP APAs were categorized based on initial APA direction: toward swing (correct) or stance limb (error) for each trial. Error rates were calculated as a percentage of all trials ($N = 520$ trials analyzed total). A two-way ANOVA was then performed (independent variables: spatial context [congruent, incongruent] x stepping limb [left, right]). Results revealed 35.6% greater errors for incongruent visual cue trials compared to congruent trials ($p < 0.001$). Our findings provide insight into how visual cues from the environment are integrated to generate successful stepping responses. Future work will explore this phenomenon in ongoing locomotion. Funding source: Ontario Graduate Scholarship; Natural Sciences and Engineering Research Council of Canada.

Can motor learning without seeing enhance perceptual judgments?

Alexandra Pizzera, German Sport University Cologne; Leonie Wilsch, German Sport University Cologne

Theories of perception-action coupling (embodiment) assume, contrary to traditional perceptual models, that visual perception is influenced by motor skills (Wilson, 2002). One study showed that learning a specific gait pattern also has an influence on the identification and recognition of the learned movement, even when participants have learned the movement

blindfolded (Casile & Giese, 2006). Physical movement has the particularity that it can be executed and perceived. Athletes in particular show an increased ability to perceive due to a high level of motor expertise (Heinen & Shiffrar, 2010). The aim of the current study was to investigate the influence of a training intervention of several weeks, which only influences the motor component, on perceptual judgments. Participants ($n = 13$) learned a gymnastics skill they had never seen or performed before, while being blindfolded throughout the training phase. Before and after the intervention, they were asked to judge the learned skill regarding its movement quality, while also judging two other skills (one they had motor expertise with, the other they had neither motor nor visual expertise). Judgment quality of the intervention group remained stable from pre- to post-test, $F(1, 12) = 4.22$, $p = .062$, $\eta_p^2 = 0.26$. However, there was a significant difference in judgment quality between the three skills, $F(1.3, 12.49) = 8.89$, $p = .006$, $\eta_p^2 = 0.426$. The learned skill was judged significantly better than one of the other two skills, $t(12) = 4.21$, $p < .001$, $d = 1.41$. The interaction effect was not significant, $F(2, 24.14) = 0.70$, $p = .51$, $\eta_p^2 = 0.06$. A control group of $n = 12$ participants, that only took part in the pre- and post-test, showed similar results. Taken together, pure motor expertise does not seem to affect perceptual judgments. An additional cognitive component seems to be necessary to translate the identification and discrimination of movements into an actual judgment of a skill. More work is needed to explore this possible link between motor and visual expertise and perceptual judgments.

Difficult skill – narrow balance beam? Effects of skill difficulty on size perception in gymnastics

Alexandra Pizzera, German Sport University Cologne; Lena Muschalle, German Sport University Cologne

The perception of our environment is dependent on how we interact with it (Gray, 2013). Witt & Proffitt (2005) have shown that the visual perception of a ball changes depending on our own performance during a softball game. The difficulty of a task has also been shown to influence visual perception (Witt, 2008). Studies with golf players revealed that the golf hole is perceived as smaller the more difficult the task gets. However, difficulty was manipulated by the distance to the hole, which automatically also changes the visual perspective and therefore confounds difficulty and perception. The aim of the present study was to address this limitation and examine the relation between task difficulty and visual perception in gymnastics. 31 gymnasts were asked to perform two skills of differing difficulty on the balance beam and after each trial, estimate the width of the balance beam by drawing a rectangle on a piece of paper. The gymnasts all underestimated the width of the balance beam, ($M_W = 8.16$ cm, $SD = 2.15$), the correct width is 10 cm. In addition, gymnasts of higher general skill level estimated the balance beam to be wider compared to the lower skill level, both for the easier ($M_W = 8.64$ cm vs 8.12, $SD = 1.86$ vs 1.27) and the more difficult skills ($M_W = 8.5$ cm vs 7.23, $SD = 1.07$ vs 3.8). However, a repeated-measures ANOVA revealed no main effect for skill difficulty, $F(1, 29) = 1.13$, $p = .297$, $\eta_p^2 = 0.04$, general skill level, $F(1, 19) = 1.99$, $p = .168$, $\eta_p^2 = 0.06$ and no interaction effect, $F(1, 29) = 0.6$, $p = .445$, $\eta_p^2 = 0.02$. Interestingly, cognitive anxiety negatively correlated with width perception, both for the easier ($r = -0.47$, $p = .007$) and more difficult ($r =$

-0.38, $p = .036$) skill. Therefore, the more worried the gymnasts were, the narrower they perceived the beam to be. Taken together, performing difficult skills on the balance beam seems to influence visual perception, in that objects, like a balance beam, are perceived smaller/narrower than they are. However, this does not seem to be related to skill difficulty or general skills level.

A test of the variability vs. specificity hypotheses in the retention of a motor skill: A registered report

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The variability of practice hypothesis suggests that practicing with task variations enhances motor learning. However, in tasks with only a 'single' criterion goal to be learned (like a free throw), the evidence that variable practice enhances retention of the criterion task compared to constant practice (i.e., practicing without task variations) is somewhat mixed. Hence, we sought to address this question in a registered report format, in which there is peer review prior to data collection. The stage 1 proposal was reviewed and accepted, and we present the preliminary results from our stage 2 data collection here. Participants ($N = 80$) learned a bimanual shuffleboard task where the goal was to slide a virtual puck towards a target. This task requires participants to release the puck at a specified speed consistently to hit the target. Two groups of participants were tested: the constant group practiced with a specific criterion target location, whereas the variable group practiced the criterion target location along with 4 additional target locations. Participants initially performed a pre-test, followed by practice of 300 throws, followed by 24 h retention and transfer tests. Preliminary analyses of results showed that both groups improved their performance with practice, with improvements lasting well toward the end of practice (i.e., indicating the task was not "easy" to learn). However, there were no significant differences in terms of task performance in the retention tests between the constant and variable groups. Bayesian analysis using Bayes factors also suggested that the null hypothesis (that the two groups had the same level of retention) was favored over the alternate hypothesis. These preliminary results suggest that there may not be an advantage of variable practice in tasks where there is only a single criterion goal. Funding source: National Science Foundation.

Enhancing executive function in children and adolescents through motor learning: A review

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Executive function is essential for development of goal-directed behavior and has been associated with academic performance and overall quality of life. Therefore, the enhancement of executive function is key to ensuring wellbeing and intellectual capacity in children and adolescents. Motor learning processes draw on executive processes to maintain goal-behavior,

explore cognitive and movement solutions, and process feedback. Due to an absence of reviews addressing motor learning and executive function in children and adolescents, we reviewed the literature to identify and describe motor learning approaches that have been reported to augment executive function in these developmental stages and to evaluate if there is a sufficient body of literature to conduct a systematic review. Studies that included children or adolescents and assessed executive function changes due to or in parallel to motor learning were reviewed. A higher proportion of these studies involved children with atypical (e.g., ADHD) developmental trajectories, though typically developing children have also been studied. Motor learning was conducted in a range of settings with the most common involving group training sessions in school environments or individual training in lab environments. Motor tasks commonly involved upper inter limb coordination as well as balance and visual guided action. Studies commonly assessed the core executive functions (working memory, inhibition, and flexibility). Motor learning approaches that introduce practice variability and expose the learner to multiple motor tasks appear to be particularly beneficial for enhancing executive function. Specifically, results of the included studies demonstrated improvements in measures of inhibition, working memory or all core executive functions following motor learning intervention. Overall, evidence suggests that engaging in motor learning is a promising approach for improving executive function in children and adolescents. Additionally, there is a sufficient volume of research to explore this link with a systematic review.

Impact of attentional focus on the underhand maximal throw of a medicine ball in young healthy adults

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The benefit of an external focus over an internal focus has been well-established (Chua et al., 2021). Within this literature, several studies have compared the efficacy of a proximal and distal external focus with a focus on the physical distance between the performer and what they are focusing on. A potential confound that exists in this design is that most distal focus cues direct the performer's attention to an outcome occurring after the completion of the movement, while the proximal cues direct attention to something that occurs during the process of completing the movement. This study aims to disentangle the effects of an internal vs. external focus and a process vs. outcome focus. We hypothesized that an external-outcome focus would elicit the best motor performance compared to other attentional focus cues. To test this, we employed a two-handed underhand medicine ball throw for maximum distance. This study was a within-participant counterbalanced design with five conditions including baseline, internal-process (focus on extending legs during throw), internal-outcome (focus on landing with bent knees), external-process (focus on accelerating the ball during throw), external-outcome (focus on throwing the ball as close to the cone as possible). A total of 38 healthy young adults participated, and the ANOVA analysis indicated that both external process and outcome foci elicited a significantly greater throwing distance than internal-process and -outcome foci, $F(4) = 14.72$, $p < .001$, $\eta_p^2 = .29$. Further, throws under the external-outcome focus were farther than the external-process focus ($p = .04$) and throw distance under internal-outcome focus was

significantly lower than the baseline ($p = .02$). Our findings seem to support the previously identified benefit of a distal external focus. Importantly, the internal-process condition actually deteriorated performance relative to baseline. This suggests that focusing on any outcome does not improve performance. Rather, an outcome associated with the desired action effects is required.

Association between physical function and stride velocity and stride length at various walking speeds in older adults

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Many gait parameters associate with physical function in older adults, with two of the most common including stride velocity, the speed at which a single step is taken, and stride length, the distance between the successive contact of a single foot. These correlations have been reported at participants' normal and maximal paces. The present study examined this relationship across varying walking speeds. It was hypothesized that across all speeds, individuals with greater physical function will have a greater stride velocity and stride length. Eighteen older adults (5 M, 13 F, $M_{age} = 72.1 \pm 4.1$ yrs) performed the Short Physical Performance Battery (SPPB) to assess physical function. Participants also performed overground walking tasks at four speeds: self-selected slow, normal, brisk, and maximal, over a GAITRite electronic mat to analyze gait parameters. Correlation analyses were run to analyze the relationships between physical function and the aforementioned gait parameters. There was a positive correlation between SPPB scores and stride velocity across self-selected slow ($r = 0.40$), normal ($r = 0.60$), brisk ($r = 0.47$), and maximal ($r = 0.59$) speeds and a significant association among normal ($p = 0.009$), brisk ($p = 0.047$), and maximal ($p = 0.009$) speeds. Additionally, there was a positive correlation between SPPB scores and stride length across self-selected slow ($r = 0.47$), normal ($r = 0.57$), brisk ($r = 0.42$), and maximal ($r = 0.40$) speeds and a significant association amongst self-selected slow ($p = 0.049$), normal ($p = 0.013$), and maximal ($p = 0.010$) speeds. The results suggest that higher SPPB scores correlate with a greater stride velocity and length, which is consistent across all four walking conditions. The ability to assess these parameters and how each associate with physical function at various walking speeds may be useful to clinicians when determining what gait parameters clinicians may want to assess and at what speed. This flexibility in testing requirements may be important for older adults with injury or declining physical function and gait performance. Funding source: Ministry of Science and ICT (The Republic of Korea).

Effect of attentional focus distance on learning a soccer dribbling skill

Aiman Sarhan, Umm Al-Qura University; Mohammed Bila, Wayne State University; Qin Lai, Wayne State University

Previous research demonstrated that increased distance of external focus produced superior balance learning (e.g., McNevin, Shea & Wulf, 2003). However, it is unknown whether the

finding can be generalized to other skills such as soccer dribbling, which requires controlling a ball close to the body. The present study aimed to compare internal focus with proximal and distal external focus in a soccer dribbling task. 40 young adults aged 18-40, with no or little soccer experience, signed an informed consent prior to the study. They were randomly and equally assigned to one of four groups: internal focus (IF), proximal external focus (pEF), distal external focus (dEF), and control. Specifically, participants were instructed to direct their focus on the medial part of the kicking foot as IF, the lower area of the ball as pEF, and the zig-zag path through the flags as dEF. In a course of 7 flags (20 m), the task was to dribble a standard soccer ball as fast as possible from start to finish line. Participants started with a pretest, followed by 5 blocks of acquisition with specific focus instructions. Retention test was administered 48 hrs after acquisition. A laser gate system and video camera were used to record dribbling time and technique errors, respectively. Dribbling performance was estimated by adjusted dribbling time, which combined actual dribbling time and technique errors. No difference was found between groups on pretest. For acquisition, a 4 (Groups) x 5 (Blocks) mixed ANOVA with repeated measure of block revealed main effects of group ($F(3, 36) = 3.08, p < .05$), and blocks ($F(4, 144) = 25.22, p < .01$). Further, Duncan's MRT found the pEF produced better performance relative to IF. A separated one-way ANOVA also found a main effect of group ($F(3, 36) = 3.07, p < .05$). The participants in pEF had the fastest adjusted dribbling time. The results showed that proximal external focus enhanced learning in soccer dribbling. It indicates that the benefits of external focus distance depend on motor skill characteristics.

Prefrontal cortex activation during dual-task tandem walking in young and older adults

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Tandem walking (TW) may be useful for investigating important aspects of dynamic balance and mobility, especially in relation to pathological motor and cognitive aging processes. There is little research into how neural resources are used effectively during single- (ST) and dual-task (DT) TW. 20 young (YA, age 21.4 ± 1.84) and 12 older adults (OA, age 55.3 ± 3.98) had to perform the tandem walk, cognitive tasks (recite the alphabet backward [mental tracking], recite numbers and letters alternately [task switching, oral TMT-B], and count backward from a given 3-digit number in steps of 3 [mental tracking]), and DT (TW + cognitive tasks) for 30s each. During task execution, the hemodynamic response of the frontal lobe was recorded using an 8 sources X 8 detectors fNIRS system; gait parameters and cognitive performance were noted. Overall, OA showed a significantly lower number of correct motor but not cognitive responses than YA (Wilks Lambda = 0.31, $F_{(10,21)} = 4.60, p = .002, h^2_p = .686$). In the individual tasks, YA and OA performed best in the oTMT-B, followed by the two mental tracking tasks (alphabet, counting backward in steps of 3). In the DT, there was no difference in YA compared to the ST condition; in OA, performance for the oTMT-B and reciting the alphabet backward decreased significantly ($F_{(1.36, 40.7)} = 4.64, p = .027, h^2_p = .134$). Notably, TW showed high oxy-Hb compared to other tasks during the first 10 seconds, which seems to be related to cognitive and executive functions and the functions of PFCs involved in gait and dual tasks. TW, a non-automated gait task, may also induce more neural resources to control posture balance during TW. Conversely, the continuous cognitive load caused by the addition of cognitive tasks during TW led to a

gradual increase in oxy-Hb during task performance. Compared to YA, the OA showed lower oxy-Hb during dual tasks, which seems to be due to the limitation of neural resources in the PFC. This downregulation of neural resources in the PFC may have been redistributed to other brain regions to complement motor control.

Influence of crutches on mental chronometry while walking – A pilot study in children and young adults

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Assistive devices such as walkers and crutches are often provided during physical therapy to facilitate ambulation. However, using walkers or crutches can lead to structural and functional changes in the sensorimotor system that can affect motor imagery (MI) ability of coordinated walking. In this pilot study, we investigated the effects of crutches on temporal characteristics of MI. The walking duration of 25 children (10.4 ± 0.5 years, 14 girls) and 25 young adults (21.2 ± 2.5 years, 12 females) was recorded in 12 conditions: actual and imagined walking with and without crutches over distances of 5, 10, and 15 m. A repeated-measures ANOVA of distance (5m, 10m, 15m), walking support (with, without), and walking time (actual, imagined) showed a significant interaction distance \times walking support \times walking time \times age group, $F(2,92) = 5.20$, $p = .007$, $\eta^2_p = .102$. Young adults showed increased walking times as a function of distance and use of walking support, but only minor differences in actual and imagined walking times. In contrast, children shortened their imagined times in the condition with crutches. In addition, an ANOVA for the CE narrowly missed significance for the distance \times crutch \times age group interaction, $F(2, 96) = 2.45$, $p = .091$, $\eta^2_p = .049$, with children not significantly different from adults in the condition without crutches but significantly different with crutches. The time course of development across the lifespan and the underlying mechanisms of motion perception ability remains poorly understood. However, it has been reported that temporal imagination is faster than the actual performance in complex whole-body tasks, possibly due to the complexity of the required motor skill and the experience of the participants involved. These results seem to be consistent with the shortened imagination times in children when walking with crutches, an unfamiliar mode of locomotion. Other walking conditions (e.g., across obstacles, elderly and pathological groups, MI ability, and working memory performance) should be included in future studies.

The effect of cognitive dual task type on manual dexterity and the association with cognitive function in older adults with mild cognitive impairment

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Decreased cognitive function in older adults with mild cognitive impairment (MCI) may play a critical role in well-documented manual dexterity impairments in this population. Dual task paradigms are commonly used to assess the effect of cognitive function on motor performance by increasing cognitive load, though different types of dual tasks exist. We examined the effect

of dual task type on manual dexterity and the association with decreased cognitive function in older adults with MCI. A total of 9 older adults with MCI (age 76.3 ± 2.9) and 13 healthy controls (age 74.5 ± 2.2) completed the Grooved Pegboard test alone and while performing a visuospatial cognitive task and non-visuospatial cognitive task. Performance on standardized assessments of cognitive function, Trail Making Test A and B, was also assessed. There was no difference in Pegboard completion time in those with MCI versus healthy controls when performing the Pegboard test alone and with the visuospatial task. However, Pegboard completion time was greater in those with MCI compared to healthy controls when performing the non-visuospatial task ($p = .035$). Older adults with MCI provided fewer correct answers for the non-visuospatial task compared to healthy controls ($p = .020$) but there was no difference in number of correct answers for the visuospatial task. In adults with MCI, Pegboard completion time while performing the non-visuospatial task was associated with decreased performance on Trail Making Test B ($r = .667$) but not Trail Making Test A. There was no relationship between Pegboard completion time and Trail Making Test A or B in healthy controls. Results provide evidence for the relationship between cognitive function and manual dexterity impairments in older adults with MCI, which may be more sensitive to increased cognitive load from non-visuospatial versus visuospatial tasks. Lack of association between Pegboard performance and Trail Making Test A suggests Trail Making Test B may be indicated when assessing cognitive function in relation to motor impairments in older adults with MCI.

The effects of high intensity interval training vs moderate intensity continuous training in a Parkinson's disease population

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Parkinson's disease (PD) is a neurodegenerative disease characterized by various motor and non-motor symptoms including bradykinesia, rigidity, tremor, postural stability, and sleep disturbances. Aerobic exercise has been shown to improve some of these symptoms, however studies examining the effects of different exercise intensity in participants with PD is limited. This study compared the effects of moderate intensity continuous training (MICT) and high intensity interval training (HIIT) on maximal oxygen uptake (VO_{2max}), posture and gait in individuals with PD. We hypothesized that HIIT may be advantageous due to health benefits observed in other populations after completing HIIT programs. Twenty-eight men and women (45 to 85 years; 11 F) with PD and no history of stroke, dementia, type 1 diabetes, or autonomic neuropathy were recruited to complete a ten-week supervised exercise training program, attending three cycling classes per week. At baseline, participants performed five walking trials to assess gait (GaitRite, 50Hz or Opal inertial measurement sensors, 128Hz). Postural stability was evaluated via three one-minute quiet standing trials (AMTI force plate; 50Hz). The Mini-BESTest clinical mobility test and anthropometric measurements were completed, and a cycling VO_{2max} test was performed. The HIIT group training program included ten, one-minute intervals at 90% peak power alternated with one minute at 10% peak power. The MICT group cycled at 60% peak power, increasing from 30 to 50 minutes over ten weeks. Following the

intervention (97% compliance), baseline assessments were repeated. Both forms of training increased relative VO_2max ($p < 0.001$) but did not result in statistically significant changes ($p > 0.05$) for the Mini-BESTest or any gait metrics (e.g., speed, % double support, cadence, stride length), which may be considered a positive outcome for a neurodegenerative population. Postural stability data is currently being analyzed. Funding source: Parkinson Canada.

Augmented reality teaching aid for lumbar puncture in graduate nursing education

Andrew Shaw, University of Tennessee; Shalaunda Reeves, University of Tennessee; Deborah Lee, University of Michigan; Jared Porter, University of Tennessee

Research in the area of practice specificity proposes that transfer of learning is increased when practice and testing parameters are closely matched. Unfortunately, not all performance situations lend themselves to realistic representative practice environments. In some cases, such as medicine, it is either dangerous, or simply not possible to practice how you expect to perform under real-world constraints. The growing capabilities of mixed reality (MR), defined as the merging of a real-world environment and a computer-generated scene, may provide a solution. MR, often used synonymously with augmented reality (AR), differs from virtual reality, where the environment is completely computer generated. MR/AR have the potential advantage of allowing the user to interact with real world objects with the aid of digital images, objects, and videos. This potential advantage has not been validated via scientific study. The aim of this study was to determine the viability of using AR as a method of learning a specific task in a graduate nursing program. To pursue this aim, we built an AR teaching aid for use with nurse training mannequins and solicited 24 participants. Volunteers practiced a lumbar puncture procedure using AR in place of traditional classroom instruction. In addition to the required practical exam required by the graduate nursing program, we conducted an exit survey to assess the potential advantages and disadvantages of the AR practice platform. Post-test survey, interview, and test results revealed that the AR learning platform was effective, engaging, and enjoyable. Specifically, participants indicated that the AR instruction facilitated learning, was easy to use, and provided meaningful hands-on practice. This indicates promise for the use of AR instruction with the goal of enhancing real-world performance on procedural tasks, especially where tasks include danger to life, challenging logistics or prohibitive costs. Additional research is needed to explore the learner experience via concepts such as judgment of learning, engagement, and motivation.

Augmented reality teaching aid for central line insertion in graduate nursing education

Andrew Shaw, University of Tennessee; Shalaunda Reeves, University of Tennessee; Deborah Lee, University of Michigan; Jared Porter, University of Tennessee

It is established that learning is most effective when the practice environment closely matches the testing environment. Advancements in technology enabling virtual, augmented, and mixed reality show promise in expanding the possibilities of replicating real-world environments during practice where the testing environment poses dangerous, logistical, or monetary

challenges. Utilizing augmented reality (AR), often used synonymously with augmented reality (AR) or virtual reality (VR), where there is minimal interaction with physical objects, may facilitate the learning of procedural medical skills, particularly those which require invasive or potentially dangerous actions when performed on a live patient. Previous research by this team examining how the use of MR in nursing education using a lumbar puncture procedure, indicates that MR learning was effective, engaging, and enjoyable. The aim of this study was to build on those results using another procedure with the addition of judgement of learning measures in order to validate the usability, engagement, motivation, and judgement of learning of AR as a method of learning a specific invasive procedural task in a graduate nursing program. To pursue this aim, we built an AR teaching aid for use with nurse training mannequins and solicited 15 volunteer participants. Nursing students conducted training on central line insertion using AR in the place of traditional classroom instruction. In addition to the required practical exam, we measured judgement of learning, engagement, and intrinsic motivation at the completion of practice. All three scales, qualitative interviews, and practical exam results indicated that the AR learning was effective, engaging, motivating, and enjoyable. These results are promising for the use of AR practice with the goal of enhancing real-world performance on procedural medical skills. Additional research is needed to explore the effect on learning and retention as well as determine if there are tasks that lend themselves to a greater or lesser gain in learning with the use of VR, AR, or MR.

The role of anticipatory and reflexive compensatory muscle activation in catching errors under load uncertainty

Sohben Sinn, Miami University; William Berg, Miami University; Gabrielle Vachon, Miami University; Michael Hughes, Miami University

Catching offers a useful task to study how humans manage impending perceptual-motor events. This experiment investigated the role of anticipatory and reflexive compensatory neuromotor control in catching errors occurring under load uncertainty. Thirty-seven ($N = 37$) participants performed 64 trials of a one-handed ball catching task using visually identical balls of four different weights (1 = lightest, 4 = heaviest) without knowing the weight of the ball on each trial. Anticipatory and reflexive compensatory muscle activation was recorded in five muscles (anterior deltoid, biceps brachii, wrist flexors, triceps brachii, lumbar erector spinae) using the EMG integral. In each muscle, the anticipatory and reflexive compensatory muscle activation were compared between successful catches and catching errors for ball weights 1 and 4. Anticipatory muscle activation was not implicated in errors made with ball weight 1. However, reflexive compensatory muscle activation in the anterior deltoid, biceps brachii, and wrist flexors were implicated in errors made with ball weight 1. Errors with ball weight 1 (lightest) were characterized by elevated reflexive compensatory muscle activation. In the case of ball weight 4, both anticipatory (anterior deltoid, wrist flexors) and reflexive compensatory muscle activation (anterior deltoid, biceps brachii, wrist flexors) were implicated in catching errors. Errors with ball weight 4 (heaviest) were characterized by lower anticipatory and reflexive compensatory muscle activation. The findings lend support to Berg and Hughes'

(2020b) conclusion about the elevated concern demonstrated for high rather than low loads when faced with catching under load uncertainty.

The influence of attentional focus on acute changes in transverse relaxation times (T2) of femoral articular cartilage in drop jump landings

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Attentional focus instructions may change biomechanical variables and injury risk of the knee when landing from a jump. However, it is unknown how these instructions impact the transverse relaxation time (T2) of cartilage. T2 relaxation time reflects cartilage compressive loading, with more acute changes in T2 relaxation time indicative of greater impact forces which may lead to a greater risk of degeneration of cartilage. As such, the present study examined acute changes in T2 relaxation time of the femoral lateral cartilage under different attentional focus instructions during repeated drop landings. It was hypothesized that external focus (EF) instructions (focus on landing as soft as possible) would improve landing biomechanics resulting in less acute changes in T2 relaxation time relative to internal focus (IF) instructions (focus on bending your knees when you land) and a no-focus control condition (CON). Ten healthy women ($M_{\text{age}} = 20.4 \pm 0.8$ years) performed the drop landing task from a 50cm high box over the course of three days ($N = 150$ total, $n = 50$ each day). For each day, the participants performed the task under one of the three counter-balanced attentional focus conditions (EF, IF, and CON). Magnetic resonance imaging (MRI) using T2 mapping was performed on knee cartilage before and after completing the drop landings each day. In total, 180 cartilage slices were measured on a 1.5T MRI and were manually segmented and divided into regions of interest. Results indicated significant reductions in T2 relaxation time in the femur, anterior femur, central femur, anterior part of the central femur, and anterior part of the posterior femur in the CON condition (all p 's $< .05$), and similar reductions in the IF condition. Importantly, no significant reductions in T2 relaxation time of cartilage were found during the EF condition suggesting lower loading of femoral lateral cartilage. Findings suggest that adopting an external focus of attention may help reduce frequent landing impact forces, thereby reducing the risk for osteoarthritis and cartilage degeneration. Funding source: SGS.

Investigating the effect of attentional focus instructions on learning a whole-arm sequence task

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Where we focus during a motor task can affect both our performance and learning of a desired skill. Most focus of attention studies evaluate performance and learning using broad outcomes and lack detailed kinematic measures to help examine how these instructions affect movement.

This study sought to investigate how focus of attention instructions affected learning a whole-arm sequence task. Forty-eight participants (31 F) completed a whole-arm, eight-target sequence task in a virtual environment on two consecutive days using either the right or left arm. On day 1, participants were instructed to focus on moving either the cursor (external, EF) or their arm (internal, IF) to the target as fast as possible. On day 2, participants received neutral instructions to move to the target as fast as possible. Performance was measured using total time (response time), total distance (hand path distance), and average peak velocity (peak velocity) to complete the sequence. Separate repeated measures ANOVAs evaluated effects over the eight day 1 practice blocks and from end of day 1 to start of day 2 ($\alpha = .05$). Response time decreased over practice blocks ($p < .001$) but did not differ between arm ($p > .5$) or focus instruction ($p > .8$). Hand path distance also decreased over practice blocks ($p < .001$) while peak velocity did not ($p > 0.2$); neither variable differed between arm ($p > .1$) or focus instruction ($p > .1$). From end of day 1 to start of day 2, response time did not change ($p > .2$), suggesting there was no forgetting. Hand path distance, however, increased ($p < .05$), with a greater increase in the IF groups ($p < .05$). Peak velocity increased from end of day 1 to start of day 2 ($p < .01$) with no differences between arm ($p > .3$) or focus instruction ($p > .05$). Both instructions had similar effects on both overall and kinematic measures of performance during practice and retention of a whole-arm sequence task suggesting that either EF or IF instruction can be used to learn a complex motor task effectively. Funding source: University of South Carolina.

Putting it into perspective: Does sleep deprivation impact cognitive load and individual perception of motor performance?

Joshua Springer, University of Tennessee; Jared Porter, University of Tennessee

The complex nature of modern military warfare places substantial demands on soldiers' cognitive resources, resulting in increased error rates, as well as decreased reaction and movement time. One's ability to monitor cognitive load and associated motor performance is vital to mission preparedness and success in the dynamic operational landscape. Over the last five years, the army has prioritized research efforts in developing and integrating combined technological platforms leveraging live, virtual, and synthetic environments. However, there is a gap in the literature on the combined effects of total acute sleep deprivation and physical fatigue on cognitive load and individual perceptions of performance. This study aimed to examine how total acute sleep deprivation and physical fatigue impact cognitive load and perception of associated motor performance. Participants ($N = 10$) performed a three-part, graded rifle marksmanship task under two conditions. During the first condition, participants completed the three-phase rifle marksmanship task following total sleep restriction for 24 hours. During condition two, participants completed the three-phase rifle marksmanship task following normal sleep conditions. Following each marksmanship task, participants completed the NASA-TLX to explore subjective cognitive workload. An ANOVA found main effects for each marksmanship task ($p = <.001, .02, .08$, respectively), as well as individual cognitive load measurements ($p = .003, .002, <.001$, respectively). Post hoc testing revealed significant differences in cognitive workload between baseline, total acute sleep deprivation, and the

combination of sleep deprivation and physical fatigue ($p = <.050$). These results support the hypothesis that the combination of total acute sleep deprivation and physical fatigue significantly impacts an individual's ability to evaluate their performance compared to baseline. Further research should continue to examine the effects of sleep deprivation and fatigue, both physical and mental, and its interaction with motor performance.

Effect of total acute sleep restriction and physical fatigue on military rifle marksmanship.

Joshua Springer, University of Tennessee; Jared Porter, University of Tennessee

Numerous studies have explored the impact of sleep restriction on cognitive and motor performance. Military members are commonly exposed to total acute and partial chronic sleep restriction due to garrison and deployed combat operations. Current research lacks the comprehensive understanding needed to accurately assess the impact on complex cognitive and motor performance and the secondary and tertiary effects of a degraded sleep environment. The purpose of this study was to explore the effects of total acute sleep restriction and physical fatigue on graded marksmanship tasks in a simulated combat environment. Participants ($N = 10$) performed a three-part, graded rifle marksmanship task under two conditions. During each condition, participants completed a precision and accuracy task, discriminatory reaction task, and a speed and accuracy task. Additionally, participants were asked to complete a physical event prior to completing each marksmanship task. During the first condition, participants completed the three-phase rifle marksmanship task following a period of 24 hours without sleep. During condition two, participants completed the three-phase rifle marksmanship task following normal sleep conditions. An ANOVA found condition main effects for the precision and accuracy task, discriminatory reaction task, and the speed and accuracy task, $p = .001$, $p = <.001$, and $p = .003$, respectively. Post hoc testing found significant differences between conditions for each of the three marksmanship tasks, $p = <.050$. Tukey HSD comparisons revealed significant differences between baseline performance and acute sleep restriction combined with physical fatigue for each marksmanship task ($M = 11.5, 22.5; 15.0, 9.4; 21.7, 31.5$), $p = .013, <.001, .019$ respectively. These results support the hypothesis that total acute sleep restriction and physical fatigue significantly decreased rifle marksmanship performance when compared to baseline. Further research should continue to examine the effects of sleep restriction and fatigue, both physical and mental, and its interaction with motor performance.

Fair starts for all: exploring multisensory reaction times in Deaf and hearing populations to develop a novel athletics standardised starting system.

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In D/deaf sport, there is no standardised starting system that assures full parity between D/deaf and hearing athletes. When competing alongside hearing athletes, D/deaf athletes typically use variable starting systems. Whilst methods to increase D/deaf inclusion such as lights or

vibrating armbands exist, the opportunities for fast reaction times (RT) – a critical part of a fast start in the 100m sprint – are not equitable. This inequity towards D/deaf athletes results in marginalisation and inaccessible sporting pathways. Technically, D/deaf athletes can compete at the Olympics, but it is uncommon for a D/deaf athlete to reach elite “mainstream” athletics which can be attributed to the lack of a fair starting system. To inform the development of a standardised starting system, studies investigating RT differences in auditory, visual, tactile, and bimodal stimuli across D/deaf and hearing populations were conducted. Thirty-nine participants (D/deaf $n = 17$; hearing $n = 22$) completed a rapid arm movement towards a target upon stimulus presentation on a manipulandum to measure their RT. Results showed significant main effects for group and stimulus modality, and a significant group \times stimulus modality interaction ($p < .001$). Breakdown of this interaction revealed significant group RT differences for all modalities except the visual-tactile stimuli. These findings not only emphasize the need to develop a starting system that promotes equality between populations but also highlights current sensory inequities on the starting line. Present findings advocate a visual-tactile system since neither group has a sensory RT advantage on the start line. This provides sound evidence and direction to inform the development of a standardised starting system that will increase equality, opportunity, and access for D/deaf athletes alongside their hearing counterparts. Funding source: Economic and Social Research Council UK, Bangor University.

Comparison of standardized balance measures and tests with the temporal and spatial measures captured from a phone app

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Fall risk in adults over 65 is high due to low efficacy of traditional physical therapy. Reducing falls with cost-effective strategies can lower the burden on the healthcare system. Using an app on a smartphone offers a community-based intervention that is both low-cost and accessible. To identify fall risk with adults at home, a phone application captured spatial data from a stepping task before, during and after a balance intervention. This study examined how standardized clinical tests compare to a novel phone app test. It was hypothesized that participants who performed well on app tests would perform well on the balance and strength tests. Participants were self-identified in the 12 months prior to the intervention. The volunteers (78.84 ± 6.4 years; 52 F, 27 M) completed a stepping task for the three conditions of eyes open (EO), eyes closed (EC), and headshake (HS). The 70 second step trials were done twice for each condition, with an initial auditory cue of 10 seconds followed by stepping as the cue was recalled. Following the trials, participants completed the Timed Up and Go (TUG), Berg Balance Test (BBT), Functional Gait Assessment (FGA), Activities-Specific Balance Confidence Scale (ABC), and grip strength. Results show correlations in the expected directions in all conditions of the tests, except grip strength and TUG, for variables of thigh ROM and mean peak flexion. For thigh ROM in EO (BBS = 0.298, FGA = 0.29, ABC = 0.25); EC (BBS = 0.33, FGA = 0.3, ABC = 0.23); HS (BBS = 0.33, FGA = 0.36, ABC = 0.29). For MPF in EO (BBS = 0.25, FGA = 0.26, ABC = 0.2); EC (BBS = 0.27, FGA = 0.26, ABC = 0.19); and HS (BBS = 0.27, FGA = 0.29, ABC = 0.24). The phone emits a timing cue that may not have a relationship to TUG, since the timing

was set by the app. Step height relates to balance confidence/testing in the literature, because it relates to clearing an obstacle successfully. Grip strength did not have a relationship, but older adults in this group may have more grip weakness as compared to legs and were older on average than the adults in the earlier literature.

Systematically increasing contextual interference during practice facilitates protective motor learning effects

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Previous work has shown that systematic increases in contextual interference (CI) during practice facilitates greater learning benefits compared to practicing with traditional random and blocked schedules. More work needs to be conducted to determine the face validity of increasing CI schedules in real-world settings when practicing complex motor skills. Therefore, the purpose of this study was to determine how systematic increases in CI facilitates the learning of a complex motor skill (i.e., sprint hurdling) in a physical education setting. Before the intervention, all participants did a 50-meter pre-test. Two groups practiced hurdling following an increasing CI ($n = 23$) or a traditional blocked ($n = 23$) schedule arrangement. Participants practiced sprint hurdles for two days of acquisition per week across six weeks for a total of 11 practice sessions. Dependent measures evaluating motor performance included: running time, foot contact time before hurdle clearance, flight time, step velocity, step length, and an expert evaluation of hurdling technique. Both retention and transfer tests were conducted 10 and 40 days after the last practice session. Retention and transfer sprint hurdle performance was analyzed using separate two-way repeated measures ANOVAs, and Tukey pos-hoc's were used for pairwise comparisons. The results showed that the increasing CI group had significantly greater step length ($p < .05$, $d = .84$) and greater step angle ($p < .05$, $d = .85$) in the 40-day transfer test compared to the blocked group. The results of this study indicate that practicing with systematic increases in CI led to long term retention of motor learning adaptations compared to practicing with a blocked arrangement of trials. These findings have implications for teachers and coaches designing practice schedules for beginners learning a complex motor skill in an applied setting.

The effects of practicing a golf putting task in virtual reality

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Previous studies have compared motor performance improvements between virtual reality (VR) and real world (RW) motor skill practice. While the empirical evidence suggests VR practice leads to similar pre- to post-test improvements, these studies typically only report the pre- and post-test results and thereby forego publishing performance data during the acquisition phase.

Thus, the purpose of this study was to determine the performance differences observed during skill acquisition between RW and VR practice. Two groups practiced golf putting in a RW ($n = 21$) or a VR environment ($n = 24$) for 3 blocks of 20 putts per day for three days. Radial error was calculated as the distance from the golf ball to the center of the target for each trial. A mixed repeated measures ANOVA was used to analyze conditions across each day of practice. Results from the analysis showed there was a significant interaction between condition and trial block. Contrary to the RW condition, a follow-up simple effects analysis found that the VR condition had significantly lower golf radial error (i.e., greater accuracy) in the first trial block ($M = 1.18$, $SE = 0.08$) compared to trial blocks two ($M = 1.33$, $SE = 0.10$) and three ($M = 1.40$, $SE = 0.10$). Interestingly, no significant performance changes were observed for the RW practice group through the same period of acquisition. Specifically, practice in VR resulted in a significant decrease in accuracy in blocks 2 and 3 compared to block 1 during each day of practice, whereas the RW group showed no change in performance during practice. Previous bodies of motor learning research have demonstrated that practice performance is not a reliable indicator of learning. For example, practicing with low contextual interference artificially inflates practice performance while learning is masked during acquisition while practicing with high amounts of contextual interference. Future research should investigate if practicing in a VR setting has a masking effect on motor learning.

Development of a non-binary measure of motor planning span

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Behavioral outcomes involving object manipulation are a window into the efficiency of multi-step problem solving because appropriate use of objects or tools implies appropriate planning to achieve motor goals. Adaptive planning is evidenced by a participant choosing an initially awkward or uncomfortable grasp to facilitate a later action. For example, when an adult wants to hammer a nail and the handle faces away from the person, he/she plans ahead by grasping the hammer with an awkward grasp (thumb toward the body) to directly afford using the hammer with a more comfortable grasp. Choice of this final, more comfortable grasp has been termed end-state comfort. Some individuals exhibit impairment in motor planning. For example, individuals with autism spectrum disorder (ASD), sometimes choose initial grasps that are more comfortable, but do not facilitate later actions, resulting in awkward or uncomfortable end-state grasps or having to make online error corrections. Decreased ability to plan adaptive grasps may be due, in part, to an inability to plan for multiple grasp states in a sequence (planning span). Little work has been done to examine tasks that involve more than two postural states (e.g., grasping an object and using it). The purpose of the current study was to develop a novel, non-binary measure of motor planning span. Participants grasped and moved a round object with 8 different pointers and placed up to three pointers against a target in a specified order. The number of pointers (1, 2, or 3) served as the planning span manipulation. Kinematics of the upper body as well as the timing of the reaction to the go signal and movement toward the object were recorded. Here we report the reaction and movement time data. Reaction and movement times were faster for the group that was not given the explicit instruction to end comfortably, but were longer as the span increased.

Planning seems to be occurring during both the reaction and movement time prior to the grasp on the object. These findings help validate our measure of planning span. Funding source: Utah State University.

BOLD functional activity in the putamen and thalamus are impaired in idiopathic rapid eye movement behavior disorder and Parkinson's disease

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Idiopathic rapid eye movement (REM) behavior disorder (iRBD) is a disruptive sleep-related disorder that has a high risk of developing Parkinson's disease (PD). About 80-90% of individuals with iRBD will develop a neurodegenerative alpha-synuclein disorder in the following decades. It is unclear how early and in which structures we observe functional changes in the brain in patients with iRBD that do not have a diagnosis of a neurodegenerative disorder. In this study, we use task-based functional magnetic resonance imaging (fMRI) to observe brain activity and blood oxygen level-dependent (BOLD) signal, in individuals with PD, iRBD, and healthy controls (HC). Participants include a total of 70 subjects (15 HCs, 38 PD, and 17 iRBD). All participants were scanned in a 3T Philips MRI scanner, while they performed a unimanual grip force task. For task-based BOLD analysis, we performed a three-factor (3 X 3) repeated measures ANCOVA for each region of interest (left anterior putamen, left middle putamen, and left thalamus) covarying for age and sex. Scan (3 scans) was a within-subjects factor and diagnosis (PD, iRBD, HC) was a between-subject factor. Post-hoc comparisons were Bonferroni corrected for multiple comparisons. There was between subjects effect of diagnosis for the left anterior putamen ($F(2,65) = 4.424, p = 0.016$), left middle putamen ($F(2,65) = 5.140, p = 0.008$), and left thalamus ($F(2,65) = 5.607, p = 0.006$). In post hoc analysis, PD has a statistically lower BOLD signal compared to HCs in the left anterior putamen ($p = 0.010$) and left middle putamen ($p = 0.032$). In post hoc analysis for the left thalamus, PD has a statistically lower BOLD signal compared to HCs ($p = 0.005$), and, iRBD has a statistically lower BOLD signal compared to HCs ($p = 0.014$). We show that there is a statistically lower BOLD signal in the left anterior putamen, left middle putamen, and left thalamus in PD compared to HCs. The thalamus has a lower BOLD signal in iRBD compared to HCs. Funding source: National Institutes of Health.

Assessing mindfulness disposition and meditation effort as individual differences in acute meditation effects on motor sequence learning

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Mindfulness meditation states acutely enhance motor sequence learning in meditation inexperienced adults. However, this might depend on the level of effort reported during focused-attention (FA) and open-monitoring (OM) mindfulness meditation styles. Specifically, compared to high meditation effort, low effort rating has been associated with greater

sequence performance improvements following single-session FA and OM (Immink et al., 2017). In the present work, we assessed if individual mindfulness disposition accounts for meditation effort ratings and meditation-based effects on motor sequence learning in individuals with no prior meditation training. Following completion of a mindfulness disposition inventory, 34 participants (28 females, 23.9 ± 4.5 years) completed a 15-min session of FA ($n = 17$) or OM followed by rating their perceived meditation effort. Participants then completed the serial reaction time task, which included twelve practice blocks with a repeating implicit sequence, a new sequence transfer block, and a final block with reinstatement of the practiced sequence. Mindfulness disposition and meditation effort did not significantly differ between meditation groups. Individual mindfulness disposition and meditation effort were not significantly correlated and did not significantly interact to influence sequence learning. In contrast to previous findings, meditation style or effort did not influence practice performance and improvement rate. However, participants in the OM group reporting low effort demonstrated significant performance loss following the transfer block. Effects of meditation style and effort on motor sequence learning are not clear and appear to be unrelated to individual mindfulness disposition. Incongruous findings might be indicative of disparity in novice meditators' ability to establish mindfulness states that differentiate FA and OM styles. This disparity could extend to perception of meditation effort and meditation session influences on motor sequence learning.

Effects of bat weight on baseball batters' gaze behavior

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In baseball batting, it is important to accurately acquire information about the ball within a limited time. However, since the ball velocity reaches about $1000^\circ/\text{sec}$, it is impossible to track the ball with a high-resolution central fovea until the very end. Therefore, predictive saccades are used to track the ball, but it is known that early saccade timing affects hitting ability because visual information in the saccade is lost due to saccade suppression. Furthermore, saccade timing has been shown to occur at a fixed time prior to a bat-ball contact within an individual, regardless of pitch speed, pitch type, or ball position, and has a strong temporal relationship with other body movements, such as head and hip movements. In the present study, we examined whether varying the bat weight and the swinging motion would alter gaze behavior, particularly the timing of predictive saccades. In the experiment, participants hit a 130 km/h ball thrown by a pitching machine while eye movements were measured by a wearable eye tracker, and body and bat movements were measured by an optical motion capture system. Three types of bats were used: light (83 cm, 870 g), medium (84 cm, 890 g), and heavy (86 cm, 930 g). Because eye movements and other body movements are closely related in time, it was expected that changing the weight of the bat to change the swinging motion would also change the timing of the predictive saccade. The results showed that the timing of the predictive saccade became faster as the bat became heavier, and vice versa. We also found that among various other parameters (e.g., swing speed, head and hip movements), saccadic timing was most correlated with a swing start time. In this experiment, we were able to show that a 60 g difference in bat weight can change the timing of the saccade up to 16 ms.

Delaying the onset of this saccade by 16 ms could provide visual information about 60 cm longer in the current experimental setting.

Neural aspects of prospective control through resonating taus in an interceptive timing task

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High-density electroencephalography (HD EEG) from visual and motor cortices in addition to kinematic hand and target movement recordings were used to investigate τ -coupling between brain activity patterns and physical movements in an interceptive timing task. Twelve adult participants were presented with a target car moving towards a destination at three constant accelerations, and an effector dot was available to intercept the car at the destination with a swift movement of the finger. A τ -coupling analysis was used to investigate involvement of perception and action variables at both the ecological scale of behavior and neural scale. By introducing the concept of resonance, the underlying dynamics of interceptive actions were investigated. A variety of one- and two-scale τ -coupling analyses showed significant differences in distinguishing between slow, medium, and fast target speed when car motion and finger movement, VEP and MRP brain activity, VEP and car motion, and MRP and finger movement were involved. These results suggested that the temporal structure present at the ecological scale is reflected at the neural scale. The results further showed a strong effect of target speed, indicating that τ -coupling constants k and k_{res} increased with higher speeds of the moving target. It was concluded that τ -coupling can be considered a valuable tool when combining different types of variables at both the ecological and neural levels of analysis.

How important is autonomy? Investigating the combination of self-controlled practice and focus of attention.

Joei R. Velten, University of Tennessee, Knoxville; Logan T. Markwell, University of Tennessee, Knoxville; Jared M. Porter, University of Tennessee, Knoxville

Numerous studies have demonstrated positive performance effects associated with self-controlled practice or adopting an external focus of attention. However, further work is needed to better understand how these two constraints interact with one another. Pilot data suggests when self-controlled practice is combined with internal focus of attention, performance differences may be marginal compared to self-controlled practice combined with external focus of attention. Therefore, the purpose of this study was to expand on previous research and compare performance between self-controlled, yoked, and control practice groups practicing the same skill. It was hypothesized that the self-controlled practice group with an external focus of attention would jump the furthest distance and the yoked condition instructed to focus their attention internally would jump the shortest distance. Participants ($N = 43$) were randomly assigned to a self-control group ($n = 15$), yoked group ($n = 14$), or control group ($n = 14$) in which they performed a standing long jump task. All participants completed a total of 10 jumps. The self-control group was given the choice of which attentional cue (i.e., internal or external)

they wanted to focus on prior to each jump. Participants in the yoked group were instructed how to focus their attention (i.e., internally or externally) prior to each jump. Participants in the control group were instructed to jump to the best of their ability. A 3 (focus of attention group) x 2 (gender) x 2 (self-control condition) mixed repeated measures ANOVA was conducted to evaluate potential performance differences. Statistical analysis revealed a significant main effect by condition, but no effect by group or an interaction. These results align with the attentional focus literature and are congruent with recent meta-analyses questioning the effectiveness of self-controlled practice. Future studies should continue to investigate this phenomenon to further develop effective practice strategies and improve our understanding of the skill acquisition process.

Motor learning student perceptions of professional development and enjoyment.

Joel R. Velten, University of Tennessee, Knoxville; Jared M. Porter, University of Tennessee, Knoxville

As researchers and educators, we are quick to boast the notion of evidence-based practice. After all, the field of motor behavior is dense with evidence for informing the practitioner's work, yet very little research has been conducted regarding how we prepare students to be practitioners. Further research is needed to better understand how we can best prepare students for a career which utilizes the fundamentals of motor behavior (e.g., physical therapy, coaching, physical education), particularly in a post-COVID world. Therefore, the purpose of this study was to investigate student perceptions of assignments completed in an undergraduate motor learning course. Specifically, we evaluated student levels of enjoyment, and how much they felt the assignments completed in the course prepared them for their future career. College students enrolled in a face-to-face introductory course on motor control and motor skill learning ($N = 22$) were surveyed. The results of the analysis indicated that students perceived a research proposal assignment to contribute most to their professional development, despite reporting it to be the least enjoyable assignment of the course. Likewise, the assignment they reported to be the most enjoyable (i.e., designing a practice schedule) was not perceived to be a top contributor to their professional development. These results are consistent with principles of deliberate practice, suggesting that the most effective forms of practice are goal-driven and not necessarily designed with the learner's enjoyment in mind. Future research should continue to investigate effective teaching methods in our discipline to further develop effective teaching strategies and our understanding of student success. Additionally, future research should investigate if there is a correlation between student perceptions of assignments, performance in the class, and utilization of motor behavior concepts and methods in their career once they become a practitioner.

The effect of implicit visuomotor learning on functional brain connectivity

Kuo-Pin Wang, Bielefeld University; Chien-Lin Yu, National Taiwan Normal University; Thomas Schack, Bielefeld University; Tsung-Min Hung, National Taiwan Normal University

The neural adaptation in the motor cortex–sensorimotor circuit plays a crucial role in acquiring visuomotor skills. However, the highly dynamic neural connectivity in the circuit underlying the acquisition of visuomotor skills is still unclear. To gain a broader understanding of the association between motor acquisition of visuomotor skills and neural connectivity, using electroencephalographic coherence that can capture highly dynamic neural connectivity in the circuit in a longitudinal design is required. To achieve this, we recruited 60 male novices who were randomly assigned to either the experimental group (EG) or the control group (CG). In addition, we analyzed the connectivity by using 8-13 Hz imaginary inter-site phase coherence in the motor cortex–sensorimotor networks (Cz-C3 and Cz-C4) during a golf putting task (visuomotor task). To better understand the dynamic nature of learning trajectories, we contrasted data collected from three temporal points beginning with a baseline measurement (Time 1), middle practice measurement as 50 % improvement from baseline (Time 2), and late practice measurement as 100 % improvement from baseline (Time 3). We mainly observed that EG showed a progressively improved golf putting performance from Time 1 to Time 2 and Time 3. Furthermore, we found that the connectivity in the motor cortex–sensorimotor circuit followed an inverted U-shaped coherence curve. We suggest that the dynamics of cortico-cortical communication in the motor cortex–sensorimotor circuit lead to the acquisition of motor skills.

Two sides of the same coin: Visual illusions reveal contrasts in perceptuomotor processing in physical, virtual, and augmented reality

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Virtual (VR) and augmented reality (AR) have been gradually introduced to areas outside of gaming and entertainment, including education and professional training. The efficacy of training in VR and AR, however, remains unclear. The possible challenge of VR/AR training could be attributed to a lack of understanding of the perceptuomotor mechanisms underlying behaviour in these systems. The present study was designed to examine the mechanisms of motor performance in unmediated/real (UR), VR, and (optical passthrough) AR. Separate groups of participants executed rapid manual aiming movements to the vertex of the same perceptual illusion (Müller-Lyer) figures in the three different modalities. Consistent with previous research in UR, the illusion affected endpoint accuracy – movements were biased in a manner consistent with the illusion (e.g., longer when the vertex was in the “fins-out” than in the “fins-in” target). VR and AR elicited a systematic distortion to the movement accuracy as a function of target size independent of the illusion, which can in part be explained using the vergence-accommodation conflict of the headsets. Further, participants adapted to this distortion and exhibited the opposite distortion in a motor control task in UR after completing the task in VR and AR. These findings suggest that both VR and AR headsets introduce systematic distortions to visually-guided manual movements, and such distortions also lead to

perceptuomotor adaptations that could adversely affect observers' subsequent interactions with the physical environment. Results from the current experiment could provide important guidance for the design of future human-computer interaction systems for training and education. Funding source: Natural Sciences and Engineering Research Council of Canada.

Video vs. in-person dance instruction or studio focus: Outcomes in motor skill acquisition

Emily Weber, Sam Houston State University; Jennifer Didier, Sam Houston State University

As use of technology has increased, so has the use of instructional videos to develop a variety of motor skills across several industries including sport, medicine, fitness, occupational therapy, and fine arts. Observational learning occurs with both in person and video modes (Mierowsky, 2019). Additionally, video modeling may be effective in aiding those who struggle to learn in a standard classroom setting (Obrusnikova & Rattigan, 2016). Instructional videos can be effective for learning complex exercises and motor skills; however, when compared to a traditional in-person setting, is virtual as effective? The purpose of this study was to examine the differences among a counterbalanced mix of 14 intermediate and advanced dancers, from two different studios, learning a new progressing ballet technique (PBT) conditioning exercise either: online with camera facing instruction (group 1: $n = 7$, $M_{\text{age}} = 14 + 2$, $\text{dance}_{\text{yrs}} M = 8 + 4$), or in-person in their dance studio (group 3: $n=7$ $M_{\text{age}} = 13 + 2$, $\text{dance}_{\text{yrs}} M = 7.8 + 2$). Performances were blind reviewed by 3 certified PBT teachers for movement accuracy errors on a scale 1 (largest # of errors) – 5 (no errors). The results of a Mann-Whitney U test were not significant for accuracy ($Z = -.386$, $p = 0.7$). However, the results did indicate significant differences between experience levels ($U = 3.5$, $Z = 2.013$, $p = .007$, $r = .54$) and unexpectedly between studios ($U = 7.5$, $Z = 2.701$, $p = .044$, $r = .72$). Advanced dancers scored significantly better for accuracy errors ($Mdn = 1.67$) than intermediate dancers ($Mdn = 4$). The difference between studios showed studio 1 (heavily technique focused, $Mdn = 4$) compared to studio 2 (heavily competition focused, $Mdn = 1.67$). These results demonstrate that advanced dancers are better equipped with the skills needed to learn exercises in unfamiliar settings than intermediate dancers; however, the focus of the studio training also has a significant impact on accuracy of the dancers. Additional research should identify key cues needed for novice and intermediate learners in the virtual learning environment.

Pre-planning an aiming direction benefits visuomotor adaptation early in learning

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The current study looked to assess how strategic planning processes contribute to visuomotor adaptation. Three groups of 16 participants were asked to report (a) the direction their hand should aim (direction group), (b) where their hand should end relative to the target (endpoint group), or (c) not report anything at all (control group) prior to reaching. Reports on aiming strategy were assessed via a line orienting task, such that at the start of 25% of the reaching trials, a red line appeared and rotated around the start position (direction group) or target position (endpoint group). The reaching trials were completed when a cursor accurately

represented participants' hand motion (48 aligned training trials) and when a cursor was rotated 40 degrees clockwise relative to participants' hand motion (160 rotated training trials). Analyses of angular errors at peak velocity revealed that participants were able to adapt their reaches by the end of rotated reaching to a similar extent regardless of aiming strategy. Interestingly, the direction group exhibited a significant reduction in angular errors at peak velocity early in rotated training (compensated for 81% of the cursor rotation) compared to the control group (compensated for only 59% of the cursor rotation). Additionally, analysis of reported aiming strategies indicated that the direction group was more accurate in the line orienting task early in rotated training (compensated for 62% of the cursor rotation) compared to the endpoint group (compensated for only 29% of the cursor rotation). Together, these results suggest that pre-planning an aiming direction is closely linked to actual reaching performance, enabling participants to engage in effective aiming strategies early in training. Funding source: Natural Sciences and Engineering Research Council of Canada.

Low imu sampling rates bias largest lyapunov exponent calculations during overground walking in abstract Lyapunov is caps???

Tyler M. Wiles, University of Nebraska at Omaha; Nick Stergiou, University of Nebraska at Omaha; Aaron D. Likens, University of Nebraska at Omaha

Much of human activity is variable – movements vary slightly from one cycle to the next. These deviations can be quantified and provide information about the health of the neuromuscular system over time. Creating guidelines for studying movement variability requires deep knowledge about the performance of analytical tools in various data conditions such high vs. low sampling rates (SRs). The effects of sampling rate on measures derived from optical motion capture are well known, but less is known about those effects on data collected from inertial measurement units (IMUs). We expected that decreasing sampling rates would bias estimation of the largest Lyapunov exponent, λ_1 , a common variability metric. 35 young adults (630 trials, total) walked for four minutes overground on a 200 m oval indoor track. Participants donned 16 IMUs (SR = 200 Hz) that captured whole body kinematics. Manufacturer recommended corrections (course stabilization, fusion models, and anti-wobbling corrections) were applied before analysis. Segment angles of the thigh, shank, and foot were down sampled to 175, 150, 125, 100, 75, 50, and 25 Hz before computing λ_1 . Two common algorithms (Wolf and Rosenstein) calculated λ_1 for the thigh, shank, and foot segment angles in the sagittal plane. A series of 1 (sensor) x 7 (SR) RM-ANOVAs were performed to test whether λ_1 varied as a function of SR. All omnibus tests were significant; differences emerged in follow-up tests. λ_1 was relatively stable as SR decreased at the thigh and foot but not the shank. Furthermore, as SR decreases, λ_1 trends positively when calculated with Rosenstein but remains stable with Wolf. 25 Hz is a breaking point for both algorithms; neither algorithm accurately estimates λ_1 in this dataset. For example, average Rosenstein λ_1 for right foot were 0.133 (200 Hz), 0.139, 0.159, 0.195, 0.249, 0.230, 0.297, 0.727 (25 Hz) whereas Wolf estimated 0.766 (200 Hz), 0.756, 0.754, 0.760, 0.770, 0.751, 0.753, 0.395 (25 Hz). Several other notable trends emerged that warrant consideration and will be discussed. Funding: National Institutes of Health, National Science Foundation.

Dyad motor learning in a wrist-robotic environment: Learning together is better than learning alone

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Dyad motor learning is characterized by two learners alternating between physical and observational practice and often includes an inter-trial dialog. Empirical evidence shows that dyad learning leads to better learning outcomes and reduced required practice time compared to physical practice alone when learning complex motor tasks. Despite these promising results, it has not been established as a tool in rehabilitation. This study aims to determine the effects of dyad learning on motor performance in a controlled wrist-robotic environment to evaluate its potential use in rehabilitation settings. Twenty-eight participants were randomized into two groups ($n = 14$): dyad learning (11 females, $M = 27.7 \pm 5.1$ years) and physical practice (12 females, $M = 28.3 \pm 4.2$ years). Participants practiced a 2 degree-of-freedom gamified motor task for 20 trials using a custom-made wrist robotic device. In addition, dyad learners observed their learning partner practice. Motor performance was measured by a composite score incorporating temporal and spatial in-game variables at baseline and the end of training, and at 24-hour retention. Motor performance did not differ between groups at baseline and both groups improved their performance over time ($p < 0.05$). In addition to a main effect of time ($\beta = 0.08$, $SE = 0.01$, $p = 0.001$), there was a significant time and group interaction ($\beta = -0.01$, $SE = 0.003$, $p = 0.02$), such that the dyad learners outperformed the other group at the end of training ($p = 0.001$; Cohen's $d = 1.089$) and at retention ($p = 0.015$; $d = 0.762$). Compared to physical practice alone, practicing collaboratively by alternating between physical and observational practice leads to superior motor outcomes after practicing a robot-aided gamified motor task. Additionally, dyad learners outperform their counterparts during retention, showing that training effects are transferable. Dyad learning may be a valuable tool in rehabilitation settings that can lead to improved motor recovery for patients. Future studies should incorporate dyad learning in rehabilitation protocols.

Bimanual coordination was different depending on the task goals in individuals with strokes

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Unilateral arm weakness may influence bimanual coordination after stroke. During bimanual actions, two arms may act together to achieve a single common goal, or each arm may work to accomplish its separate goal (dual-goal). Here, we investigated how neurotypical individuals and individuals with unilateral stroke coordinated their two hands during reaching actions to dual goals compared to a common goal. Twenty-four neurotypical individuals (CON, 61.75 ± 11.05 years) and 48 individuals with mild-to-moderate impairments following stroke (STR, 60.92 ± 9.29 years; Fugl-Meyer: 49.46 ± 13.92) participated in the study. During the dual-goal condition, each hand movement was mapped to a separate cursor, while under the common-

goal condition, an average of two hand movements was mapped to a common singular cursor. The goal of the task was to move a cursor(s) from a start position to a target at 90% of their maximum reach distance as fast as possible. A 10-trial block was completed for each condition with blocks counterbalanced across participants. Bimanual coordination was measured using cross-correlation analyses between the tangential velocity profiles of the two arms, yielding a maximum cross-correlation coefficient as a measure of spatial coordination, and associated time lag as a measure of temporal coordination. Results of rank-based nonparametric analyses (nparLD package in R) showed that spatial coordination was better in the CON group than the STR group ($F(1, 53.21) = 35.36, p < 0.001$), and the common-goal task was superior to the dual-goal task ($F(1, \infty) = 22.84, p < 0.001$). For temporal coordination, the common-goal task was better than the dual-goal task ($F(1, \infty) = 41.73, p < 0.001$), with no group difference ($F(1, 65.95) = 0.008, p = 0.929$). Individuals with stroke are more impaired in spatial coordination during bimanual actions. Further, attentional divide during dual-goal actions may impair spatial and temporal bimanual coordination; alternately, additional degrees of freedom imparted by the common goal may facilitate coordination between arms. Funding source: National Institutes of Health.

The attentional focus effects with or without visual knowledge of results in golf putting.

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Previous literature on the effect of attentional focus (AF) and vision is still inconclusive. We predicted that individuals may need to establish an association between an external focus (EF) benefit and performance outcomes for an AF to be effective. Thus, we hypothesized that the AF effects would be more evident after establishing the association than the AF effects before making this association (i.e., an interaction effect). In this study, $N = 9$ novices (14.89 ± 0.78 years) practiced golf putting for 36 familiarization trials with no AF. Then, participants completed the putting task without vision with an internal focus (IF, focus on the wrist), EF-near (EF-N, focus on the club), and EF-far (EF-F, focus on the trajectory) (12 trials each AF). Because of the absence of knowledge of results (KR) and visual information, this phase was considered the pre-association phase. Then, the three AF procedures were repeated under a normal visual condition (association phase, KR was naturally available via vision) and then again without vision (post-association). The order of AFs in each phase was counterbalanced. The radial error between the target and the ball location was analyzed with a 3 (AF) \times 3 (phase) ANOVA. Results showed a main effect of phase, $F(2,16) = 4.06, p = 0.038$, partial $\eta^2 = 0.337$, with no interaction, $F(4,32) = 2.29, p = 0.081$, partial $\eta^2 = 0.222$. Pairwise comparisons showed that performance was better in the pre-association with no vision than in the association phase with normal vision, $p = 0.009$. It is noted that other intrinsic feedback was naturally available in all phases, and the order effect was large. Although a large effect size was observed in the interaction term, the current trend was the opposite of our hypothesis. Also, large variability suggests a conservative sample size estimation for future studies. Although repeated changes in

the visual conditions may have affected the results, our results showed that the visual conditions did not moderate the effect of AF.

The effect of movement frequency on motor-respiratory coordination of cross-country skiers in a simulated double-poling task

Dan Yan, University of Wyoming; Xi Cheng, Shanghai University of Sport; Qin Zhu, University of Wyoming

Previous studies on inter-limb coordination and motor-respiratory coordination (MRC) have shown that coordination pattern and stability are influenced by movement frequency, which suggests that cross-country (XC) skiers could have employed different strategies to coordinate their breathing rhythm with upper and lower limb movements in performing double-poling (DP) to accommodate the changing demand of speed during a race. While this hypothesis remains to be tested, our understanding of inter-limb coordination and MRC involved in performing DP remains limited. Four recreational XC skiers were recruited and asked to perform a 1-min long simulated DP task for 3 trials at each of three movement frequencies: self-preferred frequency (SPF), 50% SPF, and self-determined maximum frequency (SDMF), while their inspiration/expiration, arm flexion/extension, and leg flexion/extension was recorded and assessed using continuous relative phase (CRP) to determine both pattern and stability of inter-limb and motor-respiratory coordination as a function of movement frequency. Specifically, the elbow-knee, elbow-breathing, and knee-breathing couplings were estimated. The statistical parametric mapping (SPM) technique was used to examine the difference of mean CRP time series of all skiers, and repeated measure ANOVA was used to examine the effect of movement frequency on the inter-trial variability of CRP time series of all skiers. As revealed by SPM analysis, the mean CRPs of all couplings neither significantly differed from one another, nor was significantly affected by movement frequency ($p > 0.05$), all demonstrating an intermediate coordination pattern. The ANOVA results showed that the stability of MRC coordination patterns (elbow-breathing and knee-breathing couplings) seemed to vary significantly with movement frequency ($F(2,6) = 4.83, p = 0.05, \eta^2 = 0.62$; $F(2,6) = 6.79, p = 0.03, \eta^2 = 0.69$) with the highest variability seen at SDMF ($p < 0.05$). However, these preliminary findings remain to be verified by increasing sample size with more skiers to be tested.

Does the repetitious round kick affect programming time? A perspective from working memory.

Chun-Yen Yen, National Changhua University of Education; Chung-Yu Chen, National Taiwan University of Sport; Tai-Yuan Su, National Changhua University of Education; Ti-Yu Chen, National Changhua University of Education

From experiments designed in a simple reaction time paradigm, performing a sequence of different movements led to an increase in reaction time (RT) and movement time (MT). The purpose of the study was to investigate the effect of performing a sequence of the same movements on RT and MT. Twelve (9 males and 3 females; M age = 20.5 ± 1.8 years; M training

age = 10.6 ± 3.8 years) highly skilled taekwondo athletes volunteered for the research. Following the simple RT paradigm, the participants were asked to randomly perform one of the four following responses: clench fist without kicking (task A), clench fist and a lead leg round kick (task B), clench fist and two lead leg round kicks (task C), and clench fist and three lead leg round kicks (task D). The experiment included EMG electrodes placed on the flexor digitorum profundus muscle and a triaxial wireless accelerometer positioned at the umbilicus of humanoid practice kick target to record premotor time and kick time respectively. One-way repeated measures ANOVA revealed that these tasks had significant differences in premotor time (PMT), $F(3, 33) = 7.283$, $p = .001$. The PMT of task A was significantly lower than the ones of task B, C, and D; the PMT of task B, C, and D had no significant differences between them. Neither the first kick time of task B, C, and D ($F(2, 22) = 3.108$, $p = .065$) nor the second kick time of task C and D ($F(1, 11) = 3.518$, $p = .087$) had significant differences. Results showed that performing a sequence of the same movements led to no increase in RT and MT. It indicated that performing a sequence of the same movements caused no extra time spending on the motor program retrieval during information processing (RT) and no movement slowing down due to the motor program retrieval for following movements during MT. The motor program of the same movement was still stored in working memory, thus resulting in no extra time spent on retrieving a new motor program. This finding suggests that considering a sequence of the same movements as a scoring strategy can reduce the risk of response latency.

Walking stance percentage time as an indicator of fall risk in older adults

Adam Zeidan, California State University, Long Beach; Jucheol Moon, California State University, Long Beach; Scott Ducharme, California State University, Long Beach

One important issue that older adults face is risk of falling. Many studies have investigated various gait measures that could be used to predict an individual's fall risk. While correlations between fall risk and some gait variables have been assessed, others still require scrutiny. It was hypothesized that an increased percentage of time in stance phase (i.e., foot in contact with the ground) will correspond with a decrease in physical function, a measure of fall risk. The study included 17 participants: 12 women and 5 men ranging in age from 66-81 years. Participants performed the short physical performance battery (SPPB), consisting of 5 short tests to measure physical function. Additionally, participants walked overground over a GAITrite electronic mat at self-selected slow, normal, brisk, and maximal paced speeds. Statistical analyses on physical function versus gait measures during maximum velocity walking speed were performed using SPSS and Microsoft Excel. Results revealed an association ($R^2 = 0.26$, $r = 0.519$, $p = 0.03$) between stance percent time and chair rise time, a component of the SPPB that tests leg strength. As stance percent time increased, chair rise time also increased. These data suggest that the longer a person's stance time, the longer it takes them to rise from a chair, and thus the more at risk they are of falling. If an individual displays a relatively long stance phase, it may indicate that they have a harder time pushing off the ground to move. That is, they may not have sufficient strength/function to generate force and propel themselves forward, nor the strength to remain balanced with one foot on the ground and one foot moving off the ground. This lack of strength thus may explain the observed increase in stance time in

those with higher chair rise times, and thus an increased risk of falling. Future research should include a larger dataset with a greater range of physical function scores in the older adult population. Funding source: Ministry of Science and ICT (The Republic of Korea).

Anticipating the depth boundary in returning flick serves during badminton double play

Zuoqi Zhang, University of Wyoming; Qin Zhu, University of Wyoming

Previous study on affordance perception shows that elite athletes can relate environmental features to their motor capabilities to detect opportunity for action. In playing badminton doubles, skilled players can tell without looking back whether a flick serve will go outside of boundary or not. Could this capability be associated with a developed affordance perception? Two badminton players participated in both perceptual and motor capability testing on court. In perceptual testing, they were asked to hold a racquet, occupy a receiving position, and judge whether a flick serve was out of boundary in depth without touching the shuttlecock and looking back. This was done in both standing and retreating conditions. In each condition, a total of 40 flick serves were randomly delivered to either inner or outer rear corners of the service box with half of them being inside and the other half outside of boundary. In motor testing, they were asked to reach with racquet for the highest with and without jumping, and then retreat to the back of court at maximum speed, for 3 trials in each direction of serve. All judgment data was recorded for calculating the sensitivity (d') of detecting the OUT of a flick serve. Both motion of shuttlecock in each serve and the player's performance in motor testing were videotaped for 2D-recovery of flying trajectory of shuttlecock, maximum reaching distance, and maximum retreating distance of the player. Results showed that the more experienced player was more sensitive than the other to detect the OUT of a flick serve in both conditions. When each player's motor capability data was scaled to the flying trajectory of shuttlecock, and then logistically regressed to the accurate judgments of IN and OUT, only the more experienced player demonstrated that the ratios between range of shuttlecock and maximum retreating distance of the player could reliably predict IN and OUT calls with a threshold, evidencing a developed affordance perception.

A holistic focus of attention enhances vertical jump performances among untrained individuals.

Tatiana Zhuravleva, New Mexico State University; Cabel McCandless, New Mexico State University; Christopher Aiken, New Mexico State University

Motor learning research suggests that an external focus (EF) is more beneficial for motor learning and performance than an internal focus (IF; Wulf, 2013). Recently, research has shown a similar benefit with that of a holistic focus (HF) to an EF (Becker et al., 2019; Zhuravleva & Aiken, 2023). There is still a need to better understand various attentional focuses, such as a HF, with various tasks and individuals. The purpose of the current study was to investigate the performance of different focuses both in terms of outcome (i.e., jump height) and kinetics (i.e., ground reaction force) in a vertical jump. Twenty college students performed 12 vertical jumps

in a counterbalanced order under four conditions with three jumps in each: IF, EF, HF, and control (CON). Several one-way repeated measures ANOVA's with Sidak post-hoc tests were used to analyze jump height, peak force, and average force production. A significant main effect for jump height was observed ($F = 8.75, p = .001$). HF and EF jumped significantly higher than an IF ($p < .001; p < .001$). No other significant differences were observed. In addition, there was no significant main effect for average and peak ground reaction forces ($p's > .05$). These findings provide further support for the advantages of both an EF and HF over an IF. Somewhat surprising is that ground reaction forces did not change with different jump heights. However, this is in line with research that found no changes in peak force with an EF and IF during a standing long jump (Ducharme et al., 2016; Wu et al., 2012). Additional research is needed to understand the mechanical changes with altered attentional focus, but it is suggested that a HF can be used to elicit similar outcomes as an EF.

Sport and Exercise Psychology Abstracts

Comparative analysis of motivation for delivering Nassar victim impact statements

Kat V. Adams, Utah State University; Devon R. Goss, Emory University; Travis E. Dorsch, Utah State University

In 2017, the #MeToo hashtag helped facilitate conversations about experiences of gendered sexual harassment, violence, and assault within multiple institutions in society. The sports world became a focus of the movement with the case of Larry Nassar, who abused at least 499 girls and women under the guise of medical treatment. Gymnastics has a culture that encourages compliance, yet hundreds of athletes subject to Nassar's abuse shared nearly 30 hours of their experiences publicly during sentencing hearings. The present study utilized techniques from two traditions to provide a nuanced explanation of how these gymnast survivors articulated their desire for coming forward with their experiences of abuse. Data were drawn from the portions of the victim impact statements (VIS) discussing athletes' personal motivation for engaging in public testimony during Nassar's sentencing hearings in Ingham and Eaton Counties ($N = 168$) as well as statements released to news and social media after the sentencing hearings ($N = 17$). Data were analyzed using traditional thematic analysis (Braun & Clarke, 2012) and text mining (Silge & Robinson 2017). Thematic analysis yielded five themes related to survivors' choices to share their experiences: resisting shame, owning story, reclaiming voice, changing the sport, and transforming society. Text mining highlighted similarities in how survivors discussed their individual motivations. Word counts revealed the positive vocabulary used in describing motivation while the visualization of bigrams revealed how this community of sister survivors provided inspiration and social support for those sharing their stories. The use of two analytic methods allowed for a more nuanced understanding of the motivations survivors have for publicly recounting their abuse. Moving forward, the use of text mining in conjunction with traditional qualitative methods may allow researchers to glean new insights from large sets of public and private data.

Perceived malicious intent and emotional abuse in former college athletes

Kat V. Adams, Utah State University; Katie N. Alexander, Utah State University; Travis E. Dorsch, Utah State University

Athlete abuse and maltreatment has garnered more attention in recent years as cases of abuse have reached the public's interest (Kavanagh et al., 2020). The present body of literature highlight numerous harmful effects associated with a variety of abusive coach behaviors; however, little is understood about the role of the relational context in determining whether athletes define an experience as abusive or as tough-but-effective coaching. The purpose of the present study was to consider how the athlete perceptions of coach intent affected their identification of an environment as abusive. Former NCAA ($n = 17$) and NJCAA ($n = 1$) student-athletes ($M_{\text{age}} = 26.0$ years), representing a range of sports and institutions, took part in semi-structured interviews. Data were analyzed using a constructivist grounded theory approach (Charmaz, 2014). Results indicate that specific coach behaviors are not judged to be emotionally abusive on their own. For example, yelling, reduced playing time, favoritism, and increased physical conditioning were acceptable and even encouraged when athletes perceived that coaches were acting to improve individual and team performance. However, when similar behaviors were perceived by athletes to have been enacted with malicious intent and/or disrespect for athletes' personal autonomy, they were uniformly understood to be inappropriate and abusive. This study adds to the literature articulating the difficulties in generalizing emotional abuse in high level athletics as experiences vary across athletes based on their coach-athlete relationship and individual psychological characteristics. Results highlight the importance of individualized coaching centered on athlete autonomy, and effective communication between coaches and athletes in ensuring safe training and competition environments.

Experiences of emotional abuse in former male intercollegiate student-athletes

Katherine N. Alexander, Utah State University; Travis E. Dorsch, Utah State University; Kat V. Adams, Utah State University

Although recent empirical efforts have been made to understand the emotional abuse experiences of former female student-athletes (Alexander et al., 2023), less is known about how emotional abuse is experienced by males in intercollegiate sport. To address this gap, the present study was designed to explore how former male NCAA student-athletes experienced emotionally abusive coaching behaviors and how those behaviors influenced their relationships and coping. Four former male NCAA student-athletes ($M_{\text{age}} = 32$ years) took part in retrospective semi-structured interviews. Data were analyzed using an inductive-deductive thematic analysis (Braun & Clarke, 2006) to consider the unique viewpoints of participants while incorporating current findings into previously collected data (see Alexander et al., 2023; Strauss & Corbin, 1994). Results suggest that male student-athletes go through similar stages of abuse, namely the entering and exiting of the abusive program. However, gendered socialization processes (e.g., masculinity) influenced how they interpreted and responded to

abusive experiences in unique ways. Competition, winning, rigid hierarchies of power, and obedience were identified as key determinants of athlete experiences. Participants also prioritized firm boundaries and rarely received support from others outside of their immediate systems of influence. These former student-athletes were slow to define their experiences as emotional abuse and hesitated to report them due to perceived risks and the potential for retaliation. They described feelings of anger and spite and utilized various coping mechanisms while in the abusive program. They also reflected on feelings of burnout and continued suppressing abusive experiences after retirement. Studying the perceived impacts of abusive coaching practices in male student-athletes provides a more holistic understanding of how socialization processes may influence athletes' perceptions of abuse and highlights a need for additional layers of legal protections for intercollegiate student-athletes.

Experiences of abuse among former NCAA Division I female student-athletes: Understanding the potential role of control and surveillance behaviors

Katherine N. Alexander, Utah State University; Travis E. Dorsch, Utah State University; Leslie A. Page, Utah State University; Kat V. Adams, Utah State University

Exposure to abuse in sport can manifest in a variety of negative ways, and the abuse of high-level athletes has garnered more attention in recent years as cases of abuse have reached the public's interest (Kavanagh et al., 2020). Although the present literature examines relevant factors in the coach-athlete relationship (e.g., controlling and supportive behaviors), the role of sporting culture, and general institutional failings that perpetuate abuse, it fails to fully explore the extent of controlling coaching behaviors and the associated systems that promote surveillance practices of coaches. In an effort to extend current research highlighting emotional abuse in the coach-athlete relationship (Alexander et al., 2023; Wilinsky & McCabe, 2020), the purpose of the current study was to consider how two former female student-athletes reflected on experiences of control and surveillance within NCAA Division I sport programs. A collective case study design (Yin, 2018) and a phenomenological interpretative approach (Creswell & Poth, 2016) were used to collect, analyze, and interpret in-depth interview data. Results were inductively organized into themes of athletes' loss of control (including loss of athlete autonomy, loss of athlete social lives, and threats and punishments) and system-level surveillance (including expected levels of surveillance as an NCAA athlete, misuse of power with institutional backing, coach stalking, and misuse of staff and resources). Moving forward, institutions should be encouraged to reflect on their current policies and practices regarding athlete abuse and should be aware of the potential to develop and/or adopt systematic mechanisms to protect student-athletes from abuse and maltreatment.

Taking courage to lose mental toughness!

Harvey Anderson, Sheffield Hallam University

The concept of mental toughness presents many issues for researchers and practitioners alike. There is lack of coherence in the multiple definitions and interpretations available (Strand et al.,

2022; Eubank et al., 2017; Crust, 2007) making application of the concept difficult at best. Add to this, many top athletes who have been made the poster-children for the concept openly disagree that they actually have mental-toughness. Much of this is to do with the connotations that go with the term 'toughness' and its potential to be interpreted as an innate quality. So, is it time to lose mental toughness altogether? Existentialism has long championed the virtue of courage. Courage can be seen as having three elements: (a) a willing, intentional act, (b) involving substantial danger, difficulty, or risk to the actor, (c) primarily motivated to bring about a noble good or morally worthy purpose (Rate, 2010) or more simply described as "bravery as a result of approach by a fearful person" (Evans & White, 1981). Therefore, it recognises vulnerability, anxiety, and a cause, rather than implications of fearlessness and an innate resilience. It is also widely accepted that courage is something that anyone can take (May 1994). This definition is more in line with many of the narratives used and in the observation of many athletes in the author's thirty-year coaching career, to illustrate mental toughness and what mentally tough athletes do to be attributed as such. It is argued in this presentation that the existential concept of courage is what both the researcher and practitioner are searching for in their work, and that an existential viewpoint in this area would lead to greater insight and better practices in both areas.

Coach training and education in the United States: Findings from The National Coach Survey

Dawn Anderson-Butcher, The Ohio State University; Samantha Bates, The Ohio State University

Given mass participation rates and its universal appeal, youth sport has the potential to impact children's overall health and development. Yet positive sport experiences are often dependent on coaches. Coaches' skills, behaviors, and competencies can impact whether athletes develop life and social skills and continue participating in sport. However, more research is needed to advance our understanding of whether coaches are trained to support positive youth development (PYD) through sport. In 2022, LiFEsports, the Aspen Institute's Project Play Initiative, the Susan Crown Exchange, and Nike partnered to conduct the first-ever youth sport coach survey of its kind in the United States. The 2022 National Coach Survey examined coaches' backgrounds, experiences, philosophies, behaviors, training histories, and future training interests. The survey garnered 10,485 responses and included participants from all 50 states. A majority of participants were male, White, had over ten years of coaching experience, and reported coaching over 30 different sports. Our findings highlighted important areas where all coaches could benefit from additional training and support. For instance, coaches were highly interested in receiving additional training on traditional coaching practices (i.e., the X's and O's). Coaches also reported an interest in receiving coach training in areas focused on mental wellness, life skill development, and PYD practices. Different subgroups of coaches also reported varying confidence levels concerning several key coaching practices and behaviors. Those who identified as educators reported higher confidence levels across all coaching behaviors than non-educators. Paid coaches also consistently reported more confidence in their coaching behaviors than unpaid coaches. Ultimately, this presentation will share key findings from the 2022 National Coach Survey. Our session will conclude with a discussion about opportunities to improve the youth sport environment by training coaches to support children's

overall health, development, and well-being. Funding source: Susan Crown Exchange, Nike, Aspen's Project Play Initiative.

Quebec and Moroccan educators', coaches', and players' perceptions of elite soccer coach education and professional practice

Mohammed Aslimani *University of Ottawa*; Pierre Sercia, *University of Quebec in Montreal*;
Diane Culver, *University of Ottawa*

The purpose of our research is to compare the perceptions of Quebec and Moroccan educators, coaches, and players regarding the integration of the concepts of sport coaching effectiveness, reflective methods in coaches' learning, and transformational sport coaching into the education and the professional practice of elite soccer coaches. We collected data through 12 individual semi-structured interviews with a purposeful sample, (Savoie-Zajc, 2006) composed of four educators, four coaches, and four players, including two from Quebec and two from Morocco in each participant category. The method of conceptualizing categories (Paillé & Mucchielli, 2012) allowed us to analyze the data. According to the results, there is no evidence of the integration of sport coaching effectiveness, nor of reflective methods in coaches' learning, both in their education and in their professional practice. Also, there lacks evidence of the existence of a conceptual framework of coaches' education and development, including ongoing education. As for transformational sport coaching, the Quebec educators have integrated this concept into education since 2020, unlike the Moroccan educators who claim that this concept was not included in education content. Moroccan and Quebec elite soccer coaches corroborate the absence of this concept both at the education level and at the professional practice level. Comparing results of Moroccan and Quebec elite soccer players' perceptions indicate that both Moroccan and Quebec coaches place more emphasis on the development of competence, especially technical and tactical, than on the development of confidence, connection, and character. All players want to develop all 4Cs (competence, confidence, connection and character). In terms of leadership behaviours, the results reveal that inappropriate behaviours, like recurrent screaming as a toxic leadership behaviour, greatly outweigh transformational behaviours, both among Moroccan and Quebec coaches, while players would like coaches to demonstrate more transformational behaviours.

The role of coach communication, athlete gender, and grade on burnout in high school athletes

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Jacqueline Goodway, *The Ohio State University*; Sue Sutherland, *The Ohio State University*;
Dawn Anderson-Butcher, *The Ohio State University*; Samantha Bates, *The Ohio State University*;
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Researchers have investigated coach behaviors as predictors of athlete burnout; however, few have focused on the role that coach communication plays in athlete burnout. Coach communication research has also suggested that athlete gender is an important variable that may influence how coaches communicate with their athletes. This study examined the extent to

which four constructs of coach communication (social support, instructional feedback, prosocial power, conformation), athlete gender, and grade predicted burnout among high school athletes ($N = 291$). Burnout was measured using the Athlete Burnout Questionnaire and four forms of coach communication were evaluated. The overall linear regression entered social support, instructional feedback, prosocial power, conformation, athlete gender, and grade into the equation. These variables significantly ($p < .001$) predicted 41% of the variance in burnout. Two constructs of coach communication, social support ($p < .001$) and prosocial power ($p < .001$), along with athlete gender ($p < .05$) were significant predictors. As gender was significant, separate regressions were run for boys and girls with the four constructs of coach communication and grade entered into the regression. For girls, the overall model significantly ($p < .001$) predicted 43% of the variance in athlete burnout with social support ($p < .001$) and prosocial power ($p < .001$) as significant predictors. For boys, the overall model significantly ($p < .01$) predicted 22% of the variance in athlete burnout with prosocial power ($p < .05$) as the only significant predictor. Coach communication appears to be a stronger predictor for girls with variables that measure socially supportive communication being predictive. For boys, a lesser percent of the variance in burnout is attributed to coach communication. Coaches' use of social support and prosocial power seems to be the most noticeable predictors of athlete burnout. Our findings reinforce the critical role that coach communication has on athlete burnout.

Leadership skills in high school student-athletes: Development through participation in a two-year advisory council experience

Kylee Ault-Baker, Michigan State University; Daniel Gould, Michigan State University

Often in the youth leadership development literature it is noted that in order to develop leadership, student-athletes must be able to engage in actual leadership experiences (Gould, 2016). Some high school state athletic associations have student athlete advisory boards which are comprised of representative student-athletes throughout the state. This study highlights a state athletic association's advisory board which includes 16 athletes (8 juniors and 8 seniors) selected for two-year appointment on the Student Advisory Council (SAC). The SAC exists to solicit input from student-athletes to inform the state athletic association's decisions, and additionally as an effort to develop leadership skills with the student-athletes (Blanton, 2013). However, the SAC's effectiveness in developing leadership and engagement in these young people has yet to be fully examined. Therefore, a longitudinal concurrent embedded mixed-methods design (Creswell & Plano Clark, 2011) was used to: (1) explore the leadership skills developed by the SAC members throughout their two-year appointment, (2) seek to understand the student-athlete perceptions of the SAC experience as it relates to their development, and (3) explore the SAC experience's influence on the student-athletes' motivation and perceived ability to be engaged citizens in their communities. Leadership was assessed using the Youth Leadership Life Skills Development Scale (YLLSDS: Seevers et al., 1995) at baseline, after 1 year, and at the completion of the two-year tenure on the SAC. Semi-structured interviews were used at 5 time points throughout the cohort's two-year tenure (baseline, midpoint of year one, after year one, midpoint of year two, and completion of SAC).

This presentation will share results of the participants' changes in their definition of leadership, reflections on SAC activities that impacted their leadership development, and individual changes in YLLSDS measures of leadership over time. In addition, this presentation will highlight benefits and challenges of assessing longitudinal leadership development.

Self-efficacy to regulate physical activity: Exploring factor structure, temporal invariance, and external validity in a latent variable framework

Andre Bateman, The University of the West Indies, Mona; Nicholas Myers, Michigan State University; Deborah Feltz, Michigan State University; Karin Pfeiffer, Michigan State University; Kimberly Kelly, Michigan State University; Alan Smith, Utah State University; Seungmin Lee, Binghamton University; Adam McMahon, University of Miami; Isaac Prilleltensky, University of Miami; Ora Prilleltensky, University of Miami; Ahnalee Brincks, Michigan State University

The purpose of this study was to improve measurement of self-efficacy to regulate physical activity in adults with obesity. The self-efficacy to regulate physical activity scale (SERPA) is a modified version of the barriers self-efficacy scale. The SERPA was developed to measure participants' confidence in their current ability to overcome possible barriers to engagement in a recommended amount of weekly physical activity for health. The objectives of the current study were to explore the dimensionality, temporal invariance, and external validity of scores produced by the SERPA as used in the Well-Being and Physical Activity (WBPA) study (ClinicalTrials.gov, identifier: NCT03194854). The three objectives of the WBPA study were to promote physical activity, subjective well-being, and well-being actions in adults with obesity. The WBPA study deployed the Fun For Wellness (FFW) intervention which presented sources of self-efficacy information in the form of online, interactive challenges to provide participants with capability-enhancing learning opportunities. For the objective of promoting physical activity, FFW targeted self-efficacy to regulate physical activity as one potentially modifiable mediator of physical activity participation. Data ($N_{\text{baseline}} = 461$ and $N_{30 \text{ days post-baseline}} = 427$) from the WBPA were analyzed. A two-dimensional factor structure explained responses to the SERPA at baseline. Factor 1 was conceptualized as self-efficacy to regulate barriers to physical activity participation based on social considerations. Factor 2 was conceptualized as self-efficacy to regulate internally perceived barriers to physical activity participation. There was evidence for at least partial strict temporal measurement invariance for this two-dimensional structure. There was also evidence for the external validity of the SERPA responses as demonstrated by group assignment (i.e., the FFW intervention) exerting a direct effect on the proposed two-dimensional structure of latent self-efficacy to regulate physical activity in adults with obesity at 30 days post-baseline.

Coaches' perspectives on the impact of COVID-related isolation from athletes

Anthony Battaglia, University of Toronto; Gretchen Kerr, University of Toronto

Physical distance and social isolation were prominent health safety strategies implemented during the COVID-19 pandemic by various sectors of society, including sport (Grix et al., 2021;

Parnell et al. 2020). Unfortunately, researchers have indicated that many of the negative outcomes of the COVID-19 pandemic for athletes' experiences, such as mental health concerns, were associated with the inability to interact and connect with their peers, teammates, and coaches (Graupensperger et al., 2020; Jurecka et al., 2021). Although the impact of social isolation for athletes' experiences during the pandemic has been examined, the impact of physical distance and enforced isolation for coaches remains unknown. The purpose of this study therefore was to examine Ontario sport coaches' perspectives on the implications of the COVID-19 pandemic on their experiences. As part of a large-scale survey of Ontario coaches' experiences in sport, an open-ended question was asked regarding the implications of COVID-19 on the coaching population. A total of 591 participant responses were analyzed using thematic analysis. According to the coaches, the inadequate interpersonal connections with athletes and peers resulting from physical distance and social isolation during the pandemic contributed to negative outcomes, including difficulties with online instruction, declines in coaching confidence and skills, lack of meaningful relationships, and mental health concerns. While focus has often been on how athletes may reap beneficial outcomes through their relational connections in sport (Smith & Ullrich-French, 2020), the responses in the current study indicate that coaches also reap personal satisfaction and well-being through their interpersonal relationships (Kerr et al., 2018). Further attention is needed to examine how coaches' interactions or lack thereof (e.g., isolation during COVID-19) with athletes, teams, and peers influence personal satisfaction and development.

The effect of acute high-intensity resistance exercise on memory

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Acute aerobic exercise has been found to improve memory, but this is less studied in response to resistance exercise (RE). This is despite evidence that RE-induced increases in lactate and brain-derived neurotrophic factor (BDNF) play mechanistic roles in memory performance. To determine the acute effect of RE on lactate, BDNF, and their associations with memory, blood lactate and serum BDNF were taken from 36 adults before and immediately after a 42-min high-intensity RE and a seated rest condition on counterbalanced days. After each condition, subjects studied a series of paired objects and completed object recognition and relation recognition tasks. The results showed decreased response time during the object recognition following RE ($734.4 \pm 106.1\text{ms}$) compared to following rest ($758.5 \pm 101.0\text{ms}$, $t = 2.2$, $p = 0.03$). Analysis of the response accuracy showed that more previously studied objects were correctly recognized following rest ($63.9 \pm 12.3\%$) compared to following RE ($57.6 \pm 16.0\%$, $t = 2.60$, $p = 0.01$) while there was no difference in the new (previously unseen) objects between conditions. Lactate (1.3 ± 0.4 vs. $8.3 \pm 3.4\text{mMol/L}$, $t = 16.4$, $p < 0.01$) and BDNF (620.4 ± 223.3 vs. $724.6 \pm 219.6\text{ng/mL}$; $t = 4.5$, $p < 0.01$) increased following RE, while there was no time-related change in lactate (1.4 ± 0.4 vs. $1.6 \pm 0.6\text{mMol/L}$) and BDNF (666.1 ± 213.3 vs. $667.4 \pm 256.4\text{ng/mL}$) for the rest condition. However, these RE-induced changes in lactate and BDNF did not predict any measures of object ($r_s < 0.26$, $p_s > 0.21$) or relation recognition ($r_s < 0.16$, $p_s > 0.41$). Collectively,

these findings suggest that acute high-intensity RE does not influence memory performance involving relation recognition but selectively improves the processing speed of recognizing objects at the cost of less accurate recognition of previously studied objects. Further, changes in memory performance are unlikely driven by acute increases in lactate or BDNF following high-intensity RE. Acute RE, like aerobic exercise, may be another method to alter memory performance, but changes in lactate or BDNF are not the cause of these performance changes.

“Be thankful. Be humble. Be proud”: Athlete definitions of self-compassion

Ryan Beatson, University of Saskatchewan; Serena Saini, University of Saskatchewan; Margo E. K. Adam, University of Saskatchewan; Leah J. Ferguson, University of Saskatchewan

Self-compassion is a resource for athletes to support their well-being when exposed to highly stressful and demanding experiences in their sport environments. Self-compassion entails being moved by one's own suffering and generating motivation to alleviate that suffering in a kind, caring, and accepting manner. Athletes have highlighted self-compassion as helpful for coping with failures, injuries, and poor performances. However, there are concerns that the language and qualities of self-compassion, which are sometimes perceived as “soft”, may be incompatible with competitive sport contexts. Therefore, the purpose of this research was to explore how competitive athletes define self-compassion. Participants included 112 competitive athletes ($M_{\text{age}} = 22.4 \pm 3.9$ years; 43% women) from a variety of sports and competition levels. Participants responded to an open-ended question via an online survey where they were asked to define self-compassion in their own words. Conventional content analysis was used to generate codes and themes from the data without imposing preconceived categories or theoretical perspectives. Five themes represent the ways in which self-compassion was defined by the participants, and are presented based on order of frequency in the data: (1) care and kindness towards the self (i.e., showing yourself kindness and care during difficult times, stress, or failures); (2) self-acceptance (i.e., accepting your shortcomings, failures, flaws, or inadequacies); (3) self-awareness (i.e., having awareness of internal experiences and self-control); (4) perspective (i.e., focusing on things in your control); and (5) coping skills (i.e., gaining skills to cope with difficult times, stress, or failures). There are notable similarities and points of divergence between the themes and current definitions of self-compassion in the literature. If sport practitioners understand how competitive athletes perceive self-compassion, they can better tailor self-compassion interventions to the intended population.

Parental support in professional youth soccer academies: A cross-cultural understanding of children's perceptions and expectations

Anton Bechtloff, German Sport University Cologne; Rawa Hassan, Westfälische-Wilhelms Universität Münster; Travis Dorsch, Utah State University; Valeria Eckardt, German Sport University Cologne; James Newman, Sheffield Hallam University; Connie Wragg, Sheffield Hallam University

Participation in competitive youth sports has the potential to impact the physical, cognitive, and emotional development of youth. Although the literature has largely focused on positive outcomes, youth can also experience negative consequences such as anxiety, burnout, and depression. Positive parental support can be a protective factor against deleterious effects, especially at the elite levels of youth sport participation. Thus, the aim of the present study was to capture children's perceptions of parental support provided after their transition into a professional youth soccer academy. In pursuing this aim, we sought to explore the expectations children had for their parents' engagement. With the increasing importance of cross-cultural research in sport, and to highlight cultural similarities and differences in parenting across countries, this project compared parent support in Germany, England, and the United States. Data were collected via semi-structured interviews with male soccer players aged 7 to 10 years who were attending soccer academies directed by first-tier professional clubs in these countries. Research questions were addressed using a six-step thematic analysis based on the recommendations of Braun and Clarke (2013). Themes were influenced by the structural and organizational intricacies of elite pathways across countries. One salient finding was that children had little awareness regarding the behavior of their parents and did not place high value on their involvement. Theoretically, this could be explained by the developmental course of Theory of Mind and warrants future research across a range of participant ages and abilities. In the context of elite-level academy soccer, communication and transparency between athletes, parents, and coaches should be promoted to support the changing relationships among key stakeholders contributing to sustainable personal and athletic development. Practitioners are further encouraged to provide opportunities for youth to discuss and reflect on their expectations of parental support.

Do anxiety and depression explain self-handicapping in collegiate athletes?

Lauren Bernier, Massachusetts General Hospital; Kristina Moore, Boston College

Self-handicapping (SH) is a cognitive strategy in which individuals engage in an action, opt for a performance setting, or claim an impediment that will allow them to externalize failures and take credit for satisfactory performance despite the apparent obstacle. Despite evidence that SH and state anxiety are positively correlated, it remains unclear whether trait anxiety and depression invite or thwart SH in sport. The aim of the present study was to examine whether trait anxiety and depression explain a significant amount of the variance in dispositional and situational SH. Club and Division I undergraduate student-athletes ($N = 346$, 54.8% female; M age = 20.02, $SD = 1.52$; 85.5% White; 41.7% Division I) completed a survey measuring SH, depression (BDI-II), and anxiety (STAI-Y2). Dispositional SH items asked athletes to indicate how true it is of them to use five behavioral SH mechanisms that "some athletes" use on a scale of 1 (not true) to 5 (very true). Situational SH items invited athletes to consider an important upcoming event and describe, and then rate their temptation and likelihood to use, behavioral and claimed SH mechanisms. Athletes reported low dispositional SH ($n = 238$, $M = 1.81$, $SD = 1.81$), and on average generated 3.81 SH claims and 3.31 SH behaviors. They reported being more tempted and likely to utilize claimed SH than behavioral SH. Though anxiety and depression did not significantly predict dispositional SH scores, those endorsing more severe

depression reported significantly higher claimed SH. Conversely, levels of anxiety did not explain student-athletes' temptation or likelihood to use SH. Together, depression and anxiety predicted 6.9% and 6.3% of the variance in temptation and likelihood to use SH claims, respectively, with somatic depression accounting for much of the effect. The results contribute to the growing literature on mental health in high-performing collegiate athletes. Further, this study emphasizes the clinical relevance of evaluating and addressing SH in order to protect student-athlete mental health.

Exploring youth sports coaches' definition of a coaching philosophy

Manal Beydoun, York University; Jessica Fraser-Thomas, York University

While sport participation is associated with extensive benefits, many youth report negative experiences with coaches. Holding a coaching philosophy may facilitate athletes' holistic development (Preston & Fraser-Thomas, 2018), yet most coaches do not have well developed philosophies (Nash et al., 2008). This study aimed to advance understanding of youth sport coaches' definitions of a coaching philosophy. Data were collected through an online survey shared on social media. Participants included 89 experienced (i.e., ≥ 5 years) trained (i.e., National Coaching Certification Program) Canadian youth sport coaches, aged 20–61 ($M = 33.5$; 78% male, 22% female; 58% local/regional, 42% provincial level or higher). Content analyses led to category generation in line with coaches' definitions of a philosophy, and explanations of definitions. Coaches defined a philosophy as a *tool* (e.g., guiding objectives) that can shape *priorities* (e.g., building players' character and skills) and *purposes* (e.g., sharing the fun of sport), while informing the coach's *role* (e.g., plan execution). Coaches described different *components* (e.g., principles, values, beliefs) of a philosophy making up *elemental/fundamental ideas* (e.g., worldviews). Some referred to *coach characteristics* (e.g., psychological qualities) shaping philosophies, while others identified issues of *(in)comprehension* (e.g., no definition). Coaches struggled to offer explanations of their definitions, often re-iterating stated definitions, or citing sources of their knowledge. Coaches' diverse conceptualizations of a coaching philosophy echo contrasting usages of the term among researchers (Cushion & Partington, 2016). Despite variations, some components of coaches' definitions align with those of teaching philosophies (e.g., beliefs, approaches, roles, tools) which are well developed within education literature (Caukin & Brinthaupt, 2017). Given the potential of coaching philosophies to guide coaches, there is value in further researching this construct to optimize youth sport program delivery.

Color vision deficiency: Prevalence in elite sport and the impact on participation and progression

Adam Bibbey, Oxford Brookes University; Daisy Lee, Oxford Brookes University

Color vision deficiency (CVD) affects approximately one in twelve men (8.3%) in the general population (Simunovic, 2010). Despite the general population prevalence and potential impact, it has received limited attention in sport with low screening rates. The present study examined

the prevalence and impact of CVD in elite soccer. It was hypothesized that prevalence figures in elite sport would be lower than the general population due to CVD challenges. Male soccer players ($N = 156$, $M_{\text{age}} = 20.9 \pm 3.1$ years) from professional clubs and national teams from the United Kingdom, Portugal and Denmark completed an online questionnaire to assess if they had been screened for CVD, potential CVD impact and provision provided. Participants also completed the ColourSpot app (University of Sussex) and Ishihara test to assess CVD. Thematic analysis (Braun & Clarke, 2013) was utilized to examine the qualitative data. Eight (5.1%) athletes returned a positive result for CVD. Three athletes had been screened previously within soccer. Thematic analysis revealed that CVD had a negative influence on sports participation due to difficulties such as identifying balls and cones, pitch markings and kits. Themes regarding CVD impact highlighted incorrect identification of teammates and impaired decision-making. In terms of coping, themes highlighted a lack of confidence to discuss their CVD with coaches. Coaching support was limited and often short-lived. Themes regarding recommendations for CVD indicated raising awareness for coaches and sporting bodies and consideration of appropriate equipment and kit choice colors. These results suggest that CVD has a lower prevalence in elite male soccer compared to the general population. The challenges that CVD individuals experience may be a reason for inhibited progression to the highest competitive level. The support from coaches is inadequate, thus coach education and increased awareness would appear beneficial. Further research should examine CVD individuals who exit their sport at academy level to assess the potential impact of CVD. Funding source: EU Erasmus +.

Effect of exercise and mindfulness on cognitive and psycho-emotional functioning in children with ADHD

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Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental disorders affecting ~6% of children worldwide. ADHD is characterized by deficits in inhibitory control, working memory and task-switching, as well as comorbid mental health issues. There are several treatment options, including drug therapy, but they all have drawbacks. Physical exercise and mindfulness meditation serve as alternative options to mitigate ADHD symptoms. Although there is extensive support for the benefits of long-term physical exercise or mindfulness meditation programs, there is insufficient research investigating how acute bouts (i.e., single, short bouts) can help. The current study investigated how acute bouts of exercise and mindfulness meditation impact executive functioning and psycho-emotional well-being in children with ADHD. We used a pre- post-test, within-subjects design wherein participants completed three interventions: 10min of exercise, 10min of mindfulness meditation, and 10min of reading (control group) across a 3-week period. Prior to and following each intervention, executive functioning (inhibitory control, working memory, task-switching) and psycho-emotional well-being (mood, self-efficacy) were assessed. Repeated measures ANOVAs were conducted with a three-level factor of condition (exercise, mindfulness meditation, reading control), and a two-level factor of time (pre-intervention, post-intervention). Mindfulness meditation promoted executive functioning whereas the other

interventions did not ($d = 0.55\text{--}0.86$). Exercise promoted positive mood and self-efficacy whereas the other interventions did not ($d = 0.22\text{--}0.35$). Critically, this work demonstrates that an acute bout of mindfulness meditation session can promote inhibitory control among children with ADHD, and that an acute bout of exercise can promote positive mood and self-efficacy for children with ADHD. This work offers important insight into how behavioural interventions could be personalized according to a child's needs.

The effects of sex on sport media implicit and explicit biases

Edina Bijvoet, University of Toronto; Ross Murray, University of Toronto; Catherine Sabiston, University of Toronto

Males and females may have different implicit and explicit reactions to sport media. Given the well-documented impact that sports media has on sport participation, and the lower rates of sport participation across the lifespan for females compared to males, this information may be pertinent for physical activity campaigns aimed at increasing participation rates. The purpose of this study was to explore sex differences on implicit and explicit perceptions of sport related media. Participants ($N = 184$; 46% female; 33 years of age on average) completed an implicit association task and an online survey (explicit perceptions). All image content was from the Canadian Women and Sport "She's Got It All" gender equity social campaign. Controlling for current sport participation, differences in implicit and explicit perceptions of sport for males and females were examined in separate ANCOVA models. When viewing sport photos, females reported significantly more favourable explicit attitudes ($p = .001$) compared to males. There were no significant differences on implicit perceptions of sport. Given that the image content was centered on female athletes, it is encouraging that there was no implicit bias for males and females. The difference in favourable explicit perceptions might be due to a conscious and deliberate approval of the feminocentric media in the campaign and the potential support for sex-specific role models in sport. This finding supports continued efforts for a more diverse and equitable representation of females in sport media. Future research should be focused on the ways sport participation is impacted following specific media campaigns aimed at gender equity activities.

The depression, anxiety, and stress of student-athletes from a pre- to post-COVID world

Georgia Bird, University of Birmingham; Jennifer Cumming, University of Birmingham; Mary Quinton, University of Birmingham

The COVID-19 pandemic has increased symptoms of depression and anxiety by 25% worldwide (WHO, 2022). As young people were disproportionately affected and student-athletes are known to be at risk for mental health problems, it is essential for universities to understand the impact of the pandemic on their mental health to provide appropriate support. As part of a larger study, data was collected using the Depression, Anxiety and Stress Scale-21 from 427 UK student-athletes aged 18-25 between 2018 and 2020 ("pre-pandemic"). Data was also collected from another cohort of 380 student-athletes between November 2021 (when UK restrictions

were removed for the final time) and November 2022 (“post-pandemic”). Repeated measures MANOVA showed student-athletes experienced significantly higher symptoms of depression ($M = 10.515$, $SD = 9.69$), anxiety ($M = 10.17$, $SD = 8.58$), and stress ($M = 14.32$, $SD = 9.22$) post-compared to pre-pandemic at the multivariate (Pillai’s trace = .040, $F(3, 803) = 11.15$, $p < .001$) and univariate level for depression ($M = 7.63$, $SD = 6.97$, $F(1, 805) = 23.92$, $p < .001$), anxiety ($M = 7.75$, $SD = 6.72$, $F(1, 805) = 20.153$, $p < .001$) and stress ($M = 12.92$, $SD = 9.24$, $F(1, 805) = 5.45$, $p = .020$). Crosstabulations and chi-squared tests were conducted to understand the distribution of student-athletes across categories of psychopathology from normal to extremely severe. Results showed significant differences in depression ($X^2 = 29.28$, $p < .001$) and anxiety ($X^2 = 27.86$, $p < .001$), but not stress ($X^2 = 9.45$, $p = .051$). Extremely severe symptoms of anxiety increased from 8% pre-pandemic to 19.5% post-pandemic. Further, experience of ‘normal’ symptoms decreased from 55.7% to 47.4%, suggesting anxiety was skewed towards the more severe categories after UK restrictions eased. This pattern is similar for depression and stress. This clear increase of student-athletes’ symptoms of mental illness warrants immediate attention to understand how to support student-athletes’ mental health. The dangers of not addressing this rise could exacerbate symptoms of this already at-risk group. Funding source: Economic and Social Research Council.

Understanding student-athletes’ mental health profiles: A person-centred approach

Georgia Bird, University of Birmingham; Mary Quinton, University of Birmingham; Jennifer Cumming, University of Birmingham

Mental health research in sport has typically focused on mental illness or mental wellbeing, but scarcely viewed them together to gain a holistic understanding of student-athletes mental health. Using a person-centred approach, the aim of this research was to (1) identify and characterise latent mental health profiles for student-athletes (Keyes, 2002), and (2) understand whether profiles were distinguished by alexithymia. 380 UK student-athletes (M age = 19.75, $SD = 1.45$) completed questionnaires on mental wellbeing, depression, anxiety, and alexithymia; and difficulty understanding emotions – a potential risk factor for mental health difficulties. Following latent profile analysis, 4 latent profiles were identified (“moderate mental health”, “moderate wellbeing without symptoms”, “highest mental health”, “lowest mental health”). A MANOVA revealed profiles as distinguishable by symptoms of depression and anxiety at multivariate (Pillai’s trace = .90, $F(6, 752) = 102.51$, $p < .001$) and univariate levels ($F(3, 376) = 592.60$, $p < .001$), but an ANOVA revealed not all profiles were distinguishable by mental wellbeing. Of note, the lowest mental health (46.2% extremely severe depression; 75% extremely severe anxiety) profile did not have significantly different wellbeing scores to moderate mental health and moderate wellbeing without symptoms. Only highest mental health had significantly different wellbeing scores to all other profiles but still, some in this profile had moderate mental wellbeing (37.8%). An ANOVA showed significant differences between all profiles in alexithymia, $F(3, 376) = 69.097$, $p < .001$. Lowest mental health had the highest alexithymia score ($M = 63.48$, $SD = 9.07$), whereas highest mental health had the lowest ($M = 42.84$, $SD = 10.09$). Lower alexithymia combined with an absence of mental illness symptoms was optimal for mental health. To conclude, all student-athletes could benefit from a

boost to their wellbeing, as anything less than higher levels of wellbeing is considered negative for mental health. Funding source: Economic and Social Research Council.

Associations between behavioral regulations and sedentary behavior among older adults

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Older adults, on average, engage in 8.5 hours of sedentary behavior (SB) per day making them the most sedentary segment of the population. The motivational processes that may limit or reduce sedentary time in older adults are not well understood. Further, it is not clear how the motivation to engage in physical activity (PA) may be distinct from the motivation for reducing SB. The purpose of this study was to capture behavioral regulations (specified within self-determination theory) to limit SB and engage in PA and examine associations between these behavioral regulations and average daily sedentary time in older adults. Older adults, ($N = 173$, $M_{\text{age}} = 69.81$, 75.4% White) completed a baseline questionnaire indicating their behavioral regulations to limit SB and engage in PA, then wore an accelerometer for 14 days to capture average daily sedentary time. Results from linear regressions regarding behavioral regulations to limit SB indicated that only integrated ($\beta = -.203$, $p = .006$) and intrinsic regulations ($\beta = -.185$, $p = .012$) significantly and negatively predicted average daily sedentary time. Results from linear regressions regarding behavioral regulations to engage in PA revealed that only integrated regulation significantly and negatively predicted average daily sedentary time ($\beta = -.205$, $p = .007$). Results indicate distinct differences between behavioral regulations for limiting SB and engaging in PA in predicting subsequent average daily sedentary time. Despite these differences, across both sets of behavioral regulations more autonomous, self-determined behavioral regulations appeared to be associated with less average daily sedentary time compared to more controlling behavioral regulations. Ultimately, this study fills an important knowledge gap by exploring associations between behavioral regulations to limit SB and engage in PA and subsequent average daily device-based sedentary time. This work is an essential first step in developing effective interventions designed to limit or reduce SB among older adults.

Assessing the validity and empirical distinctiveness of mental toughness in high-performance sport

Mishka Blacker, Brock University; Philip Sullivan, Brock University

Mental toughness is a psychological construct that has been highly valued and pursued by sport participants without a collective understanding of what it is or how it differs from similar constructs (Anderson, 2011; Burns et al., 2022; Gucciardi, 2020). While there is empirical support for the relationship between mental toughness and both performance and psychological functioning across a range of competitive contexts (Gucciardi et al. 2015; Lin et al., 2017; Stamatis et al., 2020), scholars who are interested in developing and/or researching mental toughness are faced with the challenge of understanding its conceptual boundaries in

addition to the conceptual differences between various models and measures that are still in use (Farnsworth et al., 2021; Gucciardi, 2020). This study examined the convergent and divergent properties of the Mental Toughness Index (MTI; Gucciardi et al., 2015) and the conceptually similar constructs of grit (Grit-O; Duckworth & Quinn, 2009), resilience (CD-RISC; Connor & Davidson, 2003) and hardiness (DRS-15; Bartone, 2008) in a sample of 197 high-performance athletes. Analyses showed that the data was a poor fit to the bi-factor solution that Price (2019) found with these measures in a non-athletic sample (CFI = .740; RMSEA = .056, SRMR = .074). A series of canonical correlations revealed that none of the models for grit, resilience, or hardiness correlated with the MTI in ways that supported their factor structures. Based on these results, it appears that mental toughness in athletes is a distinct but related construct to those of grit, resilience, and hardiness. Funding source: Ontario Graduate Scholarship.

Exploring the barriers and enablers to recreational running from both current and discontinued runners' perspectives: A qualitative analysis

Chloe Blacket, University of South Australia; John Arnold, University of South Australia; Hunter Bennett, University of South Australia; Joel Fuller, Macquarie University; Alyson Crozier, University of South Australia

Running is a popular form of physical activity, yet many individuals face barriers that prevent participation. Research has mainly examined injury-related factors impacting continued running, but psychosocial factors may also impact an individual's ongoing running participation. Therefore, this qualitative study aimed to explore non-injury related barriers and enablers of running participation among current ($N = 18$, female $n = 7$, $M_{\text{age}} = 42$ years) and recently discontinued ($N = 11$, female $n = 8$, $M_{\text{age}} = 42$ years) recreational runners. Using a semi-structured guide, in-depth interviews were conducted, transcribed verbatim, and analysed using reflexive thematic analysis. Findings identified a complex interplay of personal, social, and environmental factors that influence an individual's decision to continue running recreationally as a form of physical activity. Barriers to running participation include a lack of time (including other responsibilities taking priority), as well as reduced motivation for running, such as becoming bored with running or more interested in other forms of physical activity instead. Factors that enable running participation include having a strong social network with other runners, setting personally important goals, and valuing the physical and mental health benefits that running provides them, such as increased cardiovascular fitness and mental clarity. While there were general, consistent themes identified through participants' stories, it was also clear that each individual experienced unique motivations and barriers that influenced their running behaviour. These findings highlight the importance of addressing a variety of non-injury related barriers and promoting enablers to increase running participation and improve overall health and well-being. Overall, this research sheds light on the complex and multifaceted nature of running participation and provides insights that can inform interventions aimed at promoting and maintaining physical activity.

A history and reflection on ten years of a community-academic partnership serving high school student-athletes

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Community engagement is an important role for land-grant and public universities. These universities often rely on either volunteer time from graduate students and faculty or remain singularly transactional in their working partnership. Usually, this means focusing on one project at time, so the organization can accomplish a goal or so researchers can publish scientific papers. After several years of following a similar relationship pattern, a research institute embedded at a large, research-intensive land-grant university and a nearby State High School Athletic Association formalized their working partnership. The State Association agreed to a proposal funding a significant portion of a graduate assistantship, thus placing doctoral students in their offices each week. Rarely are rich descriptions of the formation of partnerships like this captured, nor are experiences of those working directly in a research-community partnerships examined and analyzed. The purpose of this project was to explore the lived experiences of the individuals who worked in this unique research-community partnership over a 10-year period. The study used a narrative inquiry approach, framed by a community engagement perspective. Participants included all the immediate stakeholders in this partnership: the Director of the Research Institute, the Director of the State Association, the State Association site supervisor for the graduate assistants, and all seven of the graduate students who have served in this assistantship over the 10-year period. As well, newsletters describing the partnership were also assessed. Results of the analysis included: (a) a rich description of a long-term partnership, (b) a critical synopsis of the benefits and challenges of researchers sharing space and managing working agendas, and (c) the ways in which a research-community partnership has increased the use and usefulness of research to enhance youth development and well-being in high school sport participants.

The light and dark side of positional indispensability: Understanding the relationship among goalkeepers, indispensability, and psychological outcomes

Carly Block, Boston University; Svenja Wolf, Florida State University

Goalkeepers hold a vital role on their team due to their unique positional requirements such as being the last line of defense and having task and motivational leadership obligations (Kristiansen et al., 2012). As a result, it can be argued that they are an indispensable playing position within their team. It can also be suggested that the cognitive, emotional, and behavioral outcomes goalkeepers might face are related to their importance towards their teams' success and the relationship with their team. Thus, the purpose of the present study was to determine if and why goalkeepers are perceived to be the most indispensable position in their sport. Additionally, this study examined the outcomes of perceived indispensability for athletes and determined if the team environment acted as a moderator. A sample of 229 athletes from 47 competitive collegiate teams completed an online survey comprised of

measures for perceptions of indispensability and leadership, effort, enjoyment, concerns over mistakes, perceived pressure, anxiety, excitement, team-cohesion, and the coach-athlete relationship. Results of MANOVAs and regression analyses showed that compared to all playing positions, goalkeepers are perceived to be the most indispensable due to their role requirements and leadership duties. The results also revealed that the more indispensable athletes feel, the greater effort, excitement, and enjoyment they have when competing. Athletes' individual attraction and relatedness to their team's tasks and goals was found to moderate the relationships between self-indispensability and athletes' thoughts of concerns over mistakes and perceived pressure. These findings support and add to the definition and outcomes of indispensability. The present study can provide practitioners and coaches with an increased awareness of the cognitive, behavioral, emotional, and social impact of being a goalkeeper as well as teach them the importance of helping athletes improve perceptions of self-indispensability.

The psychometric evaluation of two leadership questionnaires to assess athlete leadership behaviours

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Cross-sectional research on athlete leadership has utilized questionnaires from other fields, including the Leadership Scale for Sports (LSS; Chelladurai & Saleh, 1980) and the Differentiated Transformational Leadership Inventory (DTLI; Callow et al., 2009). There has been discussion in the literature regarding the validity of these modified inventories for measuring athlete leadership behaviours (Loughhead, 2017). Using a sample of 680 athletes from various sports, we explored and confirmed the factorial structure, internal consistency, and concurrent validity of the LSS and DTLI. Using exploratory structural equation modeling (ESEM), the results supported a five dimension 40-item inventory for the LSS and a seven dimension 27-item measure for the DTLI. The McDonald omega (ω) coefficient was calculated with the LSS dimensions of training and instruction ($\omega = 0.90$), democratic behaviour ($\omega = 0.85$), autocratic behaviour ($\omega = 0.81$), social support ($\omega = 0.82$), and positive feedback ($\omega = 0.84$) along with the DTLI dimensions of individual consideration ($\omega = 0.71$), inspirational motivation ($\omega = 0.86$), intellectual stimulation ($\omega = 0.84$), fostering acceptance of group roles ($\omega = 0.81$), high performance expectations ($\omega = 0.81$), appropriate role modeling ($\omega = 0.78$), and contingent reward ($\omega = 0.85$) being reliable measures. Concurrent validity was supported with the LSS behaviours of training and instruction ($\beta = 0.38$), autocratic behaviour ($\beta = -0.12$), social support ($\beta = 0.23$), and positive feedback ($\beta = 0.13$) accounting for 44% of the unique variance in cohesion. The DTLI behaviours of appropriate role modeling ($\beta = 0.40$), inspirational motivation ($\beta = 0.20$), contingent reward ($\beta = 0.17$), and intellectual stimulation ($\beta = 0.16$) accounted for 56% of the total variance in cohesion. The results provide evidence for the validity and reliability of the LSS and DTLI for measuring athlete leadership behaviours and the usefulness of ESEM for analyzing data from multidimensional scales (Asparouhov & Muthén, 2009).

Retention in a sports-based youth development program: What predicts intentions to return?

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Evaluation research has demonstrated that intentional sports-based youth development programs can have positive impacts on participants' social and emotional growth. Less is known, however, about which participants return year after year and what factors predict their continued participation. The Junior Giants (<https://www.mlb.com/giants/community/junior-giants-leagues>) is a sports-based youth development program for 5-18-year-old boys and girls that is non-competitive and free to participate. The 8-week program uses baseball and softball as platforms for teaching life skills and fostering social emotional competencies. This study evaluated factors predicting intentions to return to the program the following year.

Parents/guardians of Junior Giants participants ($N = 8,495$) completed online surveys about their child's demographics, social emotional climate and learning, character development, and intentions to return the following year. Chi-square and t -test analyses revealed significant differences ($p < .001$) between intended returners ($n = 7179$, 84.5%) and those who reported no/undecided on returning ($n = 1316$, 15.5%) on race/ethnicity, gender, age, and years in the program. Intended returners were most likely to identify as Latino, be younger, and have participated for two or more years in the program. A binomial logistic regression using a model with demographic variables, social emotional climate and learning, and character development as predictors was significant, $\chi^2 (113, N = 8490) = 1417.15$, $p < .001$, compared to the intercept only model. This model explained 26.6% (Nagelkerke R^2) of the variance in intentions and had an overall classification rate of 86.4%. Significant predictors and odds ratios suggested that parents who reported a greater climate of support and positive changes in their child's sense of happiness, confidence, and integrity were most likely to intend on returning. Results provide important feedback for predicting retention rates and identifying areas to strengthen programming. Funding source: Giants Community Fund.

Exploring experiences of tilt and ragequitting in competitive and recreational gamers.

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Engaging in competition, across all domains and skill levels, can be a profoundly emotional experience. One context for studying the emotional experiences of competition is online videogames. Gamers refer to tilt as a cyclical phenomenon where performance failures cause negative emotions leading to even poorer performance. When tilt experiences go unresolved, they can lead to ragequitting – an abrupt, and sometimes destructive, early removal of oneself from competition fueled by frustration. Few empirical studies have investigated gamers' perceptions of these aversive affective experiences and their consequences. The purpose of this study was to explore gamers' experiences of tilt and ragequitting. Participants ($N = 30$; 76% males, $M_{age} = 25.5$) were recruited using criterion and snowball sampling across three broad categories of videogame engagement: recreational gamers, ranked gamers, and professional/collegiate gamers. Semi-structured interview transcripts were thematically

analysed using qualitative description from a critical realist perspective. Participants tended to describe tilt, when not dealt with, as having a compounding negative “snowball” effect on performance, and elaborated on a range of strategies to reduce tilt in themselves and their teammates, and to induce tilt in their opponents. Ragequitting was described as the extreme result of an unmitigated bout of tilt, but also as a disdainful act that gamers regard very poorly. Many participants recounted having overcome their ragequitting tendencies from their younger years when they were less able to manage failures, and more frequently became overwhelmed with negative game-related competitive emotions. The results provide insight into how performance failures and negative emotions compound on each other when things go awry in competition having implications for players, coaches, and practitioners. Beyond gaming, these findings open a door for future research to explore how and when tilt may arise in traditional sport settings. Funding source: Social Sciences and Humanities Research Council of Canada.

DIY 6-Minute Walk Test: How does a self-administered 6-Minute Walk Test on a smartphone application compare to the standard protocol?

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The 6-Minute Walk Test (6MWT) is a sub-maximal test used to predict exercise capacity and functional status among populations with a range of health conditions (Crapo et al., 2022). The objective of the 6MWT is for the participant to walk as far as possible at a comfortable pace for 6 minutes. While it is considered easy to perform by the participant, it currently requires a trained individual to administer the test. Capitalizing on the simplicity of the standard test, we sought to develop a self-administered 6MWT feature within a smartphone application designed for individuals participating in a diabetes prevention program; Small Steps for Big Changes (SSBC). The aim of this study was to validate the self-administered 6MWT by comparing it to a standard 6MWT protocol. Using a cross-over design, seven SSBC participants (three males and four females) were randomized to complete both the standard 6MWT and the self-administered 6MWT on the app, separated by a 90-minute flush out period. Distance walked for each test was calculated and results were compared demonstrating no statistically significant difference in the distance between the standard and self-administered tests ($M = 5.2 + 22.77$, $p = 0.57$) with no proportional bias ($t = -1.28$, $p = 0.26$). These findings suggest a level of agreement between the measurements. The self-administered 6MWT may be a valid tool for individuals to test and monitor changes in their exercise capacity and functional status without the supervision of trained personnel. Increasing the accessibility of 6MWTs could complement or potentially substitute 6MWTs administered in health care settings. This may save time for other healthcare procedures and patient-provider discussions as well as increase the frequency of these tests. Results of tests could be used by the client as a tool for motivation to increase exercise capacity.

Examining the impact of COVID-19 on mental health, social life, and physical activity levels in individuals with Parkinson’s disease

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Physical activity (PA) improves motor and non-motor symptoms in individuals with Parkinson's disease (PD). Additionally, participation in PA and exercise provide mental health benefits, social engagement opportunities, and increased physical functional abilities. Unfortunately, due to COVID-19 restrictions in 2020, gyms, fitness centers, and rehabilitation facilities were closed to the public, leading many individuals with PD to lose access to facilities where they participated in regular PA, social interactions, and community engagement. The lack of access to these facilities impacted PA engagement and potentially had a negative impact on mental health and social engagement. Therefore, the purpose of this study was to examine the mental, social, and physical impact the restricted access to PA facilities due to COVID-19 had on individuals with PD. Data were collected from 11 participants (5 female, 6 male) diagnosed with PD via phone interviews, and questions centered on how COVID-19 had changed the individuals' daily PA levels, quality of life, mental health status, and social support. Results indicated seven main themes: overall mental health, life changes due to COVID-19, importance of group and social support, importance of PA, motivation for PA, COVID-19 adaptations and impacts on PA, and physical functioning impacts. Despite the gym, fitness center, and rehabilitation facility restrictions due to COVID-19, all participants reported maintaining some level of PA. However, the intensity of the PA and the social engagement aspect of the PA drastically decreased, resulting in a negative impact on participants' mental health. The results from this study suggest that PA for those with PD extends beyond the physical benefits, including social engagement that ties to mental health benefits. Future research should focus on how to increase social engagement with at home PA routine in those with PD.

A first look at the mental health of developing athletes: What prevents them from seeking help?

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Emerging data have led various international organizations to identify mental health as a research priority issue (Chang et al., 2020; Henriksen et al., 2020). While interest in the mental health of elite athletes is receiving more attention than ever, little attention and resources are being allocated to developing athletes. These athletes are generally competing at the provincial, national, and/or international level, but are not part of national teams. The general objective of this project is to identify the prevalence of mental health symptoms of developmental athletes and to describe the barriers to seeking help. More specifically, these results are related to mental health diagnosis, reported suicide attempts and self-harm behaviour. 139 male and 198 female athletes ($N = 337$, M age = 18.05 ± 2.31 years) completed

an online survey. Results show that whilst 21.6% ($n = 68$) of athletes met the criteria for clinical depressive symptoms and 19.9% ($n = 63$) for clinical anxiety symptoms, only 7.4 % ($n = 25$) had received a medical diagnosis. More alarmingly, 12.7% of athletes ($n = 40$) reported self-harm behaviors and 2.8% ($n = 9$) reported having attempted to commit suicide. Results of regression analysis revealed that women were 3.24 times more likely to be diagnosed with a mental health disorder ($\beta = -1.174$, CI: 0.10, 0.95, $p = 0.040$) and 3.51 times more likely to report signs of self-harm than men ($\beta = -1.255$, CI: 0.11, 0.72, $p = 0.008$). Sexual minorities are 7.40 times more likely to be diagnosed with a mental health disorder ($\beta = -2.006$, CI: 0.05, 0.35, $p < 0.000$) and 6.09 more likely to report self-harm ($\beta = -1.806$, CI: 0.07, 0.40, $p < 0.000$). When asked what was refraining them to seek help, 42.9% ($n = 126$) of athletes reported a fear of being stigmatized, 34% ($n = 100$) a fear of being misunderstood and 69.4% ($n = 204$) reported lacking time or access to seek help. These results suggest that developing athletes would benefit from mental health resources but that time, access and stigma are refraining them to seek help. Funding source: Social Sciences and Humanities Research Council of Canada, Mitacs, INS.

Exercise for improving mental health and health-related quality of life in individuals with multiple sclerosis: A systematic review and meta-analysis

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Many individuals with multiple sclerosis (MS) report symptoms of depression and anxiety, and poor health-related quality of life (HRQoL). The Physical Activity Guidelines Advisory Committee presents exercise as a strategy to treat mood disorders and return to a more productive and independent life. Several studies tested the effects of exercise interventions on mental health and HRQoL in people with MS. Therefore, the aim of the present systematic review was to determine the effects of exercise on subjective (SWB), psychological (PWB), and social well-being (SoWB), and HRQoL in people with MS. Literature searches were conducted in four databases, and we included randomized controlled trials that: (a) recruited men and women aged 18 years or older with multiple sclerosis; (b) delivered an exercise or physical activity intervention; (c) had at least one comparator group that received no intervention; and (d) had SWB, PWB, SoWB, or HRQoL as outcomes. Pairs of reviewers independently screened titles and abstracts, full texts, and performed data extraction and assessment of risk of bias using the Cochrane Risk of Bias Assessment Tool. We performed random-effect meta-analyses, and assessed heterogeneity between trials by using the I^2 statistics. Forty studies were included. Most studies combined different types of exercise, with an average intervention duration of 3.2 ± 1.9 months, for 2.7 ± 1.1 days per week. Exercise improved SWB (standardized mean difference [SMD] = 0.35; 95% CI [0.06, 0.65]; 1,003 participants; 24 studies; $I^2 = 7\%$), HRQoL (SMD = 0.38; 95% CI [0.20, 0.56]; 1,490 participants; 33 studies; $I^2 = 61\%$), and may improve SoWB (SMD = 0.54; 95% CI [0.00, 1.07]; 816 participants; 13 studies; $I^2 = 92\%$). Only two studies administered PWB measures. Exercise interventions should be implemented to improve HRQoL, SWB, and SoWB in people with MS. Future studies are required to determine the effects of exercise on PWB, as PWB outcomes (e.g., self-efficacy) play an important role in the initiation

and maintenance of healthy behaviors. Funding source: MIND & MOVE s.r.l., University of Turin.

Passion in youth hockey parents: Associations with need satisfaction and verbal aggression toward officials

Julie Brodeur, University of Manitoba; Benjamin Schellenberg, University of Manitoba

Hockey parents are not always on their best behavior while watching their children play. The purpose of this research was to understand the motivational determinants of one specific type of unkind behavior displayed by some hockey parents: verbal aggression directed toward on-ice officials. We reasoned that hockey parents with strong levels of obsessive passion would report engaging in greater levels of verbal aggression toward officials. Also, in line with the compensatory model of obsessive passion, we hypothesized that obsessive passion would be associated with high psychological need satisfaction within the context of being a hockey parent, but low psychological need satisfaction in general. We administered online surveys to 992 hockey parents which asked them to report levels of verbal aggression toward officials, passion for being a hockey parent, and psychological need satisfaction at both activity-specific and global levels. Using structural equation modeling, we found support for a model in which verbal aggression was positively predicted by obsessive passion. Obsessive passion, in turn, was positively associated with high need satisfaction within the context of being a hockey parent, and negatively associated with global need satisfaction. These results point to obsessive passion as a motivational factor that puts hockey parents at risk of taking things too far and directing insults, threats, and other forms of verbal aggression toward officials. This research also supports the compensatory model of obsessive passion, which highlights the importance of psychological need satisfaction both within and beyond passionate activities as being important for predicting obsessive passion. These findings have implications for our understanding of sport parenting behavior and why some sport parents engage in maladaptive behaviors. Funding source: Research Manitoba.

A meta-synthesis of body image and sport

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Body image is a complex construct that may be supported through sport, yet also may limit participation and quality experiences. The purpose of the current meta-synthesis was to summarize and reconceptualize qualitative research on the body image experiences of children, youth, and adults involved in sport. Evidence-informed search strategies included peer-reviewed qualitative and mixed-methods studies from January 1st, 2008 to December 31st, 2021. Overall, 56 articles were extracted for quality assessment and analysis using an inductive thematic synthesis. Five themes were identified: (1) the centrality of body weight, (2) coaches as gatekeepers to (quality) sport, (3) body image and athlete maltreatment, (4) the body and

sport paradox, and (5) the developmental impact of sport on body image. Together, the studies demonstrated that most people engage in sport for intrinsic (i.e., health and enjoyment) compared to extrinsic motives (i.e., appearance or weight management). Furthermore, most articles investigated women athletes, who detailed experiencing excessive and inappropriate body- and weight-related pressures, stemming mostly from coaches. These pressures may result in disordered behaviours and have long-term consequences for athletes even following sport cessation, such as disordered eating and physical inactivity. Some of the findings implied a high prevalence of athlete maltreatment, particularly at the competitive youth level. Compared to work focused on younger athletes, more body positive sport environments and resilience to body- and weight-related stressors in sport was reported by adults. Overall, sport appears to be an experience that positively impacts body image by allowing those involved to shift their focus to the functionality and performance of the body; however, these experiences can be tainted by individuals who use body image as a tool to manipulate participants. Moving forward, sport organizations must invest more in body image education programs for key sport leaders in order to provide positive sport experiences for all participants.

Correlates of anti-fat attitudes in health professionals

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Health professionals (HPs), including exercise and sport coaches, support individuals' health perceptions and behaviors that often center on body shape and weight. HPs' own body image and anti-fat attitudes (AFA) may impact their communication with clients. These AFAs can consist of a general dislike of overweight people, fear of becoming overweight themselves, or a belief that higher weight is due to lower willpower and control. Research describing AFA and its correlates among HPs is important to inform interventions and client interactions. The present study explores psychosocial correlates among HPs. Correlates of interest were selected based on theoretical and empirical relevance to body-image and exercise and included self-compassion, body appreciation, disordered eating, body ideal internalizations, and a measure of body image knowledge. Data were drawn from 124 HPs ($n = 110$ women; $M_{\text{age}} = 34.7$; $SD = 7.97$) participating in a study evaluating the effectiveness of an online body image course. HPs scored relatively low ($M = 54.35\%$, $SD = 12.57\%$) on a body image knowledge test, which was negatively correlated with the willpower subscale of the AFA scale ($r = -.24$). The fear of fat ($M = 5.2$, $SD = 2.37$), dislike ($M = 2.35$, $SD = 1.32$), and willpower ($M = 3.87$, $SD = 2.03$) subscales of the AFA were positively correlated with disordered eating ($r = .31$ to $.58$) and internalized body ideals ($r = .28$ to $.65$), while the willpower and fear of fat subscales were negatively correlated with self-compassion ($r = -.18$ and $-.42$). Moreover, the fear of fat subscale was negatively correlated with body appreciation ($r = -.48$). Body image knowledge was suboptimal, indicating a need for targeted education. Further, higher AFAs were related to greater body ideal internalization and disordered eating, and lower levels of positive body image in HPs. These attitudes and behaviours may negatively impact how HPs communicate with their clients on similar health-related topics. Future research on how these attitudes translate into actual communication and coaching practice is warranted.

An examination of the psychometric properties of the exercise identity scale and its adaptation to physical activity

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Research has shown exercise identity is one of the strongest predictors of physical activity behavior. However, exercise is a subset of the broader construct of physical activity and therefore existing instruments such as the Exercise Identity Scale may underestimate the relationship between identity and physical activity behavior. This study investigated associations between moderate-to-vigorous physical activity behavior with overall exercise and physical activity identity as well as their subdomains (i.e., role identity, beliefs), whether exercise and physical activity identity are conceptually distinct factors, and the most appropriate factor structure of the Exercise Identity Scale. A total of 647 undergraduate students (M age = 19.54 ± 1.86 years; 61% female, 36% male, 3% other) completed an online survey that included the Exercise Identity Scale, a modified version of the Exercise Identity Scale specific to physical activity and the International Physical Activity Questionnaire – Short Form. Results demonstrated equivalent correlations ($r = 0.42$) for overall exercise and physical activity identity with physical activity behavior, and similar correlations across the instruments for role identity (r 's = 0.47 to 0.49) and beliefs (r 's = 0.33 to 0.37). Exploratory factor analysis largely indicated a two-factor structure that broke down not by exercise versus physical activity identity, but instead, by specific identity dimension (i.e., role identity and beliefs). Collectively, these findings suggest the exercise and physical activity identity largely represent a single identity domain. As such, the Exercise Identity Scale, and its modified physical activity version, can be used interchangeably without sacrificing our understanding of the strength of the identity – physical activity behavior relationship. Evidence also suggests the two-factor structure for exercise identity is supported among more diverse samples recruited outside of physically active contexts. Funding source: The University of Texas at San Antonio.

Development of the multidimensional inventory of physical activity identity

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Emerging evidence indicates identity is among the most robust psychological constructs for predicting whether individuals translate their physical activity intentions into action. Despite that identity has been increasingly conceptualized as a complex and multidimensional construct, current instruments for assessing identity related to physical activity focus on a single domain of this behavior (i.e., exercise) and rely on unidimensional or, at best, a bidimensional conceptualization of this construct. The purpose of this study was to develop the Multidimensional Inventory of Physical Activity Identity. Two samples of university students completed surveys to develop ($n = 647$; M age = 19.54 ± 1.86 years; 61% female, 36% male, 3% other) and test the instrument ($n = 649$; M age = 19.05 ± 1.73 years; 64% female, 33% male, 3% other). Parametric and non-parametric item response theory analyses supported a 25-item,

five-dimension conceptualization of physical activity identity consisting of acknowledgement, centrality, compatibility, commitment, and exploration. Strong psychometric properties were observed. Bayesian network modeling also revealed a potential causal structure amongst the subdomains: acknowledgement predicts centrality, compatibility, and exploration; centrality predicts compatibility, exploration, and commitment; and commitment and compatibility predict exploration. Overall, findings provide initial support for the first physical activity-specific measure of identity and demonstrate evidence for its flexibility in using the five unidimensional subscales as researchers see fit. Longitudinal studies are needed to understand how the five subdomains of physical activity identity develop in relation to physical activity behavior. Funding source: The University of Texas at San Antonio.

The physicAl aCtivity Counseling for young adult canCEr SurvivorS (ACCESS) trial: A parallel, two-arm pilot randomized controlled trial

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Physical activity (PA) in young adult cancer survivors (YACS) is low despite demonstrated health benefits. Theory-based interventions offering 1:1 PA counseling may promote behavior change; yet on a large scale in-person delivery may not be feasible. Thus, the objective of this study was to assess the feasibility of a parallel, two-arm pilot randomized controlled trial providing a 12-week theory-based PA counseling intervention delivered via videoconferencing to YACS after cancer treatment. Participants were recruited from across Canada. Consenting YACS were randomized to usual care (UC) or the intervention group (IG; 6 biweekly PA counseling sessions driven by self-determination theory). Enrollment, allocation, completion of videoconferencing sessions and measures (surveys, interviews, accelerometers), and adverse events linked to the intervention were assessed. Eighty self-referred, clinician-referred, and registry-ascertained YACS were screened for eligibility from 03/2021 to 08/2022; 47 (59%) were eligible and 44 (94%) provided informed consent and completed baseline assessments. Forty-two (96%) were randomized to UC ($n = 22$) or IG ($n = 20$). Two (10%) IG participants did not start the intervention and 15 (83%) completed all 6 sessions. Thirty-five participants (83%; $n_{IG} = 18$, $n_{UC} = 17$) were interviewed post-intervention (13 weeks post-baseline) and 34 (81%; $n_{IG} = 17$, $n_{UC} = 17$) provided quantitative data post-intervention (primary endpoint), though only 26 (62%) provided accelerometer-measured PA behavior data (primary outcome). Thirteen participants (31%; $n_{IG} = 8$, $n_{UC} = 5$) were lost to follow-up (did not complete assessments at 24 weeks post-baseline). No adverse events were reported. As targets for enrollment, allocation, and videoconferencing session completion rates were achieved, the results support the feasibility of a future definitive trial. Yet, attrition and loss to follow-up rates were higher than expected. Analysis of interview data will help to identify factors to focus on to enhance YACS's willingness to stay involved in a trial and complete follow-up assessments. Funding source: Canada Research Chair.

Physical activity and associations with reward responsiveness and internalizing symptoms of depression and anxiety in adolescence

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Adolescence is a sensitive developmental period marked by the onset of depression and anxiety. Research has shown that physical activity (PA) is an effective, low-cost strategy with mental health benefits; however, there is a poor understanding regarding whether PA affects both depression and anxiety and mechanisms whereby PA improves mental health. The primary aim of the present study was to assess associations between PA and symptoms of depression and anxiety and to identify whether they account for unique variance in PA. A secondary aim was to assess the role of an electroencephalographic index of reward responsiveness (i.e., Reward Positivity [RewP] event-related potential) in relations between PA, depression, and anxiety. We focused on the RewP given evidence that has linked variation in reward responsiveness to depression and anxiety in adolescence and the potential mood-enhancing benefits of PA. Adolescents ($N = 94$; ages 13-17) completed self-reports of depression, anxiety, and PA, and a monetary reward task to elicit the RewP. Results indicated that increased PA was related to reduced depression ($r = -.27$; $p = .009$), reduced anxiety ($r = -.19$; $p = .064$), and a larger RewP ($r = .21$; $p = .041$). In a multiple regression, depression ($\beta = -.31$; $p = .066$) accounted for more unique variance in PA compared to anxiety ($\beta = .06$; $p = .731$). An exploratory regression assessing the RewP as a moderator of the PA-depression relationship indicated associations between increased PA and reduced depression for those with intact reward responsiveness (M RewP: $b = -1.83$; $p = .017$; large RewP: $b = -3.05$; $p = .004$); there was no association among those with low reward responsiveness (small RewP; $p = .585$). These findings indicate unique associations between PA, depressive symptoms, and reward responsiveness in adolescence; notably, PA may prevent depression among those with intact reward responsiveness, but not for those with low reward responsiveness. More research is needed to better understand relationships between PA, depression, and reward responsiveness during adolescence.

Motivational interviewing and physical activity counseling during pregnancy: Can we manipulate communication styles?

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Proponents of motivational interviewing (MI) have advanced different communication styles – ‘guiding’ versus ‘directing’ – for health professionals to use during consults. Limited research has explored these MI-based communication styles with exercise professionals with very few studies evaluating the utility of vignette-based scripts as an experimental stimulus using either communication style. Using physical activity during pregnancy as context, the purpose of this study was to evaluate differences in characteristics of MI between two vignette-based scripts. Pregnancy was examined because reduced physical activity is evident during this period, which

prompted recommendations to consult with exercise professionals in Canada. Each vignette-based script described a hypothetical consult between an exercise professional with an inactive pregnant client. Using a post-test only randomized experimental design, pregnant individuals ($N = 167$) were randomly assigned to read one of two vignette-based scripts that depicted the exercise professional using either a 'directing' or 'guiding' style during the consult. After reading the vignette-based script, participants responded to six items designed to assess the following response variables: evocation, compassion, elicitation, acceptance, partnership, and information provision. Multivariate analyses of variance identified omnibus differences between groups (Pillai's trace = 0.51, $F = (6, 160) 27.99$, $p < .01$). Between-groups differences ($p < .05$) were evident for all response variables with lower scores consistently reported when the exercise professional exhibited a 'directing' versus 'guiding' communication style. Overall, these results indicate that vignette-based scripts can be used to experimentally manipulate differences in communication styles central to MI. These results also highlight that variability in communication styles displayed by exercise professionals may be detectable to individuals seeking advice to guide physical activity behavior during pregnancy. Funding source: Ontario Graduate Scholarship, Match of Minds, Brock University.

Exploring Twitter sentiment analysis as a tool for teams in performance crises: A pilot study

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The purpose of this contribution is to explore Twitter sentiment analysis as a tool to identify teams in performance crises. Observers' expectations of athletes, accompanied by emotional statements, may be reflected in tweets. This can influence athletes, as well as being indicative of the team's performance standard. Twitter sentiment analysis has been used in recent research regarding the COVID-19 crisis (Boon-Itt & Skunkan, 2020), other global crises (Kusen & Strembeck, 2020), and first sport scientific attempts (Wunderlich & Memmert, 2021). To explore reflections of teams not performing to an expected standard, we had a first look at tweets of matches of teams replacing their coach, as an indicator of unsatisfying performance. Thus, we describe tweets of three teams from the English Premier League on two occasions: the first lost game of a losing streak (t1) and the last game of the subsequently replaced coach (t2). We expected an increase of negative tweets from t1 to t2 and a decrease of positive tweets from t1 to t2. This resulted in the analysis of sentiment of $N=46,909$ tweets, scraped using the Twitter API from kick-off until three hours later. For Tottenham Hotspur (TOT), first descriptive results reveal a decrease in negative and positive tweets (negative: 21% to 13%; positive: 37% to 26%), and an increase in neutral tweets (42% to 61%). For Aston Villa (AVFC), negative tweets increased (22% to 28%) and positive tweets decreased (27% to 21%). For Manchester United (MUFC), negative tweets decreased (30% to 25%), positive tweets slightly increased (19% to 21%), and neutral tweets slightly increased (50% to 54%). The inconsistent results may suggest popularity and overall performance as covariates. MUFC yielded almost 38,334 tweets, suggesting greater popularity, and both MUFC and TOT ended up on the upper third at the end of the season. We conclude that sentiment analysis could be a useful tool when

analyzing outsider's perceptions of poorly performing teams. Further analyses should compare teams with similar expectations, and include more games.

A mental toughness intervention to mitigate stress in firefighters

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Firefighters operate in increasingly stressful and demanding environments (Evarts & Stein, 2017), leading them to experience increased stress and burnout (Makara-Studzińska et al., 2019). Research among sport and military populations indicate that mental toughness can mitigate the impact of stress-related burnout (Gerber et al., 2015) as well as increase performance (Fitzwater et al., 2018). However, neither the impact of mental toughness on stress and performance, nor the effectiveness of a mental toughness intervention, has been studied within a firefighting population. Drawing on the 4 C's model of mental toughness (Clough et al., 2002), the aim of this study was to examine the effectiveness of a three-week, six-session mental toughness intervention on stress perception, burnout, and organizational performance. A total of 29 firefighters from various fire departments in the Eastern United States were allocated to an intervention ($n = 15$) or a control ($n = 14$) group. Mental toughness, stress perception, burnout, and organizational performance were assessed before and after the intervention. Repeated measures ANOVA analyses revealed that, compared to the control group, the intervention group reported higher mental toughness ($p < .001$), lower burnout symptoms ($p = .002$) and perceived stress ($p < .001$), and better work performance ($p = .008$) at the end of the intervention. Correlational analyses yielded significant relationships between mental toughness and burnout ($r = -.573$). Post-intervention, mental toughness was significantly correlated with stress perception ($r = -.507$), and a marginally significant relationship emerged between mental toughness and work performance ($r = -.354$). Feedback from participants revealed that the challenge component of the four C's model (Clough et al., 2002) of mental toughness needs to be adapted when working with firefighters. This study suggests that a three-week, six-session mental toughness intervention can be effective at positively impacting burnout, stress perception, and organizational performance in a firefighter population.

Behavioural interventions involving physical activity show decreased pain and increased quality of life for individuals with neuropathic pain. A scoping review.

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Neuropathic pain (NP) is estimated to affect up to 10% of the general population and can reach as high as 47% prevalence among diabetics and 75% among individuals with a spinal cord injury (SCI). NP is often the result of nerve damage or a malfunctioning nervous system. Commonly described as a shooting, burning, or stabbing pain, it severely impacts mood, daily function, and

quality of life of those affected. Treatment options are limited and pharmaceuticals – typically the first line of treatment – often cause unbearable side-effects. Behavioural and movement therapies, such as mindfulness meditation, cognitive-based psychological interventions, and physical activity are alternative treatment strategies. The primary aim of this review was to identify studies that have tested behavioural therapies for treating NP (e.g., mindfulness, cognitive-based psychological interventions). A secondary focus was to identify characteristics of these interventions that included a physical activity component. Ten databases were searched, and 1,277 abstracts and 33 full texts were independently screened by two authors. Seventeen studies met the inclusion criteria, of which 15 included a physical activity component such as yoga, mindfulness walking, or stretching. The 15 studies included 675 participants with NP due to cancer treatment (45%), diabetes (36%), and SCI (18%). Notably, 93% of the fifteen studies showed improvement in pain and pain relief measures. Specifically, 67% indicated decreases in pain intensity or severity, 53% decreased interference or burden, 27% decreased neuropathic pain, 20% improved quality of life and 7% improved sleep. Despite heterogeneity in population, interventions, and study designs, there is evidence that interventions combining cognitive and physical therapies can decrease pain and suffering among individuals with NP. Further research is needed to determine which intervention components provide the greatest benefits. Funding source: Mitacs, Michael Smith Foundation for Health Research.

Treating yourself in a fairway: Examining the contribution of self-compassion and well-being on performance in a golf putting task

Melanie R. Burgess, Brock University; Diane E. Mack, Brock University; Philip M. Wilson, Brock University; Leah J. Ferguson, University of Saskatchewan

Researchers have advocated for greater insight into the relationship between self-compassion and well-being relative to performance. Grounded in this understanding, the purpose of this study was to examine the contribution of self-compassion and well-being on performance in a golf putting task in adult male golfers. Using a non-experimental research design, male golfers ($N = 87$, $M_{age} = 54.94$; $SD_{age} = 15.37$ years) completed the Self-Compassion Scale – Athlete Version and the Warwick Edinburgh Mental Well-Being Scale immediately prior to performance assessment via the golf putting task. The golf putting task consisted of 15 consecutive trials from a fixed distance (7 feet) on an outdoor putting green. The number of putts holed served as one indicator of performance and self-rated performance was measured using a single-item with a 5-point response scale. On average, participants holed 7.77 ($SD = 3.15$) putts. Self-rated performance was rated as neither good nor bad ($M = 2.56$; $SD = 1.00$). Simple linear regression analyses showed that self-compassion did not significantly predict putts holed ($\beta = -0.17$, 95% CI [-2.12, 0.23], $p = 0.11$; $f^2 = .03$) or self-rated performance ($\beta = -0.20$, 95% CI [-0.81, 0.02], $p = 0.06$; $f^2 = .04$). Simple linear regression analyses further indicated that well-being did not predict putts holed ($\beta = -0.01$, 95% CI [-1.38, 1.23], $p = 0.91$; $f^2 = .00$) or self-rated performance ($\beta = -0.16$, 95% CI [-0.79, 0.12], $p = 0.15$; $f^2 = .01$). Overall, data from this research offers evidence that psychological resources such as self-compassion and well-being do not forecast performance by adult male golfers in a putting task using either performance criteria. Greater

insight detailing for whom, when and/or how self-compassion and well-being impact sport performance warrants additional scrutiny. Funding source: Match of Minds, Brock University.

Canadian university coaches' mentorship experiences

Ethan Cardinal, Nipissing University; Rachel Van Woezik, Nipissing University; Colin McLaren, Cape Breton University; Mark Bruner, Nipissing University

Mentorship is integral for coach development in sport (Bailey et al., 2019). Despite a longstanding awareness about the importance of mentorship, coaches still report the need for more mentorship opportunities (Van Woezik et al., 2021), and research in the area is scarce (Koh et al., 2017). The purpose of this study was to explore Canadian university coaches' mentorship experiences. Participants included 10 Canadian university coaches ($M_{age} = 39.00$, $SD = 7.07$), who reported an average of 14.50 years of coaching experience ($SD = 12.02$) and coached a range of sports (basketball, rugby, ice hockey, soccer, cross-country running, and golf). Coaches were recruited based on previous experience as a mentor and/or mentee. Using thematic analysis (Braun et al., 2016), three overarching themes captured participants' mentorship experiences. The first theme was the transfer of knowledge between mentor and mentee. Coaches reported several types of learning that occur in mentorship including mentor-driven, role modelling, reciprocal learning, and learning by doing. Second, mentorship was influenced by structure. Coaches perceived that the behavioural expectations of mentorship were influenced by competition level, as this impacted how coaches interacted with and spoke about other teams. Further, when mentors were vulnerable (as opposed to those who assumed a position of power), open communication took place and learning was optimized. As the third and final theme, coaches indicated that external variables have the capacity to affect the quality of mentorship and the coaches' ability to pursue mentorship. Specifically, financial restraints, time, and location were identified as obstacles to successful mentorship. It should also be noted that resourcefulness in the face of these obstacles was also a key aspect of the theme. Collectively, the findings offer novel insight into positive and negative mentorship experiences of Canadian university coaches, producing important practical implications for sport organizations.

Investigating factors associated with suicide related behaviours among Canadian university student-athletes

Quinten Carfagnini, Brock University; Burgandy Thiessen, Brock University; Philip Sullivan, Brock University

Student-athletes are a unique sub-population of post-secondary students. They must balance the demands of being a university student with those of elite athletes. The governing bodies of collegiate sport in the United States and Canada have recognized that excessive stress of these dual roles has been linked to the mental health of student-athletes (Brown et al., 2014; USports Mental Health Best Practices, 2020). Suicide is the fourth most common cause of death among student-athletes (Rao et al., 2015). The most extensive study of this issue to date was Anchuri

et al.'s (2019) analysis of the American College Health Association's (ACHA) National College Health Assessment (NCHA) survey. Their analyses revealed that among NCAA students there were no significant differences between athletes and non-athletes on intentional self-harm, suicidal thoughts, and suicide attempts. The present study replicated Anchuri et al.'s (2019) analyses with the Canadian reference group of the NCHA. This database included 1924 student-athletes and 43110 non-athletes. Analyses showed that while Canadian student-athletes showed similar levels of self-harm than non-athletes, they were significantly more likely to contemplate (16.8% to 15.0%, $\Phi = 0.01$, $p < .01$) and attempt suicide (4.00% to 2.84%, $\Phi = 0.03$, $p < .001$) than non-athletes. Student-athletes were significantly less likely to seek help than their non-athlete peers overall (41.11% to 47.09%, respectively, $\Phi = -0.024$, $p < .001$). Alcohol misuse (OR = 1.44, 1.18) and sexual activity (OR = 0.83, 0.79) were significant predictors of suicide ideation and attempts among non-athletes but not student-athletes. Older student-athletes were more likely to attempt suicide (OR = 1.11) compared to non-athlete peers (OR = 0.96). Student-athletes that had an ethnicity of "White" were less likely to engage in any of the suicide related behaviours (OR = 0.52, 0.70, 0.53). These results suggest that there may be systemic factors influencing the mental health of Canadian student-athletes that may not affect Canadian non-athletes or American student-athletes. Funding source: Brock University.

The influence of active vs passive cycling on salivary hormones and tend-and-befriend stress response

Megan Carulla, Oakland University; Alissa Kizy, Oakland University; Sarah Battle, Oakland University; Kathryn Rougeau, Oakland University; Lisa L.M. Welling, Oakland University

Females show an increase in tend-and-befriend tendencies in response to stress, whereas males show an increase in fight-or-flight responses. Preliminary studies have shown increased heart rates (HR) and ratings of perceived exertion (RPE) following active cycling (AC), but not passive cycling (PC), suggesting one is subject to physical stress during AC, but not PC. As a result of the physical stress associated with AC, it was hypothesized that females would exhibit significantly higher tend and befriend tendencies following AC compared to PC. Further, males would show significantly higher fight or flight responses following AC compared to PC. Participants ($N = 34$, 12 male, $M_{\text{age}} = 21.21 \pm 2.97$ years) completed both a PC and AC 35-min bout. Each session consisted of identically paced warm-ups (2.5-min @ 35 r·min⁻¹), exercise bout (30-min @ 65 r·min⁻¹), and cool-down (2.5-min @ 35 r·min⁻¹) at a self-selected intensity of hard (15 RPE). Salivary cortisol and alpha-amylase were measured immediately prior, immediately following, and 30 minutes after each condition. Following each session, a modified tend-and-befriend scale was administered. Mixed-model ANOVAs revealed tend and flight responses were significantly higher after AC than after PC, whereas befriend and fight responses were significantly higher after PC than after AC. Salivary cortisol and alpha-amylase did not significantly vary between conditions. There was no significant difference in stress responses between conditions based on participant sex, likely due to the small sample size. The results suggest a tendency to invest in current relationships after active exercise versus a tendency to invest in new relationships after passive exercise. This study should be repeated with a larger sample size to better understand the relationship between gender and stress

response following active and passive exercise. Other measures of physical stress, such as testosterone, which may contribute to these differences should also be investigated in future work. Funding source: Oakland University.

The psychology of elite figure skating: A systematic review

Antonia Cattle, York University; Kathryn Robinson, York University; Michelle Long, York University; Hannah Robertson, York University; Anya Guinzbourg, York University; Joe Baker, York University

Amid the recent controversy surrounding the women's figure skating event at the 2022 Olympics in Beijing, the International Skating Union has raised concerns about skaters' physical, mental, and emotional wellbeing. In recent years, the technical demands have increased, with the emergence of the triple axel and quad in the women's event, and the expectation of five quads (a complex jumping maneuver) for the men's skating program. These changes have brought heightened demands in training and performance at competitions, and inevitably additional physical and psychological stress. This systematic review aimed to gain a more extensive understanding of the psychology of elite figure skating. Following PRISMA protocols, six terms were used to search key databases (Web of Science, SPORTDiscus, Scopus, and PubMed), yielding 1589 articles. Articles were considered eligible if they (a) focused on one or more of the four main disciplines (male/female singles, ice dance, and pairs), (b) were available in full text article form, (c) written in English and (d) examined an athlete's psychology (including "mental wellbeing" and "mental health"). A total of 70 articles met this final inclusion criteria with 57.2% focused on "psychological skills" (e.g., mental preparation and skills, visualization, self-talk, etc.), 32.8% of the articles focused on mental health (e.g., eating disorders, anxiety, perfectionism) and 10% focused on "other" (e.g., family support, figure skating culture and relative age effect). A total of 25.7% of the articles focused on eating disorders and body image. This higher concentration of articles on specific topics suggests these are significant issues in the sport. As the technical, physical, and psychological demands of this sport evolve over time, researchers will need to keep pace with current demands, so coaches and support staff are able to adapt training to develop appropriate skills and supports to ensure psychological wellbeing and mental health.

Analyzing the mental health of canadian university student-athletes through the lens of the dual continuum model

Joshua Celebre, Brock University; Philip Sullivan, Brock University

Keyes (2002) developed the dual continuum model (DCM) to assess an individual's mental health by analyzing mental health functioning and mental illness status (i.e., diagnosed mental illness). Mental health functioning is quantified using the Mental Health Functioning Short Form (MHF-SF), and categorizes the individuals' mental health functioning as languishing, moderate, or flourishing. In the student population, results show that students are more likely to be languishing when greater amounts of depressive symptoms are present (Low, 2011), and Van

Slingerland et al. (2018) found that student-athletes' mental health functioning over time was not affected by gender and those without diagnosed mental illness were more than three times more likely to be flourishing. Data for this project was derived from the American College Health Association's Canadian reference group of their national college health assessment, which consists of 1,568 student-athletes. The variables used in this project were biological sex, varsity status, mental illness status, and the MHF-SF. The MHF-SF assesses emotional wellbeing (EWB), social wellbeing (SWB), and psychological wellbeing (PWB). Rather than utilizing categorical data, EWB, SWB, and PWB continuous scores were examined. Participants also reported if they had been diagnosed with a mental illness (e.g., depression, anxiety, bipolar disorder) in the past 12 months. A MANOVA examined the effects of sex and diagnosis of mental illness on the outcomes of EWB, SWB, and PWB. There were significant main effects for sex ($F(3, 1790) = 3.793, p = .010$) and mental illness status ($F(3, 1790) = 23.084, p < .001$). There was no significant interaction between sex and mental illness. Male student-athletes had significantly higher PWB than female student-athletes. Student-athletes diagnosed with mental illness scored significantly lower on EWB, SWB, and PWB. Student-athletes' mental health seems to be influenced by mental illness diagnosis, which is consistent in the literature. Contrarily, there was difference in both males and females.

Examining factors associated with undergoing bariatric surgery

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Bariatric surgery is a safe, effective way to treat obesity because it facilitates weight loss. However, factors that predict the likelihood of people choosing to undergo bariatric surgery are unknown. The objective of this study was to describe factors associated with individuals with obesity undergoing bariatric surgery. Participants were recruited via a survey link posted on the Obesity Action Coalition website. Demographic data, medical data, weight loss program data, and reports of personal experiences were gathered. A multivariate logistic regression model was conducted to examine predictors associated with bariatric surgery ($N = 4,192$). Participants with type 2 diabetes (OR = 1.795, 95% CI [1.456, 2.213]), high cholesterol (OR = 1.297, 95% CI [1.116, 1.507]), post-traumatic stress disorder (PTSD; OR = 1.779, 95% CI [1.345, 2.354]), and COVID-19 (OR = 4.989, 95% CI [2.903, 8.575]) had a higher likelihood of undergoing bariatric surgery. Those who used MyFitnessPal (OR = 2.415, 95% CI [1.972, 2.957]), Noom (OR = 1.536, 95% CI [1.248, 1.891]), Jenny Craig (OR = 1.753, 95% CI [1.416, 2.169]), or Keto (OR = 1.696, 95% CI [1.201, 2.395]) for weight loss had a higher likelihood of obtaining bariatric surgery while fasting or calorie restriction (OR = 0.840, 95% CI [0.729, 0.967]) was associated with a lower likelihood of receiving surgery. Personal experiences were also associated with whether participants underwent surgery: sexual abuse (OR = 2.133, 95% CI [1.648, 2.761]) and physical abuse (OR = 1.699, 95% CI [1.459, 1.978]). A variety of characteristics were associated with decisions to undergo bariatric surgery. These findings help to determine ways to support individuals who are considering bariatric surgery by providing patient education related to particular topics. More work is needed to explore the link between contributing factors and decisions to undergo bariatric surgery.

Martial arts, combat sports, and mental health in adults: A systematic literature review

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Often described in controversial terms, martial arts (MA) and combat sports (CS) are physical activities that may improve physical, psychological, and social health outcomes. A systematic literature review was conducted to assess the relationship between MA/CS training and mental health of adult practitioners (≥ 18 years), searching on CochraneLibrary, EBSCOhost, Web of Science, and Scopus databases. Inclusion criteria encompassed research published up to September 2022 that considered the measures of self-related constructs, emotion and well-being, cognition, and brain structure/function in adult MA/CS practitioners. Through an adapted version of the Cochrane Collaboration's tool, the retrieved seventy cross-sectional and two longitudinal studies were assessed for risk of bias. While links between MA/CS practice and self-related constructs were found negligible, associations with externalizing and internalizing emotion regulation resulted limited. In MA/CS participants, few significant links were revealed for anxiety and disordered eating, whereas some relationships were noted for emotional resources and skills, with some significant trends for high coping task. Inconsistent associations with emotional intelligence emerged. Consistent evidence was revealed for the relationship between MA/CS practice and cognitive outcomes with respect to perceptual and inhibition benefits, but inconsistencies for attention and memory. Conversely, inconclusive evidence for changes of brain structure integrity appeared mostly from studies on boxing. Regarding potential moderators, sex, activity exposure, expertise, type of MA/CS, length of training, and level of competitive engagement showed mixed results. Applying rigorous methodologies and novel techniques (e.g., functional imaging), future studies could shed light onto mechanisms of association between MA/CS exposure and outcomes. As a growing research area, MA/CS studies need extensive improvement both in theoretical and practical prospects.

Transitioning out of elite sport: The central role of groups in support experiences

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Transitioning out of elite sport can be a distressing experience for athletes with the loss of athletic identity highlighted as a significant issue. The purpose of this research was to explore athletes' experiences of identity change and loss when transitioning out of sport. Interpretative phenomenological analysis was used to explore the meanings athletes attributed to their experiences and how they related these experiences to their personal and social world. Participants were seven (5 male, 2 female) former elite athletes aged between 26 and 40 years ($M_{\text{age}} = 34 \pm 4.96$ years) from the UK. Participants had transitioned out of their sport

performance careers between nine months to 11 years ago ($M = 5.25 \pm 3.85$ years). Sports represented were badminton, basketball, football/soccer, and rugby. Data were generated through semi-structured interviews, and analysis incorporated reflexivity and an independent audit trail. Two major themes were described by participants: (1) continuity throughout transition and (2) changes that accompanied transition. Athletes spoke about maintaining their athletic identity, investing in similar values, and staying connected to sport and social groups throughout their transition. Additionally, leaving sport impacted athletes' social relationships in and out of sport, while also introducing opportunities for support. The results illustrate that the psychology of transitioning out of elite sport is less that of an elite athlete as an individual but more that of an elite athlete as a group member. Group membership structured support experiences such that those athletes who described identity continuity (i.e., maintaining athlete/sport identities) and/or identity gains (i.e., acquiring new group memberships) also described more favourable support experiences and positive transitions out of elite sport. The results have implications for providing athletes with opportunities to maintain existing athlete group memberships and to acquire new group memberships during transitions.

A battle of wills: The complexities of role communication in youth sport

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Roles are structural elements of a team that are critical for collective functioning. Most of what is understood about role transmission is derived from research on adult populations and with a focus on coach-athlete interactions. Recently, it has been suggested that parents impact the group dynamics of youth sport teams, and that there is a need to consider parents specifically in the role communication process in the youth sport context. Given the importance of roles for group success and individual sport experiences (e.g., satisfaction, burnout), this study aimed to (a) gain a deeper understanding of role communication in youth sport and (b) explore the influence of parents on athlete role clarity and role conflict. At two time points during the season, athletes ($n = 65$, $M_{\text{age}} = 13.7$) from 7 teams completed the Role Ambiguity Scale-Brief, and the Role Conflict Scale. At the same timepoints, parents ($n = 50$, $M_{\text{age}} = 46.4$) and coaches ($n = 7$, $M_{\text{age}} = 37.7$) of the athletes completed surveys with questions related to elements of role communication (e.g., role expectations, communication strategies, perceived agreement with other social agents). A descriptive analysis indicates that role transmission happens similarly between adult and youth populations, with the exception that parents act as very prominent and regular role senders. For objective 2, bivariate correlations reveal that when athletes perceive conflicting role information from parents and coaches (i.e., high inter-sender role conflict), they also experience other forms of role-related conflict (i.e., person-role conflict, $r = .61$, $p < .001$; intra-sender role conflict, $r = .52$, $p < .001$; coach-teammate inter-sender role conflict, $r = .66$, $p < .001$; inter-teammate conflict, $r = .64$, $p < .001$). This study reinforces the influence of parents on an important structural element of group dynamics in youth sport. Furthermore, there is a need to consider team strategies that help to keep communication of role responsibilities consistent among coaches, parents, and teammates. Funding source: Social Sciences and Humanities Research Council of Canada.

University culture differentiates body image and social physique anxiety among female athletes

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Body image (BI) dissatisfaction is lower among African American female athletes, perhaps because of cultural influences unique to American historically black colleges (HBCUs). HBCUs provide a nurturing environment enabling athletes to explore their collective identities and cultures. To unpack the underlying mechanisms of cultural variations in BI variables, this study addressed academic institution, race, sport type (i.e., aesthetic, non-aesthetic, team, individual), clothing related BI (i.e., daily clothing [DC], practice [PU] and competition uniform [CU]), social agent-specific meta-perceptions (i.e., MP-peers, -parents, -coach), and anthropometric associations with BI and social physique anxiety (SPA) among 123 female athletes attending HBCUs ($n = 49$) and non-HBCUs ($n = 74$). Athletes electronically completed the SPA scale; perceived and ideal BIs and MPs; and self-reported height, weight, and recalled age when noticing MPs. Significant race differences indicated highest SPA among mixed race non-African American than White international athletes. No significant differences by sport type were evident. Correlations indicated bigger athletes who were younger when noticing MP, and those with higher BI in all clothing types reported higher SPA. After controlling for race and BMI, HBCU athletes were older at MP awareness and reported lower DC BI, CU BI, and SPA than non-HBCU athletes. Regardless of sport type, race, and physical size, there were cultural differences in SPA, clothing-based, but not MP BIs among female athletes. Further research is needed to pinpoint protective mechanisms of BI and SPA associated with the culture occurring within, and but also outside collegiate sports, and those occurring before college.

Exploring the experiences and desired forms of support for individuals who are professional female hockey players and full-time employees

Christiana Colizza, McGill University; Gordon Bloom, McGill University

Empirical evidence has shown that if dual-career athletes cannot attain a balanced lifestyle, they are prone to challenges that predispose them to burnout, psychological distress, or injuries. Although women's sports are expanding, most professional female hockey players in North America must also work at another job full-time. Thus, this study aimed to explore how professional female hockey players balanced their sport and non-sport careers. Individual semi-structured interviews were conducted with ten professional female hockey players who each had a full-time job. Interviews were transcribed verbatim and were analyzed using thematic analysis. The results revealed strategies and behaviours utilized by the athletes, their coaches, and their work bosses to help them successfully balance their dual careers. Athletes stressed that clear communication and flexibility from their supporters were critical factors contributing to a positive experience as a professional hockey player with a full-time job. More specifically, athletes explained the importance of being transparent about their compact schedules with

their employers and coaches. However, athletes noted that if a conflict arose between both careers, their work obligations often took precedence, forcing them to miss team workouts or practices. Moreover, the athletes explained that they regularly sacrificed time with friends and family to ensure adequate sleep and recovery from their chaotic schedules. The athletes divulged feeling guilty about missing team functions and spending limited time with their loved ones. As a result, the athletes emphasized the importance of prioritizing their mental and physical well-being by occasionally taking a mental health day from work or taking a day off from both careers to focus on self-care. These results highlight strategies to improve elite dual career athletes' well-being and satisfaction. These results add to the small body of dual-career knowledge in professional female sports.

Effects of imagery techniques on emotional regulation of elite athletes in Oyo State, Nigeria

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Athletes are in constant training and regimes that allow them to gain superior performance. One aspect of training that has garnered much attention for athletes is in the field of mental practice. This study investigated the effect of imagery techniques on emotional regulation with elite athletes from Oyo State, Nigeria. The study used a pre-test-post-test experimental control group design (2 x 2 x 2 factorial matrix) with 133 athletes (99 males and 24 females) from 87 team sports and 36 individual sports. The Standardized Imagery Technique was used for the treatment which consisted of 48 sessions of 60 minutes for a period of 8 weeks. Athletes exposed to imagery technique performed better than the control with male athletes ($M = 123.89$) having better emotional regulation compared to females ($M = 115.83$). While the interaction effect of treatment and type of sport was not significant, the 2-way interaction effect of gender and type of sport (individual sport males [$M = 114.23$] versus females [$M = 101.47$]; team sport males [$M = 112.34$] versus females [$M = 109.43$]) was significant ($F(1,106) = 3.936$, $h^2 = .36$). Imagery technique proved to be the effective for emotion regulation of elite athletes in Oyo State, Nigeria. Gender and type of sport had moderating effect on emotion regulation of elite athletes. Elite female sports participants as well as individual sports participation should be given more attention with regards to mental skill trainings that may enhance positive emotion regulation for the attainment of optimum performance in their sporting careers.

When the gritting gets tough: Examining the predictive utility of grit in sport

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The ability to overcome setbacks and sustain one's pursuit of long-term goals is essential for athlete success. Grit (i.e., passion and perseverance over long terms) has been associated with success in many domains, including sport. However, the measurement and conceptualization of

grit has been critiqued. Some experts have suggested that grit is an example of a jangle fallacy (i.e., when a construct contributes limited discriminant validity beyond pre-existing psychological concepts) and is not empirically distinct from other psychological determinants of success. The purpose of our study was to examine if sport-specific grit was distinct from conscientiousness, mental toughness, and self-control (i.e., C, MT, and SC) and to assess which of these predictors contributed the most variance to athlete performance and well-being. We analysed data from 214 varsity student-athletes (111 women, 103 men; M age = 21.02 years, SD = 2.26), and performed three hierarchical multiple regression analyses to predict athlete performance (dependent variables (DVs) = goal achievement perceptions, highest level of competition, and holistic sport performance perceptions) and three to predict athlete well-being (DVs = mood, eudaimonic well-being, and satisfaction with sport). When predicting performance, grit explained an additional 11% of variance beyond C, MT, and SC in holistic sport performance perceptions (all $ps < .01$), but did not add unique variance when predicting goal achievement perceptions or highest level of competition. When predicting well-being, grit added 18% of unique variance beyond C, MT, and SC in eudaimonic well-being and 5% in satisfaction with sport, but did not add unique variance to the model predicting athlete mood. The partial support of grit's predictive utility of important sport outcomes provides some evidence of its distinctiveness from other popular determinants of success, but more work needs to be done to address the construct's other shortcomings. Funding source: Social Sciences and Humanities Research Council of Canada.

The Goldilocks principle: Does self-compassion impact athlete well-being and performance beyond traditional psychological determinants of success?

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Athletes are often encouraged to embody traditional psychological determinants of success such as grit, mental toughness, self-control, and conscientiousness, but some evidence suggests that an excess of these dispositions may have negative impacts on well-being. Self-compassion—treating oneself with kindness and understanding during setbacks—has been linked to several positive outcomes in sport including mental health, happiness, and purpose in life; but its relationship with sport performance is uncertain. The purpose of this study was to determine whether self-compassion contributed unique variance to models predicting athlete well-being and perceptions of performance beyond that added by traditional psychological determinants of success. We analysed data from 214 Western Canadian collegiate student-athletes (111 women, 103 men; M age = 21.02 years, SD = 2.26). Two hierarchical regressions predicting well-being and performance perceptions were performed: athlete gender was entered as step one; grit, mental toughness, self-control, and conscientiousness in step two; and self-compassion in step three. Self-compassion was positively correlated with both well-being ($r = .40$, all $ps < .05$) and performance perceptions ($r = .22$); as well as grit, mental toughness, self-control, and conscientiousness ($rs = .21 - .61$). Self-compassion added 2% of unique variance beyond traditional psychological determinants of success in sport in the model

predicting well-being ($b = .18$), but did not contribute significantly to the model predicting perceptions of performance. These findings suggest that self-compassion may play a role in well-being beyond psychological constructs typically associated with success in sport, but does not provide much evidence to suggest it contributes to athlete performance perceptions. Nevertheless, self-compassion does not seem to hinder sport performance and should be considered as an important tool when athlete well-being is a priority. Funding source: Social Sciences and Humanities Research Council of Canada.

Sport as a pathway to positive youth development: A multidimensional latent class analysis of youth sport participation

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A substantial body of literature supports the benefits of youth sport involvement across all developmental domains (physical, social, emotional, and behavioral). Although, a competing body of literature suggests that youth sport may be linked to some negative adjustment outcomes including substance use and aggression. While there are many possible explanations for these discrepant findings, researchers commonly suggest that a primary issue is the binary measurement of sport participation. This mainstream measurement practice causes significant loss of information, particularly given the vast heterogeneity of factors that affect experience and participation including the characteristics of individual participants, the social influences of their parents and peers, and their experiences within the sport setting. This study utilizes latent class analysis (LCA), a multidimensional assessment of sport participation, using person-centered analyses to explore how characteristics of sport participation cluster together in classes for subsets of the population. To characterize variability in participation and experience in youth sport a series of items were used to assess multiple facets of sport participation: (1) setting, (2) involvement, (3) motivation, (4) and relationships. After careful evaluation of multiple fit indices and consideration of theoretical interpretability, a three-class model was selected as the best-fitting model. The classes were labeled *casual participation*, *competitive participation*, and *motivated-competitive participation* after reviewing and comparing the probability estimates of sport participation indicators across classes. Sport participation characteristics including sport setting and involvement were found to predict class membership, while demographic predictors did not. Given the global popularity and natural organized structure of youth sport, this study has important implications for changing the way researchers conceptualize the link between sport and youth development.

Understanding the challenges of COVID-19 on social and physical activities: Perspectives of older adults and fitness professionals

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Group physical activity programs are important opportunities to be both physically and socially active for many older adults, as they are at greater risk of social isolation and physical inactivity. COVID-19 aggravated these risks due to physical distancing and recreational program closures. The purpose of this project was to examine older adults' (> 65 years old) and fitness professionals' perspectives on their experiences with participating in and providing physical activity and social programs during COVID-19. Guided by interpretive description methodology, older adults ($n = 20$) and fitness professionals ($n = 10$) were interviewed about their experiences with and perceived challenges of participating in and providing programs. Four themes were identified: (a) the need to follow public health restrictions caused frustration and confusion for some, (b) tensions between efforts to enable returning to programs and discomfort with social spaces, (c) challenges providing program options while addressing needs and barriers of older adults, and (d) differing opinions about how public health measures affected programs. Facilities had to follow quickly changing public health guidelines, and some older adults were frustrated with the changes and lack of access. Organizations providing programs wanted older adults to return when restrictions lifted, but it was challenging to help older adults feel safe and comfortable being together in person again. Organizations faced challenges to providing programs (e.g., staff shortages, need for larger spaces) and some participants felt older adults were lower priority. Opinions also differed on whether some changes that occurred in response to public health measures (e.g., reserving spaces in classes) benefitted or hindered participation. These findings identify current issues that could benefit from future research resulting from the COVID-19 pandemic and can inform program design for older adults. Funding source: Social Sciences and Humanities Research Council of Canada.

Do profiles of attention use predict trait and state flow experiences during endurance running? A compositional data analysis

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Runners often experience flow, an optimal psychological state characterized by feelings of absorption and a sense that everything is clicking into place automatically. Flow is associated with many desirable outcomes for runners, including enhanced motivation and performance. Both qualitative research and conceptual models suggest that the likelihood of experiencing flow is related to attention use. Attending to some types of stimuli and information appears to facilitate flow, whereas other objects of attention may impair flow occurrence. Given that endurance events are temporally finite, spending more time engaged in one type of attentional focus can only occur via a proportionate reduction in time attending to other domains. The current study used a compositional data analysis (CoDA) approach to examine whether the composition of runners' attentional focus could predict the experience of flow in endurance runners. Runners ($n = 139$, 64% female) were recruited for an initial online survey, with those who identified an upcoming running event ($n = 58$, 64% female) completing a follow-up post-event survey. Participants were asked to rate the percentage of time spent in five mutually exclusive attentional focus domains, as well as their flow experiences, during typical runs (trait flow) and during the identified running event (state flow). During typical runs, the composition

of runners' attention did not significantly predict trait flow occurrence, although it approached significance ($p = 0.05$). Exploratory CoDA analyses identified that increasing proportion of time spent in internal sensory monitoring, at the expense of other attention domains, predicted greater trait flow ($p = 0.02$). In contrast, increasing proportion of time spent in active distraction predicted reduced trait flow ($p = 0.02$). At follow-up, the composition of runners' attention did not predict state flow ($p = 0.92$). Results suggest that increasing one's focus on internal sensory monitoring may be beneficial, whereas greater focus on actively distracting oneself is detrimental for trait flow.

He shoots he misses: Talent identification and development in modern North American hockey goaltending

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Accurately evaluating and selecting amateur talent remains a significant challenge in sport. Multiple draft processes in North America exist in ice hockey, including: the Canadian Hockey League (CHL) drafts which consists of the Western Hockey League (WHL), the Quebec Major Junior Hockey League (QMJHL), and the Ontario Hockey League (OHL); as well as the National Hockey League (NHL) draft. Limited work exists examining the draft process and development of North American goaltending from the CHL draft to the NHL draft. The purpose of this study was to explore the relationship between the goaltenders selected in their respective CHL drafts, and their development and selection at the NHL level. All goaltenders selected in their respective CHL draft between 2006-2015 (OHL, QMJHL) and 2005-2014 (WHL) were included ($n = 792$). Descriptive statistics were used to examine differences between goaltenders selected by round. Exploratory linear and generalized linear models were used to examine the relationship between CHL statistics, NHL draft status, and NHL games played. Seven hundred and ninety-two goalies were drafted into their respective CHL draft, and 425 goalies (53.66%) played at least one CHL game in that league. Of goalies selected, the league median games played were 12, 3, and 0 in the WHL, QMJHL, and OHL respectively. Eighty-eight (11.11%) goalies were drafted in both the CHL and NHL; however, only 43 (5.43%) played both a game in the CHL and the NHL at the time of data collection. Statistically non-significant relationships existed between NHL games played and CHL draft round ($p = 0.23$, $p = 0.51$, $p = .94$), and CHL games played ($p = .23$, $p = .40$, $p = .88$) in the WHL, QMJHL, and OHL respectively. For goaltenders drafted into the OHL, no relationship existed between OHL save percentage ($p = 0.51$), OHL goals against average ($p = 0.94$), or OHL wins ($p = 0.62$) and NHL games played. It is currently unclear whether the CHL serves as a consistent developmental pathway for goaltenders seeking to play in the NHL.

Keeping sport safe: Using communities of practice to mobilise e-learning module content

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Safer sport environments are a global concern and many countries such as Canada have committed to improving sport safety (e.g., UCCMS). As a result, training and development opportunities have been created for and with coaches. Yet, most coaches still feel that they do not have all the tools to address sport safety concerns in their practice and have identified a need for sharing real life stories and experiences with others to enhance understanding and effect change. Coaches want to play an active role in improving the sport system (CAC, 2021). Researchers (Kraft et al., 2021; Duarte et al., 2021) have had success utilizing social learning theory (SLT) in the context of coach development specifically using communities of practice (CoPs; Wenger, 1998). Accordingly, professional coaches were invited by the Coaching Association of Canada (CAC) to participate in two pilot CoPs to pursue in-depth application of (1) anti-racism in coaching (ARiC, $n = 19$), and sport safety (SS, $n = 17$) over a six-month period, after the completion of relevant National Coaching Certification modules. The monthly CoPs supported the coaches' collective learning, allowing them to connect on issues and passions related to the module content and to grow and improve their practices using the safe sport training theory model of awareness, acknowledge, and action; and an online collaboration tool (Mural). Wenger-Trayner & Wenger-Trayner's (2020) value creation framework (VCF) was used to shape and assess the learning that occurred during and in-between the online meetings. The learning activities (group discussions, presentations, and reflections) were driven by the coaches' needs and resulted in enhanced awareness and acknowledgement of biases and power dynamics, shared and co-created practices. Coaches' learning as a result of the pilot program will be illustrated by value creation stories (e.g., athlete-centredness, vulnerability, and the coach's many roles). The findings and recommendations from these pilots support the use of CoPs to facilitate coaches' application of online module content. Funding source: Coaching Association of Canada.

A prospective exploration of diet, exercise, and self-compassion in retiring athletes.

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Athletic retirement is a significant life transition with potentially deleterious effects on former athletes' social, mental, and physical health. Individuals with high athletic identification are particularly susceptible to retirement consequences, including unhealthy eating and exercise behaviors. Additionally, they are less likely to partake in pre-retirement planning, which has been recognized as the most effective coping strategy for transition out of sport. Self-compassion has been empirically associated with positive identity adaptations and healthier eating and exercise behaviors, and may be an insightful lens through which to explore how athletes view their impending retirement. This prospective study explores how student-athletes approach retirement, specifically their consideration of future diet and exercise routines post-sport, and what role self-compassion might play in this process. Eight varsity student-athletes of high athletic identification completed one semi-structured, individual interview within one month prior to the end of their collegiate athletic careers. Interview questions pertained to athletes' diet, exercise, and self-compassion practices, and were developed from Taylor and Olgivie's (1994) model of athletic retirement and Neff's (2003) Self-Compassion Scale. Interpretative phenomenological analysis identified athletes were aware of, and slightly

apprehensive towards retirement, and trying to enjoy their sports participation while it lasted. They had mixed self-compassion tendencies and practices, and some indications of maladaptive diet and exercise habits or mindsets. This study is part of a larger longitudinal study considering how eating, exercise, and self-compassion behaviors may change throughout athletic retirement. This study will supplement scarce prospective research into athletic retirement, pioneer self-compassion in athletic retirement literature, and provide a baseline through which to explore eating, exercise, and self-compassion behaviors of retiring student-athletes throughout the challenging transition out of sport. Funding source: Social Sciences and Humanities Research Council of Canada.

A knowledge translation tool? Exploring the effectiveness of an infographic to disseminate information on psychological skills training

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Researchers have noted the importance of disseminating research-based recommendations to athletes and coaches (Ely et al., 2020; Gould, 2016). Oftentimes, researchers develop a knowledge translation (KT) tool to package such recommendations in a concise and organized manner (e.g., infographic). While development and dissemination of these tools are important steps in the KT process, evaluating the effectiveness of such tools is also critical to facilitating KT (Graham et al., 2006). Thus, the purpose of the present study was to evaluate the effectiveness of an infographic designed to disseminate information on psychological skills training (PST) to athletes and coaches. This infographic overviewed the order in which psychological skills are delivered within a packaged PST program, with basic skills (e.g., imagery) delivered before advanced skills (e.g., emotional control). Participants ($N = 167$; $n = 122$ athletes, $n = 45$ coaches) completed an online survey that contained the infographic and subsequently evaluated participants' understanding of the content on, and satisfaction with, the infographic. Further, a subset of participants ($n = 17$) completed a second survey one-month later to evaluate their recall of information from the infographic. Responses were provided on a 5-point Likert scale, with the following data reporting responses greater than neutral (combined scores of somewhat likely [4] and extremely likely [5]). Results from survey one indicated that 71.7% of participants were generally confident in their knowledge to implement the information ($M = 3.94$, $SD = .90$), 74.5% were satisfied with the visual content of the infographic ($M = 3.94$, $SD = .83$), and 75.9% understood the content presented ($M = 4.05$, $SD = .79$). A Friedman's test on survey two data determined significant differences between the participants' recalled sequence of basic and advanced skills ($\chi^2(5) = 25.703$, $W = .395$, $p = .001$). These findings provide preliminary support for the use of infographics as a KT tool, however, further evaluation on participant recall should be conducted.

Reappraisal as pertaining to the sport setting: A scoping review.

Jake DeAngelo, Florida State University

The purpose and benefits of scoping reviews are to bring conceptual clarity to a topic, synthesize emerging literature, and identify field specific research. The guiding research question for this scoping review is: What current research is available regarding reappraisal in the sport setting? Studies relevant for this scoping review were identified in an initial Web of Science online database search in August of 2021 and a subsequent follow-up search in January 2022. Guided by Arksey and O'Malley's (2005) framework for scoping reviews, 17 peer-reviewed articles were identified meeting criteria of "arousal" and "sport" in all search fields. These findings were compiled into three basic sections: (a) the frequency of use of reappraisal among athletes, (b) reappraisal as a mediating factor, and (c) reappraisal as an intervention. The conclusions from this scoping review discuss reappraisal in the sport setting as an identified intervention for arousal and emotional regulation with means of teaching and understanding mechanisms behind the coping strategy. Recommendations are presented for directions of future research surrounding reappraisal and growth of the intervention within the field.

Psychosocial and physical functioning of currently and prospectively transitioning collegiate athletes

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Program exit surveys are a distinct opportunity to gather actionable data on the health and well-being of collegiate athletes transitioning out of sport. Specifically, this critical time point facilitates assessment of athletes' psychosocial and physical functioning as they prepare to transition from sport. The study purpose was to examine the psychosocial and physical functioning of currently and prospectively (i.e., currently participating) transitioning collegiate athletes using publicly available and validated psychometric measures. It was hypothesized that measures of emotional support, depression, and anxiety as well as physical functioning would (a) describe the athlete populations as similar to non-athlete, age-related norms but with (b) lower scores driven by injury history and transition status. Participants were current and former American Division I collegiate athletes ($N = 115$) from 20 universities. Participants self-reported measures of emotional support, depression, anxiety, and physical functioning characteristics (PROMIS subscales) and demographics including sport-related injury histories and current transition status (i.e., currently transitioning [$n = 47$] versus prospectively transitioning [$n = 68$]). Following data screening, participant response scores were transformed for comparisons with general U.S. population norms ($M = 50$, $SD = 10$ for PROMIS subscales). All measures exhibited good internal consistency (Cronbach's $\alpha = 0.88-0.95$). Supporting study hypotheses, current emotional support (average t -score = 55.9; $SD = 7.9$), anxiety (average t -score = 54.3; $SD = 8.9$), depression (average t -score = 47.9; $SD = 8.2$), and physical functioning (average t -score = 53.5; $SD = 6.5$) scores among respondents were comparable to population expectations but scores varied by injury characteristics and transition status. Findings underscore the value of data-driven approaches to informing former athlete intervention efforts (e.g., required exit interviews). Athlete transition status also merits continued examination in lifespan collegiate

athlete health and well-being research and practice efforts. Funding source: Atlantic Coast Conference-Center for Research in Intercollegiate Athletics.

Physical activity intervention effects: The role of social inclusion in the relationship between change in physical activity and depression symptoms

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To optimize the effectiveness of mental health interventions on post-secondary campuses, there is a need to examine whether intervention effects differ among student population groups and to understand mechanisms of change. Regarding physical activity (PA) interventions, processes of social inclusion may facilitate mental health improvements and international students are a diverse and increasing student group who may have unique intervention and mental health needs. The current single group pre-test-post-test study examined: (a) differences in intervention effects based on student status (i.e., international/domestic student) in changes in social inclusion, depression symptoms, and PA engagement; and (b) the mediating role of social inclusion in the relationship between change in PA engagement and change in depression symptoms, while controlling for student status. Students ($N = 64$; $M_{\text{age}} = 24.73$ (5.62); 72% domestic) completed self-report questionnaires and engaged in a 6-week tailored PA program for mental health. Based on findings from a repeated measures ANOVA, there were significant reductions in depression symptoms ($p < .001$, $\eta_p^2 = .35$) and improvements in social inclusion ($p < .001$, $\eta_p^2 = .94$) and PA engagement ($p < .001$, $\eta_p^2 = .36$). Intervention effects did not differ for depression symptoms ($p = .39$, $\eta_p^2 = .01$), social inclusion ($p = .46$, $\eta_p^2 = .009$), and PA engagement ($p = .07$, $\eta_p^2 = .05$) based on student status. The mediation model explained 55% of the variance in change in depression symptoms. The total effect of change in PA engagement on change in depression symptoms was significant ($b = -.0096$, $SE = .0031$, $p < .05$, 95% CI $[-.02, -.004]$). The indirect effect through social inclusion ($b = -.005$, $SE = .002$, 95% CI $[-.008, -.005]$) accounted for 49% of the total effect. Results support the effectiveness of the PA and social inclusion intervention for student mental health regardless of student status. Strategies to facilitate students' social inclusion may be important for optimizing the effectiveness of PA interventions for student mental health.

Fostering athlete performance with pressure: Exploring successful elite sport coaches' behaviours

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Coaches are central actors within the coach-athlete-performance relationship, particularly in elite-level sporting competition. However, little is known about specific coaching behaviours in the daily training environment and in elite-level competition that can foster or hinder an athlete's abilities to perform with pressure. Notably, need-supportive coaching behaviours have

been identified in previous research as an effective approach to facilitate elite athletes' abilities to perform in competition. The purpose of this study was to qualitatively explore perceptions of coaching behaviours that can foster or hinder elite athletes' abilities to perform with pressure. Twelve highly successful coaches ($M_{\text{age}} = 62.5$, $SD = 8.63$) from various elite sporting contexts were interviewed for the study. These coaches were highly successful, such as coaching multiple podium achievements at the Olympic or Paralympic games, or sustained championship title success in professional league competitions. Eight athletes ($M_{\text{age}} = 39.9$, $SD = 7.12$) who were coached by the participant coaches were also interviewed for the study. Data were collected through semi-structured interviews and analysed via abductive reflexive thematic analysis. Data were organised into two higher order themes: (1) the importance of coaches' understanding and fulfilling of athletes' needs, and (2) coaches performing optimally as individuals. Specifically, theme one included aspects such as having a strong coach-athlete interpersonal relationship, building athletes' confidence in elite level contexts, and presenting as a calm and composed leader. Theme two included aspects such as coach self-awareness, coaches utilising self-care and support, and coaches performing with stress and pressure. These findings provide unique insight into highly successful coaching behaviours that were perceived to foster athlete's abilities to perform with pressure in competition. It is further expected this research will assist future research in elite-level coaching and encourage exploration of need-supportive coaching.

The influence of Apolipoprotein E $\epsilon 4$ carrier status on the association between aerobic fitness and mnemonic discrimination in middle-aged adults

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The hippocampus experiences early pathological changes related to Alzheimer's disease (AD), disrupting its ability to form distinct memories and impairing mnemonic discrimination. Individuals who carry the Apolipoprotein E (*APOE*) $\epsilon 4$ allele are at a heightened risk for developing AD and exhibit hippocampal changes in the absence of AD symptoms. Previous research shows a positive association between aerobic fitness and hippocampal integrity, but it is unclear how *APOE* $\epsilon 4$ carrier status influences this relationship. Using a subset from an ongoing clinical trial (NIH: R01AG058919), we examined the relationship between aerobic fitness and hippocampal-dependent mnemonic discrimination relative to *APOE* $\epsilon 4$ carrier status in cognitively normal middle-aged adults. Participants, *APOE* $\epsilon 4$ carriers ($n = 19$, $M_{\text{age}} = 56.7 \pm 3.5$ years) and non-carriers ($n = 41$, $M_{\text{age}} = 56.2 \pm 5.7$ years), provided a saliva sample to

determine *APOE* $\epsilon 4$ carrier status, performed a submaximal aerobic fitness test to estimate maximal oxygen uptake (estimated VO_{2max}), and completed the Mnemonic Similarity Task (MST). The MST is an object recognition task that places high demands on hippocampal processing by requiring participants to discriminate studied objects from perceptually similar lure objects. Hierarchical multiple regressions examined if *APOE* $\epsilon 4$ carrier status, estimated VO_{2max} , and their interaction predicted mnemonic discrimination, after controlling for age and sex. For the highly similar lure objects, the overall model was significant ($F(5, 54) = 3.32, p = 0.01, R^2 = 0.24$). The interaction of *APOE* $\epsilon 4$ carrier status by estimated VO_{2max} ($\beta = 1.07, p = 0.04$) significantly predicted mnemonic discrimination of the most difficult to discriminate lures, whereby higher aerobic fitness was associated with better mnemonic discrimination only for the *APOE* $\epsilon 4$ carriers. This result suggests that aerobic fitness may benefit the hippocampal-dependent memory of those at genetic risk for AD. Physical activity aimed at improving aerobic fitness may be a promising preventative intervention for this population. Funding source: National Institute of Aging, National Institutes of Health.

Are we on the same page? An investigation of parent-coach communication and alignment in youth soccer

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Parents and coaches equally contribute to children's development and success in youth sport. Recent studies have identified discrepancies between parents' and coaches' attributed importance of youth sport characteristics including parent-coach communication. Further, a misalignment between parents' and coaches' behaviors, goals, and expectations is often caused by a lack of communication. The aim of this study was to assess parent-coach communication in youth soccer and identify the level of alignment between both stakeholders. A quantitative online survey was administered to parents and coaches of youth soccer academies as well as recreational soccer clubs in Germany. 1,024 parents ($M_{age} = 45.2 \pm 7.0$ years, 48% female) and 338 coaches ($M_{age} = 40.0 \pm 12.5$ years, 12% female) completed a questionnaire on their perceived frequency and form of communication (sport-adapted; Sodogé et al., 2012) as well as the Perceived Organisational Support scale (sport-adapted; Siebenaler & Fischer, 2020). Several discrepancies in perceived frequency of communication between parents and coaches were identified using Mann-Whitney U tests. As such, parents reported regular conversations after practice/competitions, $U = 44964.0, p < .001, r = -.417$, as well as phone calls, $U = 44901.5, p < .001, r = -.433$, to be happening significantly less frequently compared to coaches. Further, findings indicated organizational barriers to parent-coach communication. The level of implemented parent management practices within a club was significantly negatively associated with coaches' perceptions of a challenging parent-coach relationship, $r(285) = -.45, p < .001$, and significantly positively associated with coaches' subjective confidence in engaging with parents, $r(285) = .15, p = .011$, and perceived organizational support $r(196) = .16, p = .025$. Results were similar in both youth soccer academies and recreational soccer which highlights the comprehensive need for evidence-based education for coaches and clubs to increase alignment in communication, and thus to support the parent-coach relationship.

Passion in sports and the quality of coach-athlete relationships among American athletes and coaches

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Passion in sports is a powerful motivator for athletes (Gustafsson et al., 2011) and is linked to the satisfaction of basic psychological needs (Verner-Filion & Vallerand, 2018). Harmonious passion (HP) tends to have a positive effect on coach-athlete relationships (CARs), while obsessive passion (OP) tends to influence relationships negatively (Jowett et al., 2012; Lafreniere et al., 2010). Clarification of how coaches' passion affects athletes' passion and the way athletes perceive CAR is needed. The present study examined how coaches' passion influences their athletes' passion and the quality of CARs among NCAA D1 collegiate athletes and their coaches. Athletes ($n = 45$) from 6 sport teams completed the Passion Scale and the CART-Q, along with 2 questions on their view of their coach's HP and OP. Their coaches ($n = 11$) completed the Passion Scale. Pearson bivariate correlations were run to correlate coaches' passion to athletes' passion and to CAR. There was no significant relationship between coaches' HP and athletes' HP, between coaches' OP and athletes' HP; and between coaches' HP and athletes' OP. However, coaches' OP was positively related to athletes' OP, $r(43) = .30, p < .05$. As for CAR, there was no significant relationship between coaches' HP or OP and athletes' CAR. Nonetheless, athletes' view of their coaches' harmonious passion positively correlated with CAR, $r(43) = .39, p < .01$. Results suggest that coaches' OP might be related to athletes' passion becoming more obsessive. Interestingly, only athletes' view of coaches' passion was related to CAR, but not coaches' passion as assessed by coaches' responses. Therefore, athletes' view of coaches' passion may have a stronger relationship to CAR than their coaches' actual passion levels. Nonetheless, more research is needed to determine how coaches' passion relates to athletes' passion and CAR among a wider population of athletes and coaches.

The relationship between physical activity and inhibitory control in adults with ADHD

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Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that affects between 2-5% of adults in the US. It is characterized by symptoms of inattention, hyperactivity, and/or impulsivity. Deficits in inhibitory control are a hallmark feature that affect cognitive and motor planning. There is growing evidence that moderate intensity physical activity (PA) improves inhibitory control in children with ADHD. However, less is known regarding the impact of PA on inhibitory control, and cognitive or motor planning specifically in adults with ADHD. Thus, the purpose of this scoping review was to map the literature to identify the types and characteristics of studies investigating the effects of PA (cross-sectional, acute, and chronic exposure) on inhibitory control, cognitive, or motor planning in adults with ADHD. The following search terms were used: (ADHD OR ADD) AND (inhib* OR plan*) AND (physical OR exercise) AND adult. A total of 60 records were retrieved after duplicates were removed. Following title and abstract review, a total of 29 underwent full text review. A total of 21 met inclusion for the

qualitative synthesis. The most common behavior measures were: Trailmaking A & B (4 studies), Go/No-Go (14 studies), and Flanker Task (31 studies). Several studies included some type of neuroimaging – task-based fMRI (14 studies) or EEG (17 studies). The PA study designs included acute interventions (1 session of exercise), and short-duration intervention studies (<6 weeks). No studies examined long-duration exposure (>6 weeks) or retention effects. Overall, there is limited evidence, mostly from cross-sectional and short duration interventions, that PA positively affects inhibitory control and motor planning. One of the key brain regions identified is the pre-supplementary motor cortex. Future studies are needed to determine if the type of physical activity (e.g., moderate or high intensity) or exercise modality (e.g., aerobic, resistance, multi-component, cognitively-engaging) affect inhibitory control and motor planning in adults with ADHD.

Para-athletes' experiences with an online psychological skills training program: A qualitative study

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While para-athletes are known to use psychological skills (Esatbeyoglu & Campbell, 2018), interventions designed to enhance their use of such skills are limited (Martin, 2019). In fact, many para-athletes lack access to structured psychological skills training (PST) despite reporting interest in the area (Bastos et al., 2020). To overcome these gaps, an online PST program (learnpst.com) was developed. This program included eight asynchronous learning modules, each on a unique psychological skill, delivered over an eight-month period. Each module included interactive activities and accommodated for both visual and physical impairments. While a variety of quantitative and qualitative measures were used to assess program outcomes, the purpose of the current study was to explore participants' experience with the online PST program using one-on-one semi-structured follow-up interviews. Specifically, questions were related to participants' overall experience in the program, the factors that facilitated or prevented their program adherence, the usability of the online platform, and the importance of PST in their sport. Participants included female ($n = 6$) and male ($n = 3$) para-athletes ($M_{\text{age}} = 39.44$, $SD = 12.31$) from a variety of sports and competitive levels, who showed higher (completed ≥ 4 modules; $n = 5$) or lower (completed < 4 modules; $n = 4$) adherence to the online PST program. Interviews were conducted virtually, transcribed verbatim, and analyzed using a thematic analysis (Braun & Clarke, 2006). Five themes were generated, including: (a) benefits (e.g., value of program), (b) personal circumstances (e.g., limited time contributed to lower adherence), (c) program procedures (e.g., reminder emails facilitated adherence), (d) accessibility (e.g., technology functioned properly), and (e) recommended updates (e.g., modernize home screen). These findings provide insight into the experiences of para-athletes engaging in online PST and offer valued recommendations to enhance the utility of such programs. Funding source: I'm An Athlete.

Mental skills coaching: A teaching intervention

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Peak athletic performance positively correlates with mental performance skills and competencies (Durand-Bush et al., 2022; Fry et al., 2019). Across sports, coaching efficacy is enhanced by integrating theory-based styles of mental performance (Villalon & Martin, 2020). In efforts to apply the five practices of exemplary leadership (Kouzes and Posner, 1987), Dweck's (2006) fixed and growth mindsets, and self-determination theory (Ryan & Deci, 2000), the proposed study aims to examine the impact of mental performance skills on collegiate coaches. Participants will be collegiate head and assistant head coaches ($N \approx 50$) who will complete 90-minute mental performance sessions three times a week over a six-week intervention. The intervention will consist of three training weeks followed by three instruction weeks, during which coaches will engage in activities that can be used to train and assess their athletes. The training portion of the intervention will be led by two mental performance practitioners who will facilitate group discussions, brainstorming, interactive worksheets invoking self and group reflection, and role-playing activities. The instruction portion of the intervention will place coaches in the facilitator role for skill retention and integration. Pre-test scores will be collected for the Trait Emotional Intelligence Questionnaire (TEIQue; Freudenthaler et al., 2008; Mikolajczak et al., 2007), Coaching Efficacy Scale (CES; Kavussanu et al., 2008), Leadership Scale for Sports (LSS; Würth et al., 1999) and the Sport Motivation Scale (SMS; Vlachopoulos et al., 2000). Utilizing a repeated measure longitudinal study design, measurements will be repeated at three and six weeks upon program completion, with scores being used to evaluate program effectiveness. A control group of non-head and assistant head coaches completed measures simultaneously without participation in the intervention.

Collegiate male wrestlers' perceptions of body image and masculinity

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Successful wrestling performance is largely dictated by weight. Some wrestlers engage in rapid weight loss methods to maximize performance at lower weight classes. Data from other sports suggest these methods can negatively affect body image (BI) and physical health and put athletes at risk for disordered eating behaviors and eating disorders (ED), but the actual impact in wrestling is unknown. The present study examined the relationship between perceptions of masculinity and BI to ED risk in male collegiate wrestlers. Survey data were collected from active male NCAA wrestlers ($N = 63$). Wrestlers completed the Eating Attitudes Test (EAT-26), the Multidimensional Body-Self Relations Questionnaire, the Hoffman Gender Scale, and three open-ended response items relating to participant perceptions of masculinity and wrestling identity along with methods used to enhance performance while in-season. ED risk was positively correlated to appearance self-importance ($r = 0.361, p < 0.01$) and body weight vigilance ($r = 0.618, p < 0.01$) and negatively correlated to BI satisfaction ($r = -0.328, p < 0.05$).

Gender self-acceptance was correlated to lower importance placed on BI ($r = 0.402$, $p < 0.01$). Additionally, 35 (53.9%) participants reported at least one maladaptive eating behavior (i.e., caloric restriction, vomiting, excessive exercise to control weight). Qualitative data indicates similarities in traits associated with successful wrestlers and the traditional ideal male (mental and physical strength, toughness, surpassing limits). The masculine traits exemplified by the sport of wrestling may negatively impact BI, encourage maladaptive eating or weight-control behaviors, and increase ED risk. The information in this study can be used to inform the development of safer weight control practices and specialized educational programs for ED risk for wrestlers. This study highlights a need for further qualitative analysis of weight control behaviors in collegiate wrestling.

Can brain-endurance training augment the benefits of physical exercise? Evidence from a 6-week training program with U.S. Army service members.

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Recent evidence suggests that combining cognitively demanding tasks with physical training, termed brain-endurance training (BET), can reduce perceptions of effort and enhance endurance performance beyond exercise alone. We evaluated the relative efficacy of a novel BET program on US Army service members' physical, cognitive, and operational capabilities. We hypothesized that BET would result in greater enhancements in physical performance and reductions in perceptions of effort than an active control condition. Participants ($N = 25$, $M_{\text{age}} = 29.8 \pm 5.9$ years) completed 6 weeks of training (3x/week of 45-min treadmill aerobic exercise at 70-75% heart-rate reserve) while simultaneously completing a concurrent cognitive task. The BET group ($n = 14$) performed a 1 n -back task, while the active-control group ($n = 11$) performed a visually identical stimulus-response task. Prior to and immediately following the 6-week training, participants completed an incremental (+speed or +incline) 'time-to-failure' test (TFT) on a treadmill tailored to their fitness level, which was consistent across assessments. A subsequent transfer test was conducted consisting of challenging dynamic marksmanship completed before and after a weighted (30% bodyweight) 3-mile ruck march. Percent change scores (post-test – pre-test) were computed and statistically evaluated as a function of training group. Results indicated that the BET group exhibited a significant advantage in endurance improvement on average following the training program ($M_{\text{DTFT}} = +25.1 \pm 16.9\%$) compared to the active-control group ($M_{\text{DTFT}} = +13.2 \pm 15.4\%$; $p = .041$). Moreover, minute-by-minute perceived exertion (RPE: 1-10) ratings during the TFT were significantly lower in the BET group ($M_{\text{DRPE}} = -1.1 \pm 1.0$) compared to the active-control condition ($M_{\text{DRPE}} = -0.4 \pm 1.14$; $p = .049$). No significant differences were documented in marksmanship percent change scores ($p > .05$). These and other findings are discussed with consideration to future applications of

neurocognitive optimization techniques in sport and tactical athletes. Funding source: Military Operational Medicine Research Program.

Older queer women's body image: Examining the role of physical activity in shaping aging body-related psychological adaptation

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As our population grows older, there is an imperative need to find ways to foster the wellbeing of older adults. This includes physical activity engagement given its important role in promoting functionality, independence, and quality of life. For older women, physical activity is often motivated and/or constrained by how they feel about age-related changes to their bodies. There is a notable absence of research examining the experiences of older queer women. This is an important gap in the research because gender and sexuality norms emphasizing heterosexual femininity impact how queer women experience their bodies as they age. The purpose of this research was to explore the body image of older queer women, emphasizing the role of physical activity in shaping how they perceived, experienced, and coped with age-related body changes. We conducted 2 life history interviews with 17 queer women aged 63 and older (34 interviews total) and analyzed the data through a narrative thematic analysis. Three narratives were constructed from the women's accounts, including gratitude with age, parallel experiences to heterosexual women, and queering physical embodiment. As participants aged, they expressed a growing appreciation for their bodies and abilities to remain physically active. Like their heterosexual counterparts, they were motivated to remain active to maintain health over appearance. Many of the women struggled with their weight and body image throughout their lifetime and embodied Western pressures to retain healthy, fit, yet slender bodies. However, this experience was tempered by their queer identities and expansive ideas of attractiveness. Their experiences of physical activity and their bodies were influenced, but not defined, by their romantic partners and queer identities. Through the reflection of sexual relationships with other women, participants gained an appreciation for the range of women's bodies. The findings contribute to psychological research on the body and physical activity by moving beyond dominant heteronormative perspectives in the literature. Funding source: Hampton Research Endowment Fund.

"There's no good, just satisfactory" – A qualitative investigation of perfectionistic reactivity in NCAA golf student-athletes

Daniel J. M. Fleming, Utah State University; Travis E. Dorsch, Utah State University

Perfectionistic reactivity is a relatively new line of enquiry in the perfectionism literature (Flett & Hewitt, 2016). Perfectionism is a multidimensional personality characteristic where individuals set exceedingly high standards for performance while engaging in harshly critical evaluations of their own behavior. Perfectionistic reactivity builds on the comprehensive stress process which highlights how individuals with elevated levels of perfectionism typically

experience higher levels of reactivity, especially when a personal sense of failure is experienced. Relatively little empirical work has been conducted to understand athletes' lived experiences dealing with reactive components of perfectionism, particularly in sport. The present study utilized semi-structured interviews with six NCAA golf student-athletes, all of whom self-identified as perfectionists and scored above the sample mean in an ongoing quantitative study of perfectionistic reactivity. Zoom interviews were conducted, transcribed verbatim, and cross-checked by a member of the research team. Transcripts were then coded in accordance with the six-step thematic analysis recommendations of Braun and Clarke (2012). Theory-driven deductive coding was utilized to identify higher-order themes of behavioral, affective, and cognitive reactivity components in the data (Flett & Hewitt, 2016). To enhance trustworthiness, triangulation and critical friendship strategies were utilized (Smith & McGannon, 2018) in interrogating thematic structure and interpretation. Findings offer support for perfectionistic reactivity manifesting across a range of behavioral, affective, and cognitive outcomes. These often occurred jointly, whereby an athlete feels or thinks about a particular outcome and subsequently alters their behavior to adjust for future performance. The present study provides a foundation for future work on perfectionistic reactivity and suggests that qualitative research may be a thoughtful strategy toward gaining a more thorough understanding of athletes' lived experiences of perfectionistic reactivity.

A quantitative investigation of perfectionistic reactivity and performance in NCAA golf student-athletes

Daniel J. M. Fleming, Utah State University; Travis E. Dorsch, Utah State University

Perfectionism is a multidimensional personality characteristic comprised of excessively high performance standards and overly critical evaluations of behavior. A recent conceptual development in this area is perfectionistic reactivity (Flett & Hewitt, 2016), suggesting that individuals with higher levels of perfectionism experience higher levels of stress reactivity, particularly when experiencing or interpreting a personal sense of failure. It stands to reason that competitive athletes, who maintain high standards of performance and compete in public settings, would be likely to be affected by perfectionistic reactivity. In the present study, we hypothesized that perfectionism would moderate the relationship between NCAA golfers' prior and subsequent hole scores, highlighting their perfectionistic reactivity to performance. In total, 122 student-athletes ranging in age from 18-24 years ($M = 20.08$) participated in the study. These individuals had played golf for 10.76 years ($SD = 4.29$) and at the NCAA level for 2.28 years ($SD = 1.29$). Participants completed pre-season measures capturing perfectionistic strivings and concerns, while performance data were collected from online repositories (e.g., team and tournament websites and/or live scoring platforms) during the competitive season. Using this strategy, we collected performance data for 3474 holes across 193 rounds, all nested within 46 athletes. Linear mixed-effects models with interaction terms between perfectionism and previous hole score were fit to examine the influence of perfectionism on the relationship between one hole score and the next while accounting for the clustering of holes within rounds within athletes. Results suggest a non-significant influence of perfectionism on the relationship between athletes' hole-by-hole performance, $b = 0.00$, $t(3291) = 0.127$, $p = .899$, and $b = 0.01$,

$t(3276) = 0.538, p = .591$. Future work should be designed to examine alternate ways perfectionistic reactivity may manifest cognitively, behaviorally, or affectively or across seasons, developmental periods, or careers.

An intervention using self-determination theory in the education of student strength and conditioning coaches

Ashley Flemington, University of Windsor; Todd M. Loughead, University of Windsor; Chad A. Sutherland, University of Windsor

The focus of self-determination theory (SDT; Deci & Ryan, 2002) as a behaviour change model is to understand human behaviour and development, and consider how social factors support or thwart one's development through satisfaction of the basic psychological needs of competence, autonomy, and relatedness. Satisfaction of all three needs aids individuals in being more intrinsically motivated to engage in and sustain a given behaviour. In the context of sport, need-supportive behaviours from coaches are associated with higher intrinsic motivation in athletes (Hollembek & Amorose, 2005), suggesting coaches have a significant impact on the social context within sport. While current literature assesses the influence of SDT in relation to coaches and physical educators (e.g., Raabe et al., 2019), very little research addresses strength and conditioning coaches' use of need-supportive strategies. The present study used a convergent mixed methods intervention design, with a survey pre- and post-intervention and follow-up interviews to provide a more comprehensive interpretation of the data. Student strength and conditioning coaches were assessed on their perceived competence to coach in an autonomy supportive way, their use of supportive or thwarting behaviours, and the extent to which they engage in autonomy supportive coaching. The intervention program integrated strength and conditioning knowledge along with content regarding coaching from a SDT perspective. Quantitative results indicated decreases post-intervention in thwarting ($d = .77$) and highly controlling behaviours ($d = .59$) with increases in supportive behaviours ($d = .81$) and perceived competence for providing autonomy ($d = .64$). While the effect on highly autonomous behaviours was small ($d = .31$), qualitative results suggest that participants thought they understood autonomy prior to the intervention but learned more and felt more knowledgeable after completing the intervention program. Qualitative results also indicated that participants enjoyed the SDT based intervention and would like to continue learning more.

Systematic review of early personal characteristics as predictors of future professional ice-hockey performance.

Daniel Fortin-Guichard, York University; Kathryn Johnston, York University; Joseph Baker, York University

Teams in the National Hockey League (NHL) hire scouts to watch and evaluate promising players. These players are then ranked according to their potential for success before the annual draft. To guide their ranking and complement their observation of on-ice performance, scouts measure a range of personal characteristics (e.g., personality). However, no set of

personal characteristics has been shown to consistently predict future success. This review profiles the available literature on the relationship between personal characteristics and future NHL performance. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines were followed using the keywords *draft*, *selection*, *identification*, and *sports* in four relevant databases. Ten studies where quantitative measures of at least one personal characteristic and one indicator of future NHL performance were kept (e.g., number of games played). The results revealed most studies (7/10) used correlational designs from publicly available data on large cohorts of players. Moreover, players born later in the year in the USA, who were drafted early, with high competitiveness, high emotional intelligence and strong physical fitness played more games and obtained more points in the NHL. However, except for draft rank and quartile of birth, other characteristics were only explored in single studies. Interestingly, the reviewed studies did not consider qualities of players who did not make it to the NHL (i.e., lacking between-group comparisons), and researchers almost never measured personal characteristics themselves (i.e., using unvalidated public data). Overall, this wide range of characteristics from a few studies makes it difficult to draw conclusions as to which characteristics scouts should focus on when making selections. Researchers are encouraged to replicate available studies by measuring personal characteristics explored in prior work. Relatedly, other personal characteristics should be considered (e.g., perceptual-cognitive skills) to extend the variables considered by NHL scouts.

“What about me”: Understanding the experience of providing interpersonal emotion regulation on the regulator in competitive sport dyads

Rebecca Foti, Florida State University; Svenja Wolf, Florida State University

Interpersonal emotion regulation (IER) is often used by athletes and when done effectively may positively relate to motivation, affect, team performance outcomes, sport commitment, and enjoyment (Tamminen & Crocker, 2013; Tamminen et al., 2016). Despite knowledge of numerous IER strategies athletes employ (Campo et al., 2017; Tamminen et al., 2022), minimal research has explored the impact of IER on the regulator. Findings from Foti et al. (2022) suggest that both the regulator's and target teammate's emotions may be impacted by IER; however, the regulator may be more strongly impacted. As self-regulatory resources can be depleted (Pageaux et al., 2015), understanding the net effect of providing IER is essential to ensure athletes are not assisting their teammates at the expense of the regulatory resources for their own performance. However, emotions are subjective (Wagstaff & Tamminen, 2021) and contextual and social factors surrounding IER must be interpreted. This study aims to (a) explain how the regulator's emotions, ego depletion, and effort are impacted by providing IER; (b) explore how athletes perceive the receipt of IER to impact their emotions; (c) understand the relationships and team dynamics involved in IER; and (d) understand the factors that contribute to IER strategy selection and implementation. Data collection includes multi-level descriptive phenomenological interviews from an interpretivist position with 10 dyad athletes (i.e., tennis, pickleball, and beach volleyball). Inductive coding of the gathered data shows IER impacts both the regulator's and target teammate's emotions through shifts in intensity, duration, expression, and suppression; and cohesive play style, communication, and partner

and personal performance relate to IER use and strategy selection. These results inform athletes' IER use in an effective way for both them and their teammates. This prompts the ability to conduct future experimental studies for practitioners to use evidence-based practice to advocate for the most effective and least detrimental IER behaviors in sport.

Exploring the strategies and behaviours of successful university team sport coaches during seasons of low performance and team culture

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There is a growing body of research on highly successful (serial winning) coaches. A common characteristic of these coaches is their ability to develop and implement a high-performing culture where all team members actively work towards a shared goal. Research has largely focused on how coaches have achieved success and created a winning team culture, without exploring how coaches approached and overcame barriers to success. Thus, the purpose of this study was to explore the strategies and behaviours employed by eminently successful university team sport coaches during a season where both team culture and performance were low. Participants were seven university team sport head coaches across five different sports, with an average of 23.3 years of experience and 37 combined national championship titles. All participants completed individual, virtual semi-structured interviews that were analyzed using a reflexive thematic analysis. Among the findings, coaches noted that their teams often had a combination of poor athlete leadership and problem athletes, which they felt heavily influenced their team's culture and subsequent performance during this atypical season. Furthermore, in many instances the team's past success negatively affected the culture, where athletes expected to win and thus became complacent in their drive for success. Other factors included the experience level of the team and whether the coach was aware of the underlying issues. Coaches dealt with these issues using a variety of unique and creative strategies and behaviours, such as improved coach-athlete communication, changing the athlete leadership structure, early identification of conflict, and improving coaching decision-making skills. Overall, the results of this study provide insight into how winning coaches deal with and overcome adverse situations. The strategies highlighted in this study may help coaches of all levels to overcome barriers to success and may be transferable to leaders of all levels across a range of disciplines outside of sport as well. Funding source: Social Sciences and Humanities Research Council of Canada.

Athlete-to-athlete informal help-seeking: A qualitative inquiry

Stephanie Fuller, East Carolina University; Nastja Rettich, Leipzig University; Christine Habeeb, East Carolina University; Stacy Warner, East Carolina University

In 2020, the National Collegiate Athletic Association's chief medical officer declared mental health as the most important issue affecting student-athlete welfare. Despite improved access to mental health services, many athletes that believe they need professional support do not seek formal help (Drew & Matthews, 2019). Instead, many athletes seek help from informal

sources including peers and family members (Rossetto et al., 2018). For student-athletes, teammates serve as a primary source of informal help in sport (Bird et al., 2018; Habeeb et al., 2021). Yet very little is known about the role of teammates in the help-seeking process. The purpose of this study was to understand the specific characteristics of teammates who athletes commonly seek help from. Twenty-one Division I student-athletes (14 females, 7 males) participated in six focus groups lead by a former student-athlete with qualitative training. The semi-structured interview questions were tailored to identify both why or why not an athlete would seek help from a teammate and characteristics of teammates most and least likely to be asked for help. Thematic analysis revealed that teammates' *relatedness*, *behavioral characteristics*, and *personality characteristics* were factors associated with teammate help-seeking. Relatedness represented athletes feeling understood by one another. Athletes reported shared experiences and obligations as student-athletes, perceived stigma, and barriers athletes face when seeking help for mental health problems lead to feeling related to teammates. Behavioral characteristics involved actions by teammates that lead to being more comfortable to seek out a teammate for help. These behaviors included being proactive, reciprocating, and being receptive. Finally, personality characteristics displayed by a teammate including trustworthiness and authenticity were reported as qualities that would encourage an athlete to open up to a teammate. This study provides specific knowledge on how to help improve teammate interactions so that athlete help-seeking becomes more prevalent. Funding source: American Athletic Conference.

Preference & tolerance of active versus passive cycling on enjoyment and state anxiety

Lauren Gamache, Oakland University; Kathryn Rougeau, Oakland University

Heightened preference for and tolerance of acute bouts of exercise has been shown to exhibit an increase in exercise enjoyment and decreased state anxiety. Reflecting upon the notion that acute bouts of passive (PC) and active (AC) cycling also have demonstrated benefits in executive function, the present study examined the enjoyment and state anxiety effects of PC vs. AC in healthy adults. In examining preference and tolerance of exercise, it was hypothesized that although AC and PC were similar, participants would express increased enjoyment following AC only. PC would produce similar reductions in state anxiety as AC. Thirty-five participants (19 male, $M_{\text{age}} = 21.20 \pm 2.9$ years) participated in active and passive (motor-driven) cycling on separate days. During each designated session, the participants were either asked to pedal at a constant rate of $65 \text{ r} \cdot \text{min}^{-1}$, and a predetermined rating of perceived exertion of 15 for 35-minutes (AC), or to refrain from pedaling while an exterior motor drove the pedals for them (PC). Each condition was identical in duration, pedal cadence, and resistance. Neither preference for, nor tolerance of exercise predicted enjoyment following passive ($M_{\text{Pref}} = 24.86 \pm 6.29$, $p = 0.268$; $M_{\text{Tol}} = 25.51 \pm 5.44$, $p = 0.974$) or active ($M_{\text{Pref}} = 25.00 \pm 6.31$, $p = 0.72$; $M_{\text{Tol}} = 25.65 \pm 5.38$, $p = 0.386$) conditions. There was no significant difference between enjoyment following passive ($M = 94.13 \pm 15.89$) and active ($M = 88.81 \pm 21.94$) cycling ($p = 0.109$). Further, there was no significant difference in state anxiety during either condition (PC, AC). However, reported measures of state anxiety decreased in the 30-minutes post AC only ($p = 0.013$). Participants found AC and PC equally enjoyable, thus opening the door for future studies

examining the potential benefits of PC as a therapeutic modality. Future research would examine the effect on individuals with spinal cord injuries or other neurodegenerative conditions; this would allow for further research into the mind-body connection. Funding source: Oakland University.

Perfectionism and excellencism are differentially associated with pro-cheating attitudes

Patrick Gaudreau, University of Ottawa; Benjamin Schellenberg, University of Manitoba

Perfectionistic standards have received growing theoretical and empirical attention over the last three decades. Researchers have often reported positive associations between perfectionistic standards and desirable outcomes (e.g., achievement, motivation). Clinical psychologists kept disagreeing with this position despite rising support in empirical research. The model of excellencism and perfectionism (MEP, Gaudreau, 2019) has been proposed to improve the definition and measurement of perfectionistic standards. The MEP differentiates the pursuit of high but realistic standards (excellencism) from the pursuit of extreme and exacting standards (perfectionism). Results of MEP studies with more than 3,000 students revealed that excellencism (rather than perfectionistic standards) is positively associated with scholastic and creative achievement. Perfectionistic standards also predicted a conundrum of indicators of psychological maladjustment and antisocial functioning. In a recent study, perfectionistic sport fans were found to hold a bottom-line mentality, a greater tendency toward moral disengagement, and higher tolerance toward electronic sign stealing (cheating) in professional baseball. We conducted a follow-up study to investigate the reactions of sport fans when the Houston Astros qualified for the 2021 World of Series of Baseball two years after being found guilty of cheating. We surveyed fans of the Astros ($n = 202$) and Atlanta Braves ($n = 265$) to account for potential in-group versus out-group bias. We also expanded our analyses to the attitudes of sport fans toward the use of performance enhancement drug in pro baseball. As expected, fans of the Astros displayed a higher tolerance toward electronic sign stealing compared to the Braves' fans (Cohen's $d = 0.61$, $p < .01$). Results of multiple regression (controlling for in-group vs. out-group status) showed higher tolerance toward cheating and doping in perfection strivers compared to excellence strivers. Results are discussed in light of the implications of the MEP for the perfectionism literature in sport. Funding source: Social Sciences and Humanities Research Council of Canada.

Strength and conditioning coaches' psychosocial education: Planning change via participatory action research

Brian Gearity, University of Denver; Bettina Callary, Cape Breton University; Kimberley Eagles, Cape Breton University; Christoph Szedlak, Hartpury University

Strength and conditioning (S&C) coaches' educational pathway mainly develops their biophysical-technological competencies. The United Kingdom's Strength and Conditioning Association (UKSCA) noted the lack of psychosocial competencies and wanted to improve this aspect of their curriculum. Within our ongoing participatory action research with the UKSCA,

we collaborated with UKSCA stakeholders to plan to improve their curriculum by discussing their understanding of psychosocial competencies and their suggestions for change. Twenty-six stakeholders from the UKSCA engaged in either focus groups or individual one-on-one interviews where they discussed their knowledge, beliefs, feelings of, and suggestions for psychosocial coaching competencies in the UKSCA's coach education and accreditation pathway. We created a thematic narrative analysis that outlines six sequential themes representing plans to improve their curriculum. The UKSCA stakeholders identified the current curriculum as scientific and objective, reported that psychosocial competencies are currently learned through experience, questioned if and what to change, but still identified the need for change. Finally, they suggested actions for change, particularly a new module for the UKSCA taught by psychosocial content experts that involves workshops, reflection on coaching, mentorship, naturalistic assessment, and a certificate. Despite limited knowledge and a reluctance to teach psychosocial competencies themselves, the stakeholders' reflections on the process of planning the curriculum change put the theory (i.e., lack of psychosocial competencies in S&C coach education and its improvement) in action. Building upon this evidence-based plan, we will implement and then evaluate the solution of improving the UKSCA's psychosocial curriculum. Our approach shows the dynamic, complex, and uncertain circumstances of doing action research. Implications from this work can support scholars in sport psychology and exercise psychology, amongst others, who conduct (or seek to) applied research. Funding source: Social Sciences and Humanities Research Council of Canada.

Adherence to an individually tailored physical activity counseling program in patients with major depressive disorders

Markus Gerber, University of Basel; Robyn Cody, University of Basel; Jan-Niklas Kreppke, University of Basel; Oliver Faude, University of Basel

Major depressive disorder (MDD) is a highly prevalent disease. MDD is associated with reduced quality of life, increased risk for cardiometabolic diseases and premature death. Psychotherapy and pharmacology are used as first-line treatments, but their efficacy remains limited. Physical activity, exercise and sport are considered as alternative treatments. However, promoting physically active lifestyles in these patients is a challenge. We therefore carried out a multi-centric, two-arm randomized controlled trial, including an intervention group (IG: extended personalized physical activity counseling) and a placebo control group (CG: general instructions about health-enhancing physical activity). In total, 210 patients met all inclusion criteria (IG: $n = 106$, CG: $n = 104$). In the IG, 19 participants were classified as early dropouts (dropout after first two coaching sessions). Thirty-eight participants achieved a low dose with 3-20 coaching sessions during the 12-month follow-up, while 49 participants were fully compliant with the intended coaching dose (> 20 coaching sessions). The purpose of this paper was to identify factors that are associated with program adherence such as depression severity and subtype, sex, age, antidepressant intake, education, employment, civil status, children at home, body mass index, perceived fitness, estimated VO_{2max} , sport/exercise participation, executive function, intention to exercise, motivation, self-efficacy, action and coping planning, outcome expectations, perceived barriers, social support, and automatic evaluations of exercise.

Analyses of variance showed that participants with different adherence did not differ in any of the above factors. Our results highlight that adherence to a physical activity counseling intervention can vary greatly in patients with MDD, and that no specific factors existed at baseline to predict early dropout and low/high adherence. While preliminary analyses point towards beneficial short-term effects, long-term analyses will show whether adherence moderates efficacy of our counseling program. Funding source: Swiss National Science Foundation.

Ripple effect: The team dynamics of positional subgroups in professional sport

Marc Glaude, McGill University; Gordon A. Bloom, McGill University; Luc J. Martin, Queen's University

An inevitable structural feature within sport teams involves “the groups within the group,” otherwise known as subgroups. Although there is a large body of literature dedicated to group dynamics constructs at the total team level, little research has explored such topics at a positional subgroup level, particularly in professional sports. Thus, the purpose of this study was to provide an in-depth exploration of group dynamics perceptions from a specific positional subgroup in professional sports. Specifically, we interviewed six experienced professional football offensive linemen to explore their perspectives of the factors influencing group dynamics within their positional subgroup. These athletes had played professionally for an average of 7.3 years and were playing on 5 of the 9 teams in the Canadian Football League at the time of the study. The analysis revealed environmental factors as well as internal roles and interpersonal processes that shaped group development and cohesion within the subgroup. Notably, while the offensive linemen believed cohesion was particularly important for their subgroup’s success, they also perceived several impediments to cohesion that were specific to the professional sports context, such as high roster turnover and players being perceived as commodities by management. Furthermore, participants described that individual and group success depended on experienced athletes serving as group leaders, namely by helping newcomers acclimate to the professional environment, and by serving as an important link to facilitate communication between newcomers and their positional coach. Thus, these findings are of use to members of professional football organizations, including general managers, head coaches, assistant coaches, support staff, and athletes, by providing information about how both the professional environment and group members influence group dynamics within a positional subgroup, and how these dynamics can affect individual and team outcomes.

End-user involvement can help lead the way: The development of a smart phone application designed with and for individuals with prediabetes

Natalie Grieve, University of British Columbia; Kyra Braaten, University of British Columbia; Megan MacPherson, University of British Columbia; Mary Jung, University of British Columbia

Technology is more likely to be used when end-users are involved in its development (De Beurs et al., 2017; Timmers et al., 2022; Yardley et al., 2015). To supplement the ongoing community-

based *Small Steps for Big Changes* (SSBC) diabetes prevention program, a smartphone application (app) was developed in partnership with SSBC past clientele. To examine the app's usability and collect feedback for future iterations, a focus group of seven SSBC clients was conducted. Participants engaged in a cognitive walkthrough (CW) of eight novel tasks and completed the System Usability Scale (SUS) survey. Following the CW, participants took home the app and completed the user version of the Mobile Application Rating Scale (uMARS) after three weeks of use. Analysis of the CW identified 26 usability problems and were coded using heuristic evaluation. Nielsen heuristics "match between system and real world" and "recognition rather than recall" were the most frequently coded (11 times each). A mean summary score of 66.8% was reported for the SUS which represented a marginal acceptability score and indicated that design issues needed to be resolved. After three weeks of optional use, a uMARS mean score of 3.59 ± 0.33 on a 5-point scale was reported and indicated a rating of average acceptability. These findings identified necessary improvements to be made in the app, ranging from minor aesthetic problems to major functionality problems while survey scores highlighted various levels of usability. Future versions of the app will be informed by these findings and these changes will help increase the app's functionality based off the needs of the client. Involving end-users allows for the app to be tailored to the client's preferences and potentially increases the likelihood of usage. This app can be used as a tool for SSBC clients to self-monitor their exercise, nutrition and goals which may lead to greater positive health outcomes.

Employing a critical framework to youth sport: An examination of Black adolescent boys' experiences of sport belonging

Amand Hardiman, Utah State University; Travis Dorsch, Utah State University; Rebecca Elwood, Utah State University; Diera Walton, Utah State University

Being an "athlete" and a "Black athlete" represent distinct but related experiences that warrant further investigation as researchers attempt to understand the complexities of the youth sport system more fully. Of the approximately 40 million youth who participate annually in organized sport in the United States, Black adolescent boys have proportionally high involvement rates. They also face regular microaggressions, widespread discrimination, and structural barriers that have the potential to influence their individual and shared experiences (Edwards, 2000). However, the literature often generalizes youth environments and experiences without acknowledging the interplay among race, class, and gender. The present study sought to address this gap by examining the experiences, behaviors, and processes of Black adolescent boys in youth sport. Semi-structured interviews were conducted with eight Black adolescent boys between ages 13 and 18 from a school district in the Midwest United States. Interviews were transcribed verbatim and cross-checked for accuracy by a member of the research team. A six-step thematic analysis was conducted in line with the recommendations of Braun and Clark (2012). Results suggest that the intersection of race, class, and gender influences participants' perceptions of their experiences. Results also highlight that Black boys consider the sport environment a place of belonging, influenced by the positive regard received from key social agents. Finally, results suggest that social motivation plays an important role in Black

boys' motivation and commitment to participate. Future work should be thoughtfully designed to consider the integration of critical frameworks, potentially affording further insight into Black boys' relationship with youth sport and those with whom they participate. In pursuing this pathway, researchers should continue to focus on the perspectives and experiences of athletes when offering recommendations for improving the youth sport system (Weiss & Wiese-Bjornstal, 2009).

From season to season: A phasic approach to sport team development

Sebastian Harenberg, St Francis Xavier University

A main approach to describe the development of sport teams is Tuckman's five-stage model (i.e., forming, storming, norming, performing, adjourning). While this model is foundational to our understanding of group development, it lacks empirical evidence in sport and has several theoretical limitations (e.g., lack of environmental influences). Current developments in the group dynamics literature (e.g., teamwork) are also not represented in the model. Further, sport seasons are usually pre-planned and phasic (e.g., pre-season, season, playoffs, off-season) which creates a unique context for the development of sport teams. Hence, this presentation introduces the phasic model for sport team development (PMSTD), which suggests that there are four cyclical phases. First, the *orientation* phase is marked by athletes meeting at the beginning of a new season and the team's efforts to set expectations (e.g., value setting, norms, goals). This phase usually occurs during the early stages of the pre-season. The second phase, *preparation*, represents the team's efforts to improve group effectiveness (e.g., by assigning roles, creating a hierarchy, developing a style of play). This phase usually occurs during the latter stages of pre-season and in the first part of the season. The third phase is *adjustment*, which describes the refinement of team processes and maintenance efforts of team effectiveness. This phase is tailored to reach optimal group effectiveness, peaking towards the latter stages of the season and playoffs. Lastly, the *reduction* phase describes the processes when the competitive season has ended. While players still interact, communication becomes less frequent and emotional attachment decreases. The PMSTD conceptualizes sport team development to be cyclical. Members return to the team and aspects of team development (e.g., values, identity) may carry over from season to season. The relationship between the PMSTD phases and other group processes (e.g., socialization) as well as future research directions to examine the validity of the model will be discussed.

Examining real-time physical activity in adolescents: An ecological momentary assessment study using the multi-process action control model

Sheereen Harris, Brock University; Sara King-Dowling, The Children's Hospital of Philadelphia; Pallavi Dutta, Brock University; Matthew Kwan, Brock University

The transition from adolescence to emerging adulthood is associated with steep declines in physical activity (PA). Given that much of the research has focused on the discordance between intentions and behavior, relatively little is known about the non-conscious influences on PA.

The multi-process action control (M-PAC) model is becoming a popular framework to examine post-intentional constructs including reflexive influences on PA. The purpose of this study was to examine real-time associations between M-PAC constructs and PA among adolescents using ecological momentary assessment (EMA). Participants ($N = 218$) were grade 11 students taking part in year 1 of the ADAPT study. Over a 7-day study period, participants responded to EMA surveys up to four times daily after school while simultaneously wearing an accelerometer. EMAs assessed reflective (state motivation), regulatory (willpower), and reflexive (habit) processes. Total minutes of moderate-to-vigorous intensity PA (MVPA) in the 60-minute time window following each survey prompt was calculated. Prior to data analysis, between- and within-person effects were disaggregated. Results from multilevel linear modelling showed significant between-person (coefficient = .80, $p = .008$) and within-person (coefficient = 1.00, $p < .001$) positive effects of reflective processes and significant positive within-person effects of reflexive processes (coefficient = 1.02, $p = .002$) on subsequent MVPA. No effects of regulatory processes on MVPA were found. Results suggest higher levels of real-time motivation compared to others and one's typical level were associated with engaging in more MVPA minutes. Conversely, reports of engaging in an activity consistent with one's usual level was associated with engaging in fewer MVPA minutes. Overall, findings suggest both conscious (motivation) and non-conscious (habit) processes are associated with real time MVPA behavior in adolescents in naturalistic settings, providing support for the M-PAC framework. Funding source: Social Sciences and Humanities Research Council of Canada.

Examining the moderating role of goal conflict on the intention-behavior relation in people's daily lives: An ecological momentary assessment study

Sheereen Harris, McMaster University; Samira Sunderji, McMaster University; Steven R. Bray, McMaster University

Although intention is a strong predictor of moderate-to-vigorous intensity physical activity (MVPA), several factors moderate the intention-behavior relationship. People experience goal conflict when one of their goals (e.g., preparing for an exam) makes it more difficult to pursue other goals (e.g., engaging in MVPA). We examined goal conflict as a moderator of the intention-behavior relation using data from ecological momentary assessments and accelerometer-derived estimates of MVPA. Participants ($N = 100$; 22 males) wore an accelerometer and responded to digital surveys assessing MVPA intentions and goal conflict up to four times daily for seven consecutive days. MVPA in the 180-minute epoch following each survey prompt was recorded. Multilevel linear modelling was used to analyze the data using the disaggregated between- and within-person effects. Results showed no significant between-person effects. However, significant within-person effects were observed for intention (coefficient = 1.81, $p < .001$), goal conflict (coefficient = -1.20, $p = .001$) and the goal conflict X intention interaction (coefficient = -.62, $p = .001$). In short, when people had stronger intentions to be active compared to their average level of intention, they engaged in more MVPA; and when goal conflict was higher, compared to their average level of goal conflict, people engaged in less MVPA. Post-hoc examination of slope estimates from the interaction revealed significant positive associations between intention and MVPA at the 25th and 75th percentiles of goal

conflict ($ps < .001$). The intention-MVPA association was weaker at the 75th percentile (coefficient = 1.38) compared to the 25th percentile (coefficient = 2.17). Findings suggest experiencing higher goal conflict about engaging in MVPA thwarts people's abilities to follow through with their intentions to be active throughout the day. Interventions designed to help people manage their time commitments and other goals or obligations that compete with being physically active may better enable them to translate their intentions into action. Funding source: Social Sciences and Humanities Research Council of Canada.

The impact of learning styles on academic and athletic motivation in collegiate athletes

Kayleigh Hart, Long Beach State University; Leilani Madrigal, Long Beach State University; Alison Ede, Long Beach State University; Jana Fogaca, Long Beach State University

College student athletes balance the demands of sport and higher education, and high levels of motivation are necessary for success in both spaces. Studies such as one by Fritz et al. (2004) have evaluated learning styles and academic motivational outcomes in college student athletes, but there is a need to explore how motivation impacts both academic and athletic success. The present examined the relationship that academic, student athletic, and career athletic motivation had with (a) learning styles and (b) major (STEM vs. non-STEM). A total of 186 NCAA Division I, II, III, and Club collegiate athletes ($M_{age} = 19.87$) took the Grasha-Reichmann Student Learning Style Scale (Riechmann & Grasha, 1974) and Student Athletes Motivation toward Sports and Academics Questionnaire (Gaston-Gayles, 2005). Learning styles were grouped into intrinsic (independent, participant, and collaborative) and extrinsic (dependent, avoidant, and competitive) styles. There were positive relationships between intrinsic learning style and both student athletic ($r = .19, p = .02$) and academic ($r = .30, p < .001$) motivation. Extrinsic learning styles were positively correlated with career athletic ($r = .27, p = .001$) and student athletic ($r = .16, p < .05$) motivation but negatively correlated with academic motivation ($r = -.17, p = .03$). Student athletes in STEM majors ($M = 3.88, SD = 0.36$) had higher academic motivation than those in non-STEM majors ($M = 3.66, SD = 0.40$), $t(182) = 3.85, p < .001$. Athletes in STEM majors ($M = 4.00, SD = 0.88$) had higher career athletic motivation than non-STEM majors ($M = 3.56, SD = 0.91$), $t(182) = -3.29, p = .001$. Findings indicate that being more independent, participant, and collaborative in class is related to motivation in school and in student athletic endeavors. Pursuing a STEM major is related to higher academic motivation than athletes in non-STEM majors. Encouraging student-athlete learning autonomy via education/intervention could improve intrinsic motivation in sport and classes, though more studies are needed to further explore these relationships.

Organizational influence in athletes' retirement preparation

Iman Hassan, University of Ottawa; Diane Culver, University of Ottawa

Over the last few decades, athletes have reported to experience mental well-being challenges as a result of their departure from sport. Although Canadian high-performance athletes receive free access to resources that are targeted to proactively and reactively support athletes for

their retirement, utilization rates for such resources remain low and athletes from numerous sports are still reporting retirement related challenges. There are vast discrepancies in how each sport organizations views and prioritizes athlete retirement in Canada. This present study sought to explore sport organizations' approaches to athlete retirement and examine the impact the approaches have on athletes' perception of retirement support mechanisms. Semi-structured empathy interviews were conducted with 19 members across the ecological system including active athletes, retired athletes, coaches, support staff, and performance partners. Composite personas for each role across the ecological system of sport were created from the empathy interviews. The analysis indicated that (a) members across the sport system have limited knowledge and understanding of accessible retirement resources, (b) sport organisations' culture can present as barriers or facilitators through direct and indirect messages to athletes and, (c) athletes who proactively sought out support and/or had a sport-life balance experienced fewer challenges transitioning. These results suggest organizations have a level of responsibility upkeep to proactively support athletes for retirement while simultaneously supporting their pursuit for performance excellence.

Design thinking practices used to enhance athlete retirement support through collaborative innovation

Iman Hassan, University of Ottawa; Diane Culver, University of Ottawa

Two virtual, co-design ideation sessions took place with the objective of collaboratively innovating a sustainable prototype to further support Canadian high-performance athletes' retirement needs. Each of the 15 participants held one of the following roles; retired Olympic athlete, coach, support staff, or performance partners. Members each participated in one of 2 three-hour sessions that guided participants through cognitive, strategic procedures from Stanford d school's five-step model of design thinking: empathize, define, ideate, prototype, and test. Collected data was obtained from transcripts, participants' sticky notes, and video recordings. A result of the co-design sessions, the participants generated solution focused prototypes aimed to enhance the retirement support mechanisms accessible to Canadian high-performance athletes. The following prototype suggestions emerged: (a) new funding metrics system to incentivize holistic athlete development and well-being, and (b) collaboration commitments to strengthen sport organizations' relationships with support mechanisms. Participants evaluated the prototypes by accessing each prototype's risks, opportunities, and indicators for implementation. This study contributes to athlete well-being and retirement literature by demonstrating design thinking practices to empowering members within sport systems to collaborate and co-design practical prototypes, targeted to improve retirement support gaps.

Cognitive load affects effort, performance, and kinematics in elite and non-elite rowers

Henrik Herrebrøden, University of Oslo; Thomas Espeseth, University of Oslo; Laura Bishop, University of Oslo

The extent to which elite athletes depend on mental effort and attention to task execution has been a debated topic. Some studies have suggested that motor experts might be relatively unaffected in the face of distraction and that they might even perform better when they attend to extraneous cognitive stimuli (for example in a dual-task paradigm), as compared to single-task conditions where they concentrate fully on a sports task. However, task complexity and participants' skill levels have so far been relatively modest in most dual-task studies. To address gaps in past research, a multi-method study was conducted using a rowing ergometer task. Participants were nine male elite rowers from the Norwegian national rowing team, preparing for the 2020 Olympic Games in Tokyo, as well as nine male recreational rowers. Participants engaged in three-minute rowing trials of varying task demands, including single-task conditions (focusing on rowing only) and dual-task conditions (focusing on rowing and solving arithmetic problems). Performance and mental effort were measured via ergometer data (i.e., rowing speed values) and eye-tracking measures (i.e., blink rates and pupil size measurements), respectively. Movement kinematics was measured by motion capture technology. The results suggested that adding extraneous cognitive load led to performance decline and increased mental effort across all participants. Both elites and non-elites demonstrated kinematic changes when going from single-task to dual-task performance. That is, kinematic events in participants' lower-body and upper-body segments became more temporally coupled, and more in line with movement patterns associated with novice athletes when the extraneous cognitive load was added. This study contradicts several past findings and suggests that elite athletes rely on attentional resources to execute fundamental aspects of their performance. Funding source: Research Council of Norway .

“There may not be a rainbow sticker at the door, but there are my rainbow shoes”: Resilience among LGBTQ+ adults in physical activity contexts

Shannon Herrick, University of British Columbia; Lindsay Duncan, McGill University

Researchers have identified LGBTQ +-specific stressors that hinder physical activity participation; however, LGBTQ + resilience against these stressors has yet to be explored. The purpose of this study was to gain an understanding of how LGBTQ + resilience is experienced within physical activity. Ten focus groups with LGBTQ + adults ($N = 36$) were conducted online and subject to abductive thematic analysis. Experiences of individual resilience were conceptualized through the interplay of (a) persistence-adaptability (ranging from being regimented with physical activity to being flexible and amenable to changes), (b) toughness-tenderness (possessing mental grit to self-kindness), and (c) complaisance-resistance (internalizing to resisting norms that govern physical activity). Participants also described three sites for community resilience: (a) LGBTQ + communities that provided pivotal social support, but rarely for physical activity; (b) digital communities that could support or thwart LGBTQ + resilience, but often prioritized aesthetics; and (c) physical activity communities that supported participation, but often perpetuated LGBTQ + exclusion. Funding source: Social Sciences and Humanities Research Council of Canada.

Understanding the mechanisms of action: A preliminary analysis of cognitive reframing compared to action planning

Isabelle F. Hill, Brock University; Sean Locke, Brock University

Multi-component exercise interventions are effective, but research investigating the underlying mechanisms of the individual strategies is lacking. Cognitive reframing has been newly applied to exercise behaviour change, but whose mechanisms of action have not yet been established. In the depression literature, cognitive errors are the hypothesized mechanism of reframing. Cognitive errors are biased or exaggeratedly negative views of the situations we experience (eg., exaggerating how busy we are). Reframing cognitive errors to help individuals overcome their exercise barriers is novel in that it treats barrier perceptions as (at least partly) inaccurate, whereas other strategies (action planning) do not. It was hypothesized that those randomized to receiving cognitive reframing would significantly improve their level of cognitive error compared to those randomized to an action planning comparator group whose level of planning detail should improve. Participants ($N = 29$) were randomized to receive either reframing (REF; $n = 15$) or action planning (AP; $n = 14$). REF is a 15-minute counselling session that helps participants to identify, challenge, and reframe negatively biased perceptions of their exercise barriers. AP is a 15-minute counselling session that assists individuals in creating a detailed exercise plan and identify barriers with solutions. Validated measures of exercise-related cognitive errors (ECEs), action and coping planning skills, and moderate-vigorous physical activity were examined at pre, post, and 1 and 4 weeks post. Those in the REF group experienced a significant decrease in ECEs compared to those in the AP group ($F(3) = 2.988$, $p = 0.5$, $p \eta^2 = .26$). Those in the AP group experienced a greater increase in their coping skills compared to the REF group ($F(1) = 4.051$, $p = .051$, $p \eta^2 = .088$). There were no significant changes in planning skills or MVPA. This preliminary analysis suggests that ECEs could be a mechanism of action for cognitive reframing. A larger sample is required to run a mediation analysis to determine if ECEs are a casual mechanism of action.

“You can’t lead everyone in the same way”: Personal meanings attributed to athlete leader fairness

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Athlete leadership is the process of an athlete occupying a formal or an informal leadership position who influences team members to achieve a common goal (Loughead et al., 2006). Researchers have suggested that leader fairness is a factor that contributes to the effectiveness of an athlete leader (Eys et al., 2007). However, athlete leaders have yet to be explored as a source of fairness and, therefore, little is known about how athlete leaders can demonstrate fairness towards their team members. The purpose of the present study was to investigate athlete leader fairness by exploring athletes’ and coaches’ personal meanings of athlete leader fairness derived from experiences with fair and unfair athlete leaders. Participants included 11 intercollegiate varsity athletes and nine coaches who completed a one-on-one semi-structured interview. An inductive reflexive thematic analysis was conducted following Braun and Clarke’s

(2016, 2019) six-step approach. Two broad categories of themes were generated to describe the complex nature of athlete leader fairness along with the display of fairness behaviors. The complex nature of athlete leader fairness was explained by themes pertaining to the construct being (a) subjective, (b) situation-specific, (c) essential for effective leadership, and (d) difficult to maintain. The complexity was highlighted by the ongoing process in which athlete leaders demonstrated fairness as team members regularly determined perceptions based on new situations and interactions with their athlete leaders. Themes describing athlete leader fairness behaviors revolved around (a) the promotion of the team's mission, (b) utilization of leadership power, and (c) and predictability. Participants shared experiences in which these themes intertwined, or how athlete leaders behaved in ways that captured multiple themes simultaneously. These findings can inform athlete leaders of how they can more effectively provide leadership to their teammates and coaches as well as inform the development of an inventory for measuring athlete leader fairness. Funding source: Social Sciences and Humanities Research Council of Canada.

Do coach injunctive norms and social identity moderate the relationship between peer descriptive norms and mentorship willingness among NCAA athletes?

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Researchers exploring peer mentorship have focused on the benefits of being a mentored athlete, but few studies have examined the social factors that might explain why an athlete would be willing to mentor teammates. Grounded in the theory of normative social behavior, we sought to explore the relationship between peer descriptive norms and athletes' willingness to mentor teammates who played the same vs. different positions as them, and whether this relationship was moderated by coach injunctive norms and social identity. Participants were 173 NCAA athletes ($M_{age} = 20.21$; 120 female, 52 male, 1 non-binary) who completed an online survey assessing perceptions of teammates' peer mentorship (peer descriptive norms), coaches' approval of peer mentorship (coach injunctive norms), social identity, and willingness to provide (a) task mentorship to teammates who played the same position, (b) task mentorship to teammates who played a different position, (c) friendship mentorship to teammates who played the same position, and (d) friendship mentorship to teammates who played a different position. Data were analyzed using moderated multiple regressions. Though statistical significance of interaction terms was inconsistent, patterns of moderation were observed based on simple slopes across all mentorship willingness outcomes, with the exception of willingness to provide task mentorship to teammates who played a different position. Specifically, the positive association between peer descriptive norms and mentorship willingness increased as a function of increasing levels of coach injunctive norms and social identity: $bs = -.003-.12$, $ps = .109-.968$ at lower; $bs = .10-.22$, $ps = .005-.171$ at moderate; and $bs = .19-.35$, $ps = .003-.034$ at higher levels of coach injunctive norms and social identity. Results suggest that coaches' active approval of peer mentorship and a strong sense of identification with one's team may strengthen the influence of peer descriptive norms on

mentorship willingness, which has implications for the norms and values coaches create and embed within their teams.

Examining predictors of mental health and well-being in community sport coaches

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Mental health and well-being are affected by social, environmental, and personal factors in one's life, and impact how individuals perform at all levels of sport. While most of the existing literature in this area has examined athlete mental health, coach mental health has received increased attention from researchers and sport organizations in recent years. Most of this research comes from the high-performance context; however, a large portion of the coaching workforce participates at the community level where coaches play a critical role in developing sport environments and supporting athletes from a variety of backgrounds and skill levels. This study addressed a key gap in the literature by examining the psychosocial and contextual factors that impact the mental health and well-being of community sport coaches. Coaches from across Atlantic Canada ($n = 77$, $M_{\text{age}} = 35.9$, $SD = 11.7$) completed an online survey, responding to questions about their sport-specific experience and demographics, coaching-related stressors, coping strategies, mental health and well-being, and mental health training and resources. Results indicated that more than half of the participants had flourishing mental health (52.6%, $n = 41$), while 42.3% experienced moderate mental health ($n = 33$), and only 5.1% of participants had languishing mental health ($n = 4$). A linear regression model revealed significant predictors of these outcomes: results suggest those who were older, had better coping strategies, and had performance stressors impact their mental health less experienced better mental health and well-being. These findings highlight the importance of effective coping strategies for the mental health of community sport coaches. Since this study represents a sample of active coaches, further research should explore predictors of mental health and well-being of individuals who are no longer coaching, which could reveal factors related to coach burnout and retention. Funding source: Mitacs, Canadian Sport Institute Atlantic.

Coach outcomes from a two-day functional fitness seminar to train autistic athletes

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Our previous research revealed a high demand from functional fitness coaches to increase their knowledge and skills to work with autistic athletes: 93% of surveyed coaches ($n = 118$) want to work with this population. There is a corresponding demand for functional fitness training by autistic athletes: 89% of surveyed autistic athletes ($n = 32$) were interested in participating (Hynes & Pangelinan, 2022). To address this need, we collaborated with coaches, therapists, researchers, and people on the autism spectrum to create a curriculum to increase coaching capacity to work with autistic athletes. This curriculum was piloted at a two-day seminar with 18 coaches of which 12 completed a post-seminar survey. The level of coach experience ranged

from no experience working with autistic athletes (27.7%), limited experience (9.09%), moderate experience (36.6%), and substantial experience (27.7%). Coaches were asked to report the extent the seminar curriculum increased their knowledge of autism. Coaches ranked the greatest areas of increased knowledge in creating programs for autistic athletes (72.7%), assessing behavioral strengths/difficulties (72.2%), teaching movements to autistic athletes (63.6%), monitoring athlete progress (63.6%), and communicating with autistic athletes (63.6%). Coaches were also asked to report the extent to which the seminar curriculum increased their confidence. Coaches endorsed that the seminar increased their confidence to create a training structure (72.7%) and communicate with autistic athletes (63.6%). Additionally, 70% of coaches reported being extremely likely to work with autistic athletes following the seminar. To build on this model, we are creating corresponding online learning modules and a coach development program with on-going support.

“Be stronger than your excuses”: Examining biased evaluations of fitspiration

Jesica Jabbar, Brock University; Sean Locke, Brock University; Tanya Berry, University of Alberta; Elaine Ori, University of Alberta

Fitspiration (fitspo) is a social media trend that uses photos and/or quotes to depict women's bodies as being desirable when thin and achievable through extreme exercise or eating practices. Studies have reported that viewing fitspo content negatively impacts body image, and leads to lower body satisfaction and lower positive affect for women. If internalized, the extremes promoted in fitspo may encourage exaggerated or biased thinking (i.e., cognitive errors). Cognitive errors represent a distorted lens that impacts how individuals perceive their experiences. We examined whether implicit or explicit evaluations correlated with message believability, social media behaviour, physical activity, and fitspo related cognitive errors (FCEs). Using a regression model, we investigated which variables predicted FCEs. Women ($N = 137$) between the ages of 18 to 65 ($M = 22.35$, $SD = 3.54$) completed an online cross-sectional survey measuring demographics, social media behaviour (frequency of searched and shared fitspo), and measures of FCEs and physical activity. Participants were then shown fitspo media, asked to rate their believability, and stated up to five thoughts they had about the media (coded into anti- and pro-fitspo comments). Finally, they completed an implicit association task that paired fitspo media with good or bad descriptors. Message believability ($M = 4.12$, $SD = 1.29$; 1-5 scale) and FCEs ($M = 4.97$, $SD = 1.74$; 1-9 scale) were positively correlated with pro-message comments ($message\ r = .216$, $FCE\ r = .254$, $p < .05$). Implicit evaluation scores only correlated with BMI ($r = .192$, $p = .034$). Physical activity ($b = 0.258$, $p = .003$), pro-message comments ($b = 0.190$, $p = .024$), and share frequency ($b = 0.189$, $p = .026$) significantly predicted FCEs ($R^2 = .198$). Positive explicit evaluations of fitspo and social media behaviour were related to FCEs, which may represent a maladaptive form of motivation. Future research should examine the potential causal impact of FCEs on mental health and physical activity.

Parent support for physical activity and motor development during early childhood: An application of the multi-process action control framework

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Promoting physical activity (PA) and fundamental movement skills (FMS) in early childhood is necessary to address the high rates of inactivity in children. Parent support is a determinant of PA in children; however, intentions are not always translated into behaviour resulting in an intention-behaviour gap. Parent support for PA and FMS in early childhood remains largely unexplored and further research is warranted given the importance of the early years on child development. Positioned within the multi-process action control framework (M-PAC), this study examined parents' intentions and support of PA and FMS in early childhood. A cross-sectional online survey was sent to parents ($n = 127$) of children aged 3-4 years old. The survey measured parents' intentions and support of PA and FMS as well as associated reflective (e.g., attitudes), regulatory (e.g., planning) and reflexive (e.g., habit; measured for PA support only) behaviours. Parents were categorized as either: (a) intenders who supported PA ($n = 72$) or FMS ($n = 33$), (b) intenders who did not support PA ($n = 18$) or FMS ($n = 21$), (c) non-intending supporters of PA ($n = 21$) or FMS ($n = 25$) or (d) non-intenders who did not support PA ($n = 16$) or FMS ($n = 47$). Discriminant function analyses identified one significant function for PA support (canonical $r = 0.39$, $p = 0.006$). Post hoc analyses showed that successful intenders had higher regulation, habit, and identity compared to non-successful intenders. One significant discriminant function was identified for FMS support (canonical $r = 0.61$, $p < 0.001$). Self-efficacy and regulation were significantly higher among the successful intenders. Most parents (73%) in our sample supported PA, but less than half (46%) supported FMS. Given the importance of FMS for PA, parent PA support interventions should also include strategies for parents to support FMS development in the early years. Interventions should prioritize fostering a combination of reflective, regulatory, and reflexive behaviours to translate intentions to support PA and FMS into behaviour among parents of young children. Funding source: North American Society for the Psychology of Sport and Physical Activity.

An exercise service for university students experiencing mental illness: A feasibility study of the Stride program

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Young adults experience high levels of mental illness, partly due to significant life events such as transitioning out of high school or developing financial independence. Universities are predominantly populated with young adults, and it has been shown that tertiary studies may pose additional stressors that further increase the likelihood of developing a mental illness. Universities and tertiary institutions provide a range of services designed to prevent and treat mental illness; however, there is insufficient evidence regarding the existence, delivery, or

effectiveness of on-campus exercise programs as a complementary treatment method for student mental illness. Stride is a 12-week, referral-based, peer mentor-led exercise program that has been operating at an Australian university since June 2020. In this single-arm, non-randomised study we aimed to investigate the feasibility and acceptability of Stride, as well as the preliminary effectiveness of the program with respect to mental illness, wellbeing, and lifestyle markers. Framed by the CONSORT guidelines for non-randomised pilot and feasibility trials, we collected survey data from 114 program participants ($M_{\text{age}} = 24.21$, 34 male, 79 female, 1 non-binary). The most commonly cited reasons for referral into the program were anxiety disorders (53.9%) and mood disorders (34.5%). Participants reported positive perceptions of program components (e.g., referral, mentor-mentee structure), the people in the program (e.g., facilitating staff), and the exercise sessions (e.g., content, duration). Analyses of preliminary effectiveness data indicated noteworthy pre-to-post-program reductions in depressive symptomatology ($d = .78$) alongside increases in physical activity ($d = .62$), quality of life ($d = 1.04$), and self-efficacy perceptions ($d = .39 - 1.19$). Our findings provide insight into the delivery and feasibility of on-campus exercise programs, and offer preliminary evidence for the role of structured exercise programs as a complement to student mental illness treatment pathways.

A multinational study to test the hypotheses of the physical activity adoption and maintenance model (PAAM)

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Consistent with dual-process approaches, the physical activity adoption and maintenance (PAAM) model proposes that physical activity behavior is regulated by explicit and implicit processes (Strobach et al., 2020). The aim of the present study is to test the theoretical assumptions of this model. Eight hypotheses were derived from the model: (1) past behavior, (2) intention, and (3) habit positively are positively associated with future physical activity (PA). In addition, we postulate that (4) intention and (5) habit mediate, at least in part, the link between past PA behavior and future PA behavior, while (6) affect and habit act as a mediating chain between past PA and future PA. Moreover, we propose that (7) self-regulation and (8) affect moderate the intention-behavior relationship. For the purpose of testing these hypotheses, data were collected by means of an online survey in English, German, and Italian at two measurement time points four weeks apart. The sample consisted of 422 participants ($M_{\text{age}} = 25.3$, $SD_{\text{age}} = 10.1$; 74.2% female) recruited from Germany, Switzerland, Italy, the United States, and Canada. Results using hierarchical linear regression analyses confirmed hypotheses 1 to 3, as past behavior, intentions, and habits each had statistically significant effects on future PA. In addition, intentions (4) and habits (5) significantly mediated the effects of past behavior on future PA. Moreover, the effect of past PA had a significant effect on future PA through a

mediation chain via affect and habit (6). A significant moderation effect of affect on the intention-behavior relationship (8) was found. However, the hypothesis that trait self-regulation moderates this relationship (7) was not supported. The results of the present study largely support the assumptions of the PAAM model. To examine the utility of the theory for the long-term process of initiation and maintenance of PA behavior, further longitudinal studies with a duration of several months and additional measurement time points (e.g., weekly) are needed.

Playing it safe: Is parent tolerance of risk in play associated with children meeting physical activity guidelines?

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Play outdoors has declined in developed nations with fears for children's safety a potential factor. This paper reports on cross-sectional data (via research panels in Dec. 2022) from 413 Australian parents/guardians (87% female) for their oldest/only child aged 5-12-years (49% girls, $M = 8.7$ years, $SD = 2.3$). The 32-item Tolerance of Risk in Play Scale (TRiPS) assessed parents' risk tolerance. Child measures included: adherence to PA guidelines (n of days in past 7-days children engaged in moderate-to-vigorous PA at least 60 minutes), active and adventurous play (average time playing actively/adventurously p/day in past week). A logistic regression was run for each predictor (a) children's active play (low/medium/high), (b) adventurous play (low/medium/high), (c) parents' risk tolerance (risk averse/somewhat risk averse/somewhat risk tolerant/risk tolerant); and the outcome (meeting/not meeting 60-minutes MVPA daily), adjusting for confounders. A fifth (22%) met PA guidelines, 22% had active play for 2hrs+ p/day (high), and 20% had adventurous play for 1hr+ p/day (high). Children with more active play ($OR = 2.2$, $CI [1.62, 2.99]$, $p < 0.0001$), more adventurous play ($OR = 1.9$, $CI [1.42, 2.52]$, $p < 0.0001$), and parents with higher risk tolerance ($OR = 1.4$, $CI [1.12, 1.84]$, $p < 0.01$) were more likely to meet guidelines. Modifying these factors could improve children's PA. Funding source: Deakin University, North American Society for the Psychology of Sport and Physical Activity.

"They're not tired of being supportive, everyone is just used to it": Prospective study of social support during prolonged concussion return-to-sport

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The return-to-sport (RTS) protocol is the pervasive concussion management strategy for athletes. Recovery from concussion typically takes two-weeks, yet athletes may experience longer recoveries (McCrory et al., 2017). Prolonged recovery may cause adverse psychosocial outcomes (i.e., anxiety, depression, or suicidal ideation; Caron et al., 2017). Psychosocial resources like social support may assist athletes with prolonged recoveries (Steins et al., 2022).

We explored a Canadian university athlete's social support during their prolonged concussion recovery. During RTS, the athlete completed concentric circles maps (Van Waes & Van den Bossche, 2020) to identify social support agents and their importance and indicated the types and degree of social support from each agent using the Perceived Available Support in Sport Questionnaire (Freeman et al., 2011). The athlete also completed a semi-structured interview about support received. The athlete identified seven social support agents in total and their mother ($M = 3.00$, $SD = 0.00$), athletic therapist ($M = 2.41$, $SD = 1.18$), teammate ($M = 2.24$, $SD = 1.15$), and roommates ($M = 2.00$, $SD = 1.37$) were ranked most important. For social support types, the athlete's mother offered the most emotional ($M = 3.41$, $SD = 0.54$), esteem ($M = 2.12$, $SD = 0.75$), and tangible ($M = 0.25$, $SD = 0.91$) support and their athletic therapist offered the most informational ($M = 0.72$, $SD = 0.44$) support. Across the support agents, six overarching themes related to social support were interpreted: (a) check-ins, (b) instructive and experiential advice, (c) prioritizing and encouraging recovery, (d) empathy, (e) "you are not your concussion", and (f) goal setting to promote psychological readiness factors. Our results from our prospective study offer novel insight into the support agents and types that fluctuate during a prolonged RTS. Findings may assist sport stakeholders in providing social support by increasing their understanding of athletes' evolving recovery needs during a prolonged concussion. Funding source: Social Sciences and Humanities Research Council Canada.

Competitive sport as a complex social system: Illustrating the iterative process of designing a self-compassion intervention for women athletes

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Competitive sport is a complex social system characterized by sub-systems (e.g., athletes) operating within larger systems (e.g., teams) that comes with inevitable challenges. Applying a complex social framework (i.e., considering context, programme theory, partners, key uncertainties, intervention refinement, and economics), the purpose of this research was to illustrate our pragmatic process of developing an athlete-informed self-compassion program to promote competitive women athletes' thriving in sport, despite adversity. Programme theory development began by conducting focus groups with our primary partners – competitive women athletes ($N = 19$; ages 16-34 years; $M = 22.6$; $SD = 5.4$) – to discuss preferences for learning and practicing self-compassion. Focus groups were audio-recorded and transcribed verbatim. The data revealed women athletes desire support from professionals and partners within their sport, such as coaches and sport clubs/associations. However, uncertainties remained about how professionals and partners can be involved. Additional uncertainties included where women prefer to access information about self-compassion, and the length of time they want to be involved in a self-compassion program. Intervention development for complex systems follows an iterative process of incorporating varying partner perspectives for continual refinement of the intervention. Therefore, future research phases will intentionally explore how partners (e.g., coaches) can support women athletes through a self-compassion

program, and continue conversations with women athletes to refine details around program modality. This iterative process promotes economic feasibility of the program, ensuring competitive women athletes receive the support they need to thrive in sport, despite challenges. Funding source: Social Sciences and Humanities Research Council of Canada, Sport Participation Research Initiative.

Mental toughness and sport anxiety among student-athletes in Taiwan

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Mental toughness (MT) and sport anxiety (SA) are two important psychological factors in an athlete's performance. These two constructs influence a student-athlete's experience and potential burnout in sports. This study aimed to examine the extent to which MT predicted SA. The participants were 280 student-athletes (M age = 19.69, SD = 2.69) from Taiwan (159 boys and 121 girls) classified into 4 competitive levels (CL): club, university, national, and international. All participants completed the Mental Toughness Questionnaire-48 (MTQ48) and the Sport Anxiety Scale (SAS). Five linear regressions were conducted. Regression 1 found that the total MT score (TMT) along with gender, age, and CL significantly ($p < .001$) predicted 26% of the variance in total SA (TSA) scores, with the only significant predictor being TMT. Regression 2 found the 4 subscales of the TMT scale along with gender, age, and CL significantly ($p < .001$) predicted 43% of the variance in the TSA score, with 3 of the 4 subscales being significant (challenge, commitment, control). Regressions 3-5 used TMT to predict the individual subscales of the TSA scale (somatic anxiety, worry, and concentration). Regression 3 entered the 4 subscales of TMT along with gender, age, and CL to significantly ($p < .001$) predict 35% of the variance in somatic anxiety. Challenge, commitment, and control subscales and CL were significant predictors. Regression 4 entered the 4 subscales of TMT along with gender, age, and CL to significantly ($p < .001$) predict 39% of the variance in the worry subscale. Challenge and control TMT subscales and CL were significant predictors. Regression 5 used the 4 subscales of TMT along with gender, age, and CL to significantly ($p < .001$) predict 28% of the variance in the concentration subscale. Challenge, commitment, and control subscales were significant predictors. It can be concluded that MT significantly predicts SA, and higher CL is associated with lower SA. We suggest that coaches use MT coaching strategies to decrease athletes' SA to improve their performance.

Exploring the barriers and facilitators to national movement behaviour guideline dissemination among health promoting organizations

Kaitlyn D. Kauffeldt, Queen's University; Guy Faulkner, University of British Columbia; Amy E. Latimer-Cheung, Queen's University; Jennifer R. Tomasone, Queen's University

National movement behaviour guidelines offer evidence-informed recommendations for how to obtain health benefits, yet they have had limited influence on practice and policy to date.

Factors at multiple levels determine the effective translation of knowledge into practice. Historically, little attention has been paid to assessing the social, organizational, and economic factors that influence the uptake of national movement behaviour guidelines; potentially contributing to their blunted impact on public health outcomes. The purpose of this study was to qualitatively explore the barriers and facilitators to disseminating national movement behaviour guidelines among health promoting organizations in Canada. Organizations involved in the development and dissemination of the Canadian 24-Hour Movement Guidelines for Adults aged 18-64 years and Adults aged 65 years or older (24HMG) were invited to participate in semi-structured interviews to explore barriers and facilitators to national-level movement behaviour guideline dissemination. Interview guides were structured using the consolidated framework for implementation research (CFIR). Ten interviews were completed. Transcripts were analyzed using inductive content analysis and resulting codes were deductively mapped onto the CFIR. Multi-level factors were identified that influenced the dissemination of national movement behaviour guidelines including available resources, individual dissemination knowledge and/or expertise, and ownership of the guideline contents and messages. Findings highlight the potential for the use of organizational theories to inform interventions designed to increase the uptake of national movement behaviour guidelines among health promoting organizations in Canada. Funding source: Public Health Agency of Canada, Canadian Society for Exercise Physiology, Queen's University, Social Sciences and Humanities Research Council of Canada.

Assessing a peripheral nerve stimulator for remediating cognitive and executive dysfunction in adolescents with persistent post-concussion symptoms

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Executive function encompasses a variety of processes that are important for daily living and school performance for adolescents, including regulation of goal-directed behaviors, working memory, and cognitive flexibility. However, these processes are often disrupted following concussion. The present study evaluated the efficacy of the Apollo Neuro Device (AN) for remediating cognitive and executive dysfunction in adolescents with persistent post-concussion symptoms (PPCS). The AN is a watch-like device that uses vibrations of different modes and intensities to stimulate afferent nerve fibers, and may help improve PPCS via autonomic nervous system balance. Adolescents presenting with PPCS at a local concussion clinic were invited to use the AN device. All participants completed a comprehensive assessment battery as part of their routine care, which included the Rivermead Post-concussion Symptom Questionnaire (RPQ), Vestibular Ocular Motor Screening (VOMS), parent-reported executive function via the Behavior Rating Inventory of Executive Function (BRIEF), and a modified CogState testing battery. Participants completed the assessment battery at two timepoints: before and after six weeks of daily AN use. Seventeen adolescents opted to complete the AN intervention and were matched to a standard treatment control group ($n = 17$) on age, sex, and

concussion injury characteristics. The AN and standard treatment groups did not differ on recovery of somatic or affective symptoms on the RPQ, VOMS outcomes, nor on any domain of parent reported executive function (p 's > .08, d 's < 0.5). However, the AN group experienced greater improvements in accuracy on a one-back working memory task from timepoint one to two in comparison to the standard treatment group (p = .03, d = 0.68). The AN group also displayed a larger reduction in cognitive RPQ symptoms, but this was not significant (p = .06, d = 0.55). These results provide preliminary evidence suggesting that the AN device may help facilitate recovery of working memory function in adolescents with PPCS. Funding source: Board of Medicine.

The Lola study: Testing the effects of 3D optical scanning on women's body image

Samantha Kennedy, Louisiana State University; Alex Garn, Louisiana State University

Three-dimensional (3D) optical scanning devices can assess body composition and health indicators in minutes. 3D scans produce an avatar picture of one's physique that provides detailed visual and numeric information on body lengths, circumferences, bone, fat, and lean mass. While access to these types of devices is increasing, little is known about how 3D scans effect body image. Using an experimental design, this study investigated how delivery of body composition information affected females' body image. Specifically, we compared differences in body satisfaction based on exposure to a 3D scan or analogous numerical information. Women (N = 320, M age = 30.18, SD = 11.41) were randomly assigned into four groups (G) after stratification based on BMI: G1 (3D scan – normal weigh, n = 80), G2 (3D scan – overweight/obese, n = 80), G3 (numerical information – normal weight, n = 80), or G4 (numerical information – overweight/obese, n = 80). Participants in the 3D scan groups received an avatar picture and numerical body composition information of "Lola", an adult female with the average BMI (26.4) for adult women in the US. Participants in the numerical information groups only received Lola's body composition information in numerical form. All participants were asked to write a brief interpretation of Lola's information. After completing a distraction survey, participants completed the Body Areas Satisfaction Scale (9-items; 5-point scale; α = .82) to assess body image. Group descriptive statistics were: G1 = 3.35, SD = .63; G2 = 2.98 SD = .67; G3 = 3.40, SD = .66; and G4 = 3.15, SD = .69. ANOVA results revealed a treatment effect, $F(3,316)$ = 12.38, p < .01, es = .11. Post hoc tests showed significant mean differences in all body image comparisons between normal BMI and overweight/obese BMI groups and no differences between 3D scan and numerical information groups with the same BMI classification. Findings suggest that 3D scanning devices do not appear to undermine women's body image to a greater extent than receiving numerical information related to body composition.

The LIFE Study: Lifestyle intentions for female empowerment

Samantha Kennedy, Louisiana State University; Alex Garn, Louisiana State University

Three-dimensional (3D) optical scanning offers an interactive method for measuring and tracking information pertaining to body size, shape, and composition as well as obtaining feedback on individual health and fitness. Results from these assessments include not only numeric data comparable to results from traditional tape measurements and bioimpedance analysis (BIA), but also monochromatic images of the user's figure. While this technology is becoming increasingly accessible, research has yet to uncover the implications of scanning on user body image. Applying a repeated-measures design, The LIFE study investigated how the scanning experience effects multiple components of body image including self-evaluation of physical attractiveness and the valuation of one's physical appearance. Specifically, women ($N = 66$, M age = 28.50, $SD = 11.68$) completed baseline measures of body image using the appearance evaluation (7-item, 5-point scale) and appearance orientation (12-item, 5-point scale) subscales of the Multidimensional Body-Self Relations Questionnaire, personality using the Big Five Inventory-2 (60-item, 5-point scale), and physical activity using Godin and Shephard's Leisure Time Exercise Questionnaire. Following a 3D optical scan and in-depth review of the results, participants were asked to complete the same subscales of the MBSRQ. Regression analysis reveal that women with higher BMIs showed greater change in their appearance evaluation scores following scanning than women with lower BMIs ($M_{BMI} = 25.2$, $SD = 5.48$; $\beta_{highBMI} = 0.59$, $p < 0.01$; $\beta_{meanBMI} = 0.76$, $p < 0.01$; $\beta_{lowBMI} = 0.92$, $p < 0.01$). Similarly, women who scored higher in extroversion on the BFI-2 showed greater change in their appearance orientation following scanning than women with lower extroversion scores ($M_E = 3.46$, $SD = 0.70$; $\beta_{Ehigh} = 0.73$, $p < 0.01$; $\beta_{Emean} = 0.86$, $p < 0.01$; $\beta_{Elow} = 1.00$, $p < 0.01$). Findings suggest that assessing a female's BMI and trait characteristics may help identify groups more sensitive to the effects of 3D optical scanning on aspects of body image.

Mindfulness induction and executive function after high-intensity interval training with and without mindful recovery intervals

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High intensity interval training (HIIT) is a form of activity consisting of multiple short exercise bouts interspersed by recovery intervals. HIIT is beneficial for physical and mental health, with recent evidence showing acute benefits of HIIT to subsequent cognitive performance requiring executive function (EF). Similar EF enhancements have been observed following acute engagement in mindfulness, a psychological state characterized by heightened awareness and attention with minimum evaluative and judgmental thought processes. By incorporating mindfulness activities into the recovery intervals of HIIT, this study investigated the efficacy of an innovative mindful HIIT (mindfulness + HIIT) protocol versus traditional HIIT without mindfulness during recovery intervals (HIIT-only) in inducing mindfulness state and enhancing EF performance. Forty adults (22.0 ± 3.4 years) completed the mindful HIIT and HIIT-only conditions on separate and counterbalanced days. Before and after each condition, participants performed three tasks (flanker, switch-flanker, n-back) to assess inhibitory control, cognitive flexibility, and working memory components of EF. The results showed greater mindfulness

induction following the mindful HIIT compared to the HIIT-only condition and a positive correlation between dispositional mindfulness with the degree of mindfulness induction selectively for the mindful HIIT condition. Response accuracy during the switch-flanker task improved from the pretest to post-test for the HIIT-only condition ($89.8 \pm 10.5\%$ vs. $93.5 \pm 7.0\%$, $t = 5.4$, $p < 0.01$) but remained unchanged for the mindful HIIT condition ($90.7 \pm 10.0\%$ vs. $91.6 \pm 7.9\%$, $t = 1.2$, $p = 0.23$). No between-condition difference in other EF outcomes was found. These findings suggest that incorporating mindfulness activities during the recovery intervals of HIIT is effective for inducing state-related mindfulness. However, such mindfulness induction may attenuate HIIT-related benefits to cognitive flexibility and may not contribute to additional benefits to inhibitory control and working memory.

Developing culturally inclusive approaches to sport and exercise psychology and motor behavior research in NASPSA

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Globally, systematic disparities within kinesiology research and healthcare practices limit the relevance and applicability of our discipline's work to racially/ethnically minoritized populations (Choy et al., 2022). Locally at our institution through pilot work and ongoing discussions between the kinesiology department's equity, diversity, and inclusion committee, faculty, and graduate students, biases were identified in the design and evolution of scientific instruments (e.g., electroencephalography [EEG]) that are commonly used in various subdisciplines of kinesiology to assess temporal aspects of brain function, neurocognitive changes encompassing exercise, and negative impacts of concussions. Most EEG systems use a fitted cap that requires limited obstruction between sensors and the scalp to ensure low impedance and improved signal-to-noise. This design inherently fails to accommodate for thick hair types and/or various hairstyles that are common among Black or African American individuals which may interfere with EEG signal quality (Etienne et al., 2020) and in turn lead to misdiagnosis, underdiagnosis, and prescription of inappropriate treatments in clinical settings. Further, the resulting lack of data derived from Black populations (< 2% of samples in US-based clinical trials; Ma et al., 2021) makes research findings less generalizable. Thus, the limited availability of alternative measurement approaches has problematic implications for both research and clinical practice, ultimately contributing to disparities in access to healthcare and effective treatments (Choy et al., 2022; Webb et al., 2022). In line with current NASPSA initiatives and the mission of our university as a minority-serving institution committed to equity, diversity, and inclusion efforts, the purpose of this presentation is to initiate an important conversation among NASPSA scholars with the goal to offer and collect recommendations that are culturally inclusive and reduce health disparities in the use of EEG technology in research and clinical settings.

Social norms and intentions matter differently depending on attraction toward physical activity: A moderation analysis

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Despite decades of research that helped to identify various predictors of physical activity (PA) engagement, promoting sustained PA engagement of the general public remains a major challenge. A limitation of previous research lies in the focus on sociocognitive predictors of PA, and there is a need to consider individuals' attraction-antipathy toward PA that results from repeated affective experiences of PA. Leveraging Brand and Ekkekakis's (2018) affective-reflective theory, the present study examined whether individuals' attraction toward PA moderated the influence of two sociocognitive predictors: social norms and PA intentions. Online surveys were administered to university students (M age = 20.4 ± 4.5 years) at baseline ($N = 582$) and at a two-week follow-up ($N = 327$). Results demonstrated that attraction toward PA negatively moderated the influence of injunctive and descriptive social norms on PA intention strength (i.e., intensity of one's commitment to engage in regular PA). That is, social norms were more predictive of PA intention strength for those who were less attracted to PA. However, the influence of social norms was not moderated by attraction toward PA when the outcome variable was decisional intention (i.e., number of PA sessions one intends to complete), suggesting that intention strength and decisional intention represent different intention constructs. For the relationship between PA intentions and PA behaviors, the interaction term was statistically nonsignificant, but simple slopes suggested that attraction toward PA may positively moderate the influence of PA intentions on PA behaviors. That is, intentions at baseline more strongly predicted PA behaviors two weeks later for those who were more attracted to PA. Overall, the results suggest that the importance of sociocognitive variables differs depending on individuals' attraction toward PA, and align with dual-process perspectives that consider both sociocognitive and affective motivators of PA.

Preliminary effects of sex and task difficulty on motor imagery performance

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It is increasingly acknowledged that motor imagery interventions should be tailored to the individual. However, at present it is unclear if sex differences exist in motor imagery ability. Such differences may indicate a need for different training strategies when using motor imagery with females versus males. One approach for measuring motor imagery ability is mental chronometry, or the comparison between time taken to physically perform a task versus imagine performing that same task. Greater similarity between the two task conditions is indicative of higher motor imagery ability. The purpose of this study was to examine sex differences in mental chronometry. At present, we have collected data from 74 healthy young adults (40 female). Participants were timed as they walked and then imagined walking down three different paths at a natural pace. We manipulated task difficulty by varying path width. Data analysis focused on differences in imagined and real walking times. In both sexes, imagined walking times were significantly shorter than real walking times. Male participants

exhibited the most pronounced discrepancies between real and imagined walking times in the most difficult condition. In contrast, female participants exhibited similar timing discrepancies across difficulty levels. These results indicate a consistent effect of young healthy adults overestimating their speed when performing a walking task. However, males as opposed to females may be particularly likely to misestimate performance as the task increases in difficulty. Future analysis will examine the potential contribution of executive functions to these sex differences, as this cognitive domain has previously been linked to performance on mental chronometry tasks of higher difficulty. Funding source: Canadian Institutes of Health Research.

The relationship between sleep hygiene, sleep quality, and indicators of psychological distress in Canadian student-athletes

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In Canada, 30% of student-athletes report high levels of psychological distress. Student-athletes also demonstrate overall poor sleep quality, with 67% identified as poor sleepers. Two modifiable factors that may be linked to student-athletes' psychological distress are sleep hygiene (i.e., practices, habits, and behaviors that promote restful sleep such as a sleep schedule) and sleep quality (i.e., overall subjective experience of sleep, including duration, depth, and uninterruptedness, as well as how refreshed and alert the individual feels upon waking). Inadequate sleep hygiene and poor sleep quality have both been linked to mental illness, including depression and anxiety disorders. The purpose of this study was to investigate the mediating role of sleep quality on the relationship between sleep hygiene and psychological distress among Canadian post-secondary student-athletes' ($N = 115$; M age = 21.6 years; $SD = 2.5$, 67% men). Data was collected through an online survey during Fall 2022. Students reported their personal, academic and sports demographics, sleep hygiene (Sleep Hygiene Index, SHI), sleep quality (Pittsburgh Sleep Quality Index, PSQI) and indicators of psychological distress (Kessler 6, K6). Participants averaged scores of 12.8 for the K6, 28.6 on the SHI, and 9.3 for the PSQI. Sleep quality mediated the relationship of sleep hygiene with psychological distress ($\beta = 0.28$, $p < 0.05$). Additionally, the direct effect accounted for 69% and indirect effect 31% of the total effect of the model. Moreover, student-athletes living off campus, non-starters, those receiving no academic scholarship, and those in season scored lower on the K6, SHI, and the PSQI. Findings highlight that sleep hygiene is a modifiable behaviour that may impact psychological distress. Experimental studies are needed to test sleep hygiene interventions and their impact on sleep quality and indicators of mental health.

The acute effects of hatha yoga on heart rate variability and electroencephalography spectral power in young adults with mental health symptoms

Danielle Lang, Auburn University; Janette Hynes, Indiana University Bloomington; Gage Ellis, Indiana University Bloomington; Danielle Wadsworth, Auburn University; Melissa Pangelinan, Indiana University Bloomington

Despite the increased prevalence of mental health symptoms among young adults, 24.7% of adults in the U.S. report an unmet need for mental health treatment. Yoga is an accessible and alternative form of mental health treatment shown to reduce symptoms of anxiety, depression, and stress. However, few studies have examined the physiology that may underlie the changes in internalizing mental health symptoms due to participation in an acute bout of yoga. To address this knowledge gap, 41 young adults (3M/38F, $M = 20.9$ years, $SD = 3.37$) participated in a randomized cross-over design study with a 45-minute session of hatha yoga or a non-active control session. The order of the sessions was randomized with 7-days between sessions. Heart rate variability (HRV) and electroencephalography (EEG) were recorded at rest for 5 minutes before and after each session. A linear mixed-effect regression assessed the differences from pre- to post-test between the two conditions for HRV indices (low-frequency high-frequency ratio (LF/HF) and root mean square of successive differences (RMSSD) and EEG spectral power (average absolute alpha and theta power). Significant main effects of time and condition and a time x condition interaction for alpha and theta power were observed ($p < 0.05$). Significantly lower alpha power was observed for the control group from pre- to post-test, but not for the yoga group. Significant main effects of condition, HF, and a time x condition interaction were observed for LF/HF ($p < 0.001$). No significant main effects or interactions were observed for RMSSD. These results suggest that an acute session of yoga results in neural modulation and increases parasympathetic activity. These physiological changes may underlie the effects of yoga on internalizing symptomology.

The impact of doing high-fives with a partner on psychophysiological parameters in children

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High-fives are a social phenomenon that can be frequently observed in and outside of sports. Based on embodied cognition approaches (e.g., Barsalou, 2008) and the model of affectionate touch (Jakubiak & Feeney, 2017), high-fives have been shown to lead to an increase in perceived closeness to the partner (Lautenbach et al., 2021) and a decrease in cortisol (Lautenbach et al., 2019). An incidental finding showed that high-fives in comparison to thumps up led to the highest motivation level in children (Morris & Zentall, 2014). We aimed to replicate the effects of high-fives on motivation, and additionally investigate the effects of high-fives on affect, perceived closeness, and cortisol in children for the first time. In a between-subject design 44 children performed either high-fives ($n = 22$; M age = 10.00) or low-fives ($n = 22$; M age = 10.38) for 2 minutes with a partner. Before and after performing the movement, children provided information on their motivation to solve an upcoming puzzle (visual analogue scale), their affect (i.e., arousal and valence using self-assessment manikins), and their perceived closeness to their partner (inclusion of other scale), and provided salivary samples for cortisol analyses. Results indicate a multivariate main effect for time ($p < .001$, $\eta^2 = .643$). Univariate testing confirms a decrease in valence ($p = .027$, $\eta^2 = .128$), cortisol ($p < .001$, $\eta^2 = .328$) and an increase in perceived closeness ($p < .001$, $\eta^2 = .487$) from pre to post over all participants. Also, a multivariate interaction effect ($p = .045$, $\eta^2 = .287$) was detected, however only confirmed for motivation ($p = .024$, $\eta^2 = .133$). Post-hoc t -tests show a significant increase

in motivation in the high-five group from pre to post, $t(21) = 2.233$, $p = .037$, $d = 0.601$, whereas only descriptively motivation decreased in the low-five group ($MDiff = 9.34$; $p = .068$). Overall, we were able to show that high-fives can lead to an increase in motivation to perform an upcoming task in children and thus, can be used intentionally in sport and school settings by coaches or teachers.

Exploring changes in social experiences, physical activity, and psychological wellbeing among older adults during the COVID-19 pandemic

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Concerns about social isolation, physical inactivity, and psychological well-being (PWB) were raised during the COVID-19 pandemic; however, potential change in older adults' social experiences, physical activity (PA), and PWB during the pandemic remains unclear. We examined change in social experiences (descriptive and injunctive norms, social network, social participation, social connection, and quality and quantity of social support [SS]), PA (moderate-to-vigorous [MVPA], light PA) and PWB (stress and positive and negative affect) among older adults. We hypothesized that social experiences, PA, and PWB would become worse when pandemic-related public health restrictions were greater. Adults ($N = 831$ aged 55-86 years, 75% women, 91% White, and 62% retired) completed six monthly online surveys between October 2021-June 2022. Repeated measures ANOVAs were conducted with each variable. A linear improvement was found for negative affect ($F(1,334) = 33.04$, $p < .001$, $\eta_p^2 = .10$), consistent with an overall relaxing of restrictions between baseline and month six. Some variables exhibited significant curvilinear patterns, suggesting they were more responsive to increased restrictions introduced during the Omicron wave, and relaxing of those restrictions by the end of the study. Specifically, there was a significant quadratic effect of time on stress ($F(1,336) = 4.99$, $p = .03$, $\eta_p^2 = 0.2$); a cubic effect on SS quality ($F(1,328) = 5.60$, $p = .02$, $\eta_p^2 = .02$); a fourth-order effect for social participation ($F(1,351) = 6.83$, $p = .01$, $\eta_p^2 = .02$); and a fifth-order effect for SS quantity ($F(1,333) = 6.79$, $p = .01$, $\eta_p^2 = .04$), MVPA ($F(1,351) = 13.69$, $p < .001$, $\eta_p^2 = .04$), light PA ($F(1,351) = 57.22$, $p < .001$, $\eta_p^2 = .14$), and positive affect ($F(1,333) = 7.70$, $p = .01$, $\eta_p^2 = .02$). Injunctive and descriptive norms, social connection, and social network did not significantly change across six months. Hypotheses were partially supported, although some variables seemed more sensitive to the cyclic COVID-19 waves and restrictions. Results suggest restrictions may have negatively impacted older adults' PA and wellbeing during this time. Funding source: Brawn Family Foundation.

Validity evidence for responses to the newly expanded version of the I COPPE Actions scale from adults with obesity

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Well-being actions refer to an individual's actions that may improve their status in six domains of their life: interpersonal, community, occupational, physical, psychological, and economic (I COPPE) in an online behavioral intervention context. While validity evidence for responses to the original I COPPE Actions scale (i.e., 12 items) was previously reported, validity evidence for responses to the newly expanded version of the I COPPE Actions scale (i.e., 18 items) has not yet been reported. The objective of this study was to provide validity evidence for responses to the newly expanded version of the I COPPE actions scale from adults with obesity under an exploratory latent variable approach. Longitudinal data from the 2018 Fun For Wellness Effectiveness Trial (ClinicalTrials.gov, identifier: NCT03194854) were reanalyzed in the current study. In the 2018 Fun For Wellness Effectiveness Trial, adult participants with obesity ($N = 667$) provided data via self-report at three time points: baseline, 30 days after baseline, and 60 days after baseline. The a priori measurement theory specified a six-dimensional correlated structure of well-being actions to govern responses to the I COPPE Actions scale. The a priori measurement model exhibited exact fit to well-being actions data at baseline within an exploratory latent variable approach. There was strong evidence for at least partial strict measurement invariance by time for responses to the scale. Convergent (or divergent) correlations between concordant (or discordant) pairs of well-being actions self-efficacy scores at 30 days post-baseline and latent well-being actions factors at 60 days post-baseline provided strong evidence for hypothesized relationships to other theoretically relevant variables. We believe that use of the newly expanded version of the I COPPE Actions scale to derive multidimensional measures of well-being actions may be of potential utility to future research in the interdisciplinary study of human movement and in a population of adults with obesity. Funding source: Erwin and Barbara Mautner Charitable Foundation.

Physical activity and energy intake in US young adults with depression: National Health and Nutrition Examination Survey 2017 – 2020 pre pandemic

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Physical activity (PA) and energy intake relate to the prevalence of depression in young adults, but these effects may differ by sex. We analyzed differences in PA levels and energy intake according to the sex and depression presence among young adults, to investigate the relationships among these factors. Data of 750 young adults aged 18-24 years (381 males) were obtained from the National Health and Nutrition Examination Survey (2017 March–2020 Pre Pandemic). We analyzed PA levels (occupational and recreational PA, and transport) and energy intake (total, carbohydrate, protein, and fat) through independent t -tests and two-way analyses of variance. PA variables were collected once through a computer-assisted personal interview system. Dietary variables were collected through 24-hour recall method. All participants with depression spent significantly less time in vigorous recreational activities ($t = 4.788, p < 0.001$) than those without depression. There was a significant interaction effect between sex and

depression in moderate recreational activity ($F(1, 749) = 5.041, p < 0.01$). And males with depression spend significantly less time in moderate recreational activities ($t = -1.081, p < 0.01$) than those without depression. However, there was no significant difference in total PA between the depression group and non-depression group in both sexes. There was a significant interaction effect between sex and depression in all energy intake variables. And males with depression consumed significantly less total energy ($t = 0.337, p < 0.05$), carbohydrates ($t = 1.636, p < 0.05$), and protein ($t = 2.416, p < 0.01$) than those without depression. Females with depression consumed significantly less protein ($t = 2.640, p < 0.01$) than those without depression. We found significant differences among low physical activities, low energy intake, and depression prevalence in the US young adults, but with patterns differing according to sex. These findings highlight the need for different approaches of implementing PA and nutrition strategies according to the sex.

Effects of virtual reality training on boxing performance

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Virtual reality training is considered to be a promising safe complementary training in sports, allowing to maintain the psycho-perceptual-motor fidelity of a task. However, its impact on performance factors such as anticipation and decision-making have not been studied extensively in sports, especially in boxing. The objective of this study was to measure the effects of a commercial virtual reality boxing simulation on anticipation and decision-making skills in elite boxers, to confirm the effectiveness of this type of training. Twenty-three elite boxers were recruited in this study (including 11 women) divided into two randomized groups: a virtual reality trained group and an active control group. The experimental design consisted of sixteen training sessions and two measurement sessions. The training sessions corresponded to the duration of an amateur boxing bout (3*3 minutes, 1 minute rest between each round). The trained group faced virtual opponents in a boxing simulation (thrill of the fight) while the active control group punched a bag for approximately the same training duration. Measurement sessions were carried out before and after all the training sessions. They consisted of a technical sparring in a boxing ring. Participants' gaze was recorded with an eye tracker (Tobii Pro Glasses 3, Tobii AB, Danderyd, Sweden) and their fights were also recorded. To evaluate the effects of the training on anticipation and decision making, visual behaviors (number and duration of fixations; saccades) and performance (subjective rating scale) were measured during the field sessions. Statistical analysis with linear mixed models is in progress. Visual behaviors and performance variables will be set as dependent variables, the two experimental training sessions as fixed effect factors and participants as random effect factor. This study will provide information on the effectiveness of a virtual reality training simulation in boxing. Virtual reality could greatly contribute to injury prevention in combat sports but validation is required before adopting such approaches. Funding source: Mitacs, Programme Synergique.

Food restriction for weight change: Prevalence and correlates in a large Canadian adolescent sample

Kristen M. Lucibello, Brock University; Scott T. Leatherdale, University of Waterloo; Karen Patte, Brock University

Weight and weight control were among the central social narratives perpetuated throughout the COVID-19 pandemic. More than half of adolescents reported seeing social media content that perpetuated weight-related stigma and stereotypes, as well as dietary restriction during this period. Concurrently, maladaptive eating behaviours have substantially risen among adolescents during the COVID-19 pandemic. Therefore, the purpose of the present study was to examine the prevalence of food restriction specifically for weight change in a large Canadian adolescent sample, and how it relates to health behaviours (days of resistance training, minutes of moderate-to-vigorous physical activity [MVPA]) and well-being (flourishing, self-rated mental health). Adolescents ($N = 51,875$, $M_{\text{age}} \pm SD = 14.96 \pm 1.54$, 52% women) completed a cross-sectional survey as participants in the 2020-2021 wave of the COMPASS study. Descriptive statistics, chi-square tests and linear regression were used to test the proposed relationships. Although 62% of adolescents perceived their weight as 'about right', 1 in 3 adolescents reported restricting/altering their food intake to manipulate their weight and shape at least once a week (42% of which reported restricting every day). After controlling for gender, age, socioeconomic status, and perceived weight, food restriction was associated with higher levels of resistance training ($\beta = .17$, $p < .001$, $R^2 = 6\%$) and MVPA ($\beta = .08$, $p < .001$, $R^2 = 5\%$), as well as lower flourishing ($\beta = -.11$, $p < .001$, $R^2 = 8\%$) and self-rated mental health ($\beta = -.10$, $p < .001$, $R^2 = 10\%$). This evidence underscores the importance of multifaceted assessments of weight-related perceptions and intentions in relation to health, and future research that investigates how even subtle or infrequent forms of dietary restriction relate to health and well-being in adolescents over time is warranted. Funding source: Social Sciences and Humanities Research Council of Canada, Canadian Institutes of Health Research.

A retrospective examination of the prevalence and correlates of weight commentary in adolescent girls sport

Kristen M. Lucibello, Brock University; Madison F. Vani, University of Toronto; Catherine M. Sabiston, University of Toronto

Sport participation can foster positive experiences and well-being for adolescents. However, girls sport has also been noted as an evaluative and weight stigmatizing environment, with regular occurrences of weight commentary and poorer resultant well-being and sport experiences among girl athletes. Importantly, the persistence of psychological ramifications of weight commentary in girls sport over time remains less understood. The purpose of the present study was to examine how a history of weight commentary in adolescent girls sport relates to body image and well-being in young adulthood. Participants were young women ($N = 168$, $M_{\text{age}} = 21.24 \pm 1.70$ years) from a prospective longitudinal cohort study investigating girl athletes' sport experiences. Participants completed a cross-sectional survey on their

retrospective weight commentary experiences during girls sport, as well as their current body image (appearance and fitness self-conscious emotions) and well-being (internalized weight stigma, depressive symptoms). Frequency analyses tested the prevalence, sources, and target (i.e., weight gain, weight loss) of weight commentary in sport. Multivariate analysis of variance models examined differences in (a) appearance emotions, (b) fitness emotions, and (c) well-being between women with and without a weight commentary history. Just under half of women (47.7%) received weight commentary during sport at least sometimes, with parents (47%) and coaches (40%) being the most common sources. Women with weight commentary histories reported more current appearance shame ($p = .001$, $\eta_p^2 = .07$), guilt ($p = .01$, $\eta_p^2 = .04$) and embarrassment ($p = .02$, $\eta_p^2 = .03$), as well as higher depressive symptoms ($p = .014$, $\eta_p^2 = .04$) and internalized weight stigma ($p = .002$, $\eta_p^2 = .05$). No differences in fitness emotions were found. These findings suggest that sport stakeholder education on avoiding weight commentary, as well as policy to prevent its occurrence, are important steps towards fostering more adaptive girls sport experiences and well-being over time. Funding source: Social Sciences and Humanities Research Council of Canada.

Physical activity barriers among visible minority and Indigenous adults living with type 2 diabetes: A scoping review

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The prevalence of type 2 diabetes in Canada is rising, with visible minorities (i.e., a term used in the Canadian context to describe persons other than Indigenous Peoples who are non-Caucasian in race or non-White in colour) and Indigenous Peoples disproportionately affected. Further, visible minorities and Indigenous adults in Canada are less likely to participate in physical activity, which is a key component in the management of type 2 diabetes. An examination and synthesis of published studies on physical activity barriers among visible minority and Indigenous adults living with type 2 diabetes is needed to clarify unique barriers and identify potential solutions relevant to physical activity interventions among these populations. This research used the Arksey and O'Malley (2005) scoping review framework to identify peer-reviewed and grey literature exploring physical activity barriers among visible minorities and Indigenous adults living with type 2 diabetes in Canada, the United States, the United Kingdom, Australia, and New Zealand. After screening and data characterization of 766 articles, 19 studies met the scoping review's inclusion criteria. Interestingly, none of the 19 studies were based in Canada. Among the studies included, physical activity barriers among visible minority and Indigenous adults living with type 2 diabetes were categorized as either internal (factors that are within the individual, e.g., lack of time, lack of motivation, health issues, emotions) or external (factors that are outside the individual, e.g., financial constraints, culture, physical environment, weather). Notably, all studies in the scoping review identified an aspect of culture (a set of meanings and ideas shared by a group of people) as a unique physical activity barrier among visible minority and Indigenous adults living with type 2 diabetes. Future research should devise culturally inclusive strategies to address physical activity barriers in

visible minority and Indigenous adults living with type 2 diabetes to improve effectiveness of intervention programs.

Coping together with the COVID-19 crisis: Does leadership matter?

Kevin Mahot, Nantes Université; Emilie Pété, Nantes Université; Noémie Lienhart, Nantes Université; Julie Doron, Nantes Université

Teamwork and interpersonal coordination are key to successful teams in sports. The way teammates combine efforts may serve to manage stressful situations they may share and face on the road to success. Therefore, communal coping appears to be a relevant framework for investigating how team members coordinate and share strategies to collectively deal with stressors. This study aimed to better understand how coping takes place within a professional sports team as a communal process when dealing with the COVID-19 crisis and to what extent leaders influence this process. 20 male athletes ($M_{age} = 28.5 \pm 4.00$) from a professional ice hockey team competing at the highest French national level participated in semi-structured interviews ($M_{length} = 53.45 \pm 7.52$) in December 2020 (i.e., lockdown during which athletes were allowed to practice together but the competitions were postponed). Data were analysed using thematic analysis. Results revealed that players used different types of communal coping strategies to face the COVID-19 crisis such as problem-focused communal efforts (e.g., effort expenditure through intra-team tournament), relationship-focused coping (e.g., collective moments and sharing), and communal management of emotions (e.g., caring conversation in the locker room or in a group chat). Results highlighted also that leaders played an active role in the deployment of communal coping strategies by both promoting a positive social environment and initiating collaborative strategies. This study provided new insights into communal coping processes in sports focusing on the way members of a team cope with a shared stressful situation and especially the role played by leaders in this process were underlined. Findings suggest several theoretical and practical implications. Staff could be encouraged to identify leaders and train them to develop a sense of “we” in order to improve the team’s coping effectiveness when dealing with a crisis period. Funding source: French Ministry of Higher Education and Research Cifre.

Assessing a peripheral nerve stimulator for improving cardio-autonomic and clinical outcomes in adolescents with persistent post-concussion symptoms

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The present study evaluated the efficacy of the Apollo Neuro Device (AN) for remediating cardio-autonomic dysfunction and improving clinical outcomes in adolescents with persistent post-concussion symptoms (PPCS). The AN is a watch-like device that uses vibrations to stimulate afferent nerve fibers. These vibrations can help improve autonomic nervous system

balance, and thus may have a positive impact on cardio-autonomic dysfunction and clinical outcomes associated with PPCS. Adolescents presenting with PPCS at a local concussion clinic were invited to use the AN device. Those who volunteered to use the device completed a six-week intervention consisting of daily AN use. The AN group ($n = 16$) was compared to a control group ($n = 16$) who received standard treatment and were matched on demographics including age, sex, and concussion injury characteristics. All participants completed a comprehensive assessment battery as part of their routine care. Participants completed the assessment battery at two timepoints, six weeks apart, encompassing pre- and post-intervention for the AN group. Outcome measures included concussion symptoms indexed by the Rivermead Post-concussion Symptom Questionnaire (RPQ); the Beck Youth Inventory-Depression Scale (BYI-D); Neuro-QoL sleep disturbance and fatigue scales; and time and frequency domain metrics of heart-rate variability (HRV). The AN group experienced a greater reduction in fatigue from timepoint one to two in comparison to the control group ($p = .04$; $d = 0.66$). The AN group also had a greater change in CVNN and RMSSD during 1-minute hand grip contraction and 1-minute deep breathing (p 's $< .04$; d 's > 0.64), suggesting the AN group had a greater recovery in the ability to modulate HRV in accordance with situational demands. There was also a moderate nonsignificant correlation between change in fatigue and hand grip RMSSD ($r = 0.34$, $p = .06$). These results suggest that the AN device may be a useful intervention for improving clinical and cardio-autonomic outcomes in adolescents with PPCS. Funding source: Board of Medicine.

The female athletic ideal — friend or foe? Fit, thin, and athletic body ideals and their associations with women's body image

Maryam Marashi, University of Toronto; Kristen M. Lucibello, Brock University; Catherine M. Sabiston, University of Toronto

Internalization of body ideals are critical predictors of body image and health behaviors such as physical activity. A simultaneous drive for both thin and athletic ideals (i.e., the fit ideal) is shown to be suboptimal for women's health. However, evidence also suggests that the internalization of an exclusively athletic ideal may not be as detrimental when compared to the historically thin ideal. Thus, research is warranted to explore unique combinations of thin and athletic ideal internalization in women. In a sample of 399 women ($M_{age} = 25.6$, $SD = 5.4$), the purpose of this study is to examine the endorsement of thin and athletic body ideals and assesses groups differences on measures of negative body-related self-conscious emotions (appearance and fitness shame, guilt, envy, embarrassment) and positive body image (body appreciation, functionality appreciation, appearance-related authentic pride, and fitness-related authentic pride). Using a mean-split, participants were grouped into fit ($n = 112$), thin ($n = 84$), athletic ($n = 58$), and neutral ideal ($n = 145$) groups which were operationalized by high-high, high-low, low-high, and low-low levels of thin and athletic ideal internalization, respectively. Three multivariate analyses of variance were conducted to examine body ideal profile differences in negative appearance, fitness self-conscious emotions, and positive body image. There were statistically significant ($p < .001$) group differences in negative appearance ($\eta^2 = .05$) and fitness ($\eta^2 = .06$) self-conscious emotions, and positive body image ($\eta^2 = .09$). Bonferroni-corrected post-hoc comparisons indicated that the athletic and neutral ideal groups

generally scored lower on negative self-conscious emotions and higher on positive body image in comparison to both the fit and thin ideal groups. Results suggest that different levels of thin and athletic internalization may intersect uniquely with women's affective and positive body image and thus may have distinct effects on women's health and behavior. Funding source: Social Sciences and Humanities Research Council of Canada.

Game misconduct: Absence of formal staff positions to support the mental health of adolescent hockey players playing at competitive levels

Colin Marshall, Acadia University; Christopher Shields, Acadia University

Early specialization and the professionalization of competitive youth sport means young athletes face significant pressures in adolescence. For many young athletes, participation in competitive sport is core to their identity and the desire to perform can lead to stressors such as moving away, limited social groups, and coping with competing athletic and academic demands. Parents and coaches are often ill-equipped to provide sufficient support and can actually be sources of stress. Personnel trained to provide psychological support can help young athletes develop coping strategies to enhance performance and improve mental health, yet little attention has examined the supports available to younger athletes playing at competitive levels. The current study used a content analysis of team websites to document formal staff positions to support the mental health of young amateur hockey players playing at the highest competitive levels for their age. The staff lists of 352 hockey teams spanning elite minor teams (U14-U18AAA), through major junior and university level hockey were examined. A total of 2821 staff members across 133 separate positions were documented. These positions were condensed into 12 categories, one of which was staff focused on mental health and wellbeing (e.g., psychologist, mental skills coach etc.). Only 9.7% of teams had dedicated staff to support the mental health and performance of their athletes. Chi-square ($p < .001$) revealed that elite minor teams were less likely to have a formal staff member responsible for mental health with only 2.5% reporting such a position, while 9.1% of university teams and 38% of major junior teams listed such staff. In contrast 53% of elite minor teams listed staff responsible for fitness, diet, and athletic performance (university = 55%, major junior = 73%). Despite the limitations of a cross-sectional observational design, these findings highlight a clear gap in formal team staff trained to support the mental health of young hockey players playing at competitive levels.

Quality over quantity: The quality of exercise participation experiences explains more variance in subjective well-being than time spent exercising

Kathleen Martin Ginis, University of British Columbia; Cameron Gee, University of British Columbia; Adrienne Sinden, University of British Columbia; Jennifer Tomasone, Queen's University; Amy Latimer-Cheung, Queen's University

Recent theorizing to explain psychosocial outcomes of exercise for people with physical disabilities has distinguished between the performance versus the experiential aspects of exercise participation. Historically, studies have operationalized exercise participation only in

terms of performance (e.g., time spent exercising) and reported small, positive relationships with measures of subjective well-being (SWB). It is not known if exercise participation experiences explain variance in SWB beyond that explained by time spent exercising. Such knowledge has important implications for developing theory and SWB-enhancing interventions. The purpose of this study was to test the relative contributions of minutes per week of exercise versus exercise participation experiences, in explaining variance in SWB among adults with physical disabilities. Participants were 264 adults (42% male; M age = 57 years + 14) who exercise, drawn from a nation-wide survey of Canadians with physical disabilities ($N = 800$). Participants completed measures of weekly minutes of exercise (Leisure Time Physical Activity Questionnaire-SCI), exercise participation experiences (Measure of Experiential Aspects of Participation), life satisfaction (Satisfaction with Life Scale), satisfaction with physical, psychological and social life-domains (LiSAT-11), and positive/negative affect (SF-36). Hierarchical multiple regressions showed minutes per week of exercise explained 0% to 2.6% of the variance in SWB measures. Participation experiences explained an additional significant 5% to 11% of the variance ($ps < .05$). These results suggest exercise experiences help to explain relationships between exercise participation and SWB. Time spent on exercise may not be as important as how the exerciser feels while participating in exercise. Researchers should consider both exercise performance and subjective experiences when testing the effects of exercise on SWB in people with physical disabilities. Funding source: Social Sciences and Humanities Research Council of Canada.

Teacher-identified barriers, facilitators, and recommendations to implementing daily physical activity in Ontario elementary schools

Lauren Martyn, Western University; Hannah Bigelow, Western University; Graham Jeffrey, Brock University; Michelle Ogrodnik, University of Waterloo; Deborah Chiodo, Western University; Barbara Fenesi, Western University

Only 7% of Canadian youth are meeting the international recommendations for daily physical activity (PA). As children spend a significant amount of time in school, classrooms have been identified as an ideal space to address this concern. In Ontario, the daily physical activity (DPA) policy mandates that elementary school children receive a minimum 20 min of moderate to vigorous PA each school day during instructional time. However, prior work shows that only half of Ontario teachers were meeting this expectation, highlighting a need for additional research to identify factors contributing to this discrepancy. Thus, the current study investigated factors influencing DPA fidelity in Ontario elementary schools and provides teacher-identified recommendations to support implementation. The first part of the study, a quantitative approach surveying 186 Ontario elementary school teachers, examined the barriers, facilitators, and recommendations to DPA implementation and the relationship between the likelihood of DPA implementation and intrapersonal factors. The second part, a qualitative approach using teacher interviews, explored teachers' recommendations to support DPA implementation. Survey results showed that only 23% of teachers are meeting the DPA mandate. Barriers to implementation included space, time constraints, inadequate training, student behavioural issues and low self-efficacy. Gender, teaching experience and prior DPA

training were not related to the likelihood of DPA implementation. Teachers who rated themselves as more physically fit were more likely to implement DPA. Teacher interviews elucidated key areas for improving DPA implementation, including greater DPA training opportunities, resources, community partnerships, accountability and strategies that support school-wide implementation. The current study demonstrated that fidelity to the DPA policy in Ontario elementary schools is on the decline. This work highlights unique factors implicated in DPA fidelity and brings to the forefront teacher recommendations to improve DPA implementation. Funding source: Social Sciences and Humanities Research Council of Canada.

Exploring “meaning” in community exercise programs for older adults

Alia Mazhar, York University; Micheline Senia, University of Windsor; Sean Horton, University of Windsor; Joe Baker, York University

Exercise is an essential component of healthy aging, and many organizations across Ontario offer exercise programs designed for older adults. The restrictions brought upon by the COVID-19 pandemic forced these organizations to turn to alternate delivery methods, including remote sessions (conducted either synchronously or asynchronously), web resources, and socially distanced in-person sessions. To better serve this population, there is a need to understand what makes exercise programs meaningful for older adults. As such, a qualitative study in collaboration with a number of community organizations offering instructor-led exercise programs was designed. The study included an interview prior to the start of the program, biweekly check-ins during the program, and a final interview following the completion of the program. A monetary incentive (\$25 gift card to a store of their choice) was also provided. This presentation will discuss the findings from one of the participating organizations. Twelve participants (ten female, two male) completed the study. All communication with participants took place over the phone or via Zoom. All audio interviews were transcribed verbatim, and transcripts were coded using thematic analysis. Codes were refined and ultimately placed into themes and sub-themes. Through discussion, the authors identified two overarching themes: the efficacy of the program, and the impact of online delivery. In the former, the elements contributing to sustained engagement (i.e., the relationship between the staff and the client, the structure of the program itself, and the perceived benefits) were explored. In the latter, positive attitudes of participants toward the transition to online delivery were observed, with the resulting impact on motivation to participate. This work adds to the body of knowledge regarding structured exercise sessions and online methods of program delivery for this population.

“It all comes into one circle”: The cycle of conformity to the sport ethic norms and experiences of psychological maltreatment within sport

Sarah McGee, University of Toronto; Ashley Stirling, University of Toronto

Athletes are socialized to believe that in order to attain and maintain athletic status they must exceed performance expectations and push beyond their limits in the pursuit of sporting

success (Coakley, 2015; Coker-Cranney et al., 2018; 2020; Demers et al., 2021; Fournier et al., 2021; Hughes & Coakley, 1991). These sets of expectations are embedded within the culture of sport and have been identified as a vulnerability to athletes' experiences of psychological maltreatment; in turn, contributing to the normalization of harm in sport (Hughes & Coakley, 1991; Fournier et al., 2021; Kavanagh, 2014; Stirling, 2011). To date, there has only been one quantitative study explicitly exploring the relationship between psychological maltreatment and conforming to sport ethic norms (Fournier et al., 2021), signaling a need for further exploration. Thus, the purpose of this study was to explore retired, competitive, women athletes' experiences of conforming to sport ethic norms and their acceptance of psychological maltreatment in sport. Thirteen women athletes ($n = 13$, $M_{age} = 25.75$) participated in an online, semi-structured interview to discuss pressures and expectations placed on them within sport, as well as their experiences of psychological maltreatment. As a qualitative study, a constructivist paradigmatic approach was utilized, acknowledging that knowledge was co-constructed through the dialogic interaction between both the researcher and participants. Reflexive thematic analysis was used to analyze the data. Results demonstrated a bi-lateral relationship between athletes' uncritical adherence to sport ethic norms and acceptance of psychological maltreatment in sport, with both conformity influencing acceptance of psychological maltreatment in addition to acceptance of psychological maltreatment enhancing conformity behaviours. From these findings, recommendations will be shared to inform prevention and effective intervention strategies to reduce harm and protect the welfare of athletes both inside and outside of sport.

How the COVID-19 pandemic affected adolescent travel sport coaches' perspectives of coach-athlete relationship characteristics

Keith McShan, Missouri State University; E. Whitney G. Moore, East Carolina University

Due to COVID-19 related government regulations in Ontario, Canada, multiple adolescent sports organizations canceled or postponed sporting competitions and/or modified the training experience (e.g., remotely online, smaller groups, less frequent) from March 2020 to May 2021. The purpose of this study was to use a phenomenological research design to explore how the coach-athlete relationship (CAR) characteristics (i.e., closeness, commitment, and complementarity) were affected for coaches. We interviewed 14 travel/club sport coaches working with adolescents from across Ontario representing individual (e.g., swimming) and team sport (e.g., field hockey, volleyball). Participants had coached travel sports for 3-33 years. Coaches reported closeness was the one characteristic of CAR that was consistently maintained throughout the COVID-19 pandemic. Coaches felt they were able to maintain their level of closeness with athletes regardless of sport type or coach-athlete dyad gender type. The level of maintained closeness was attributed to prior established relationships between coaches and athletes. The characteristic of commitment was expressed as improving in certain aspects during the COVID-19 pandemic. Coaches attributed increases in commitment to coaches' perceptions that athletes had increased resiliency to their relationship during the COVID-19 pandemic. Complementarity was the CAR characteristic most reported among coaches as decreasing during the COVID-19 pandemic. Coaches attributed this decrease to not being able

to see athletes face to face due to COVID-19 government regulations (e.g., masks, social distancing, smaller training groups). It is recommended that coaches try and focus on building up the CAR characteristic of complementarity to aid in their CARs. Creating environments where social distancing is limited (e.g., giving athletes high fives), using increased facial expressions with athletes, and increasing training sizes to interact with more athletes may help coaches improve the characteristic of complementarity within coaches post-COVID-19 CARs.

The barriers and benefits experienced by coaches of adolescent athletes during the COVID-19 shutdown

Keith McShan, Missouri State University; E. Whitney G. Moore, East Carolina University

The coach-athlete relationship (CAR) has been thought of as a pivotal part of what it means to be a coach. Within Ontario, Canada between March 2020 and May 2021 coaches' CARs were affected by the cancelation and postponement of sporting competitions and training related to government regulations created to help stop the spread of the COVID-19 virus. The purpose of this study was to explore the differences reported by coaches within their CARs before and during the COVID-19 pandemic. Participants were 14 travel/club coaches who coached adolescent sport athletes. Participants coached at the team sport level (e.g., volleyball) and individual sport level (e.g., swimming). Using a phenomenological research design participants engaged in a 60–90-minute semi-structured interview. Major differences reported by coaches in their CAR comprised three themes: (a) barriers, (b) variability, and (c) benefits. The most reported sub-theme within barriers was the uncertainty related to when they would return to consistent training and competitions during the COVID-19 pandemic. Additional barriers included adolescent dropout of sport, managing COVID-19 regulations, and venue restrictions. The theme of variability included the subthemes of preferential scheduling for higher-skilled athletes to train over lower-skilled athletes, parental engagement, perceived athlete amotivation, and coaching burnout. The last theme of benefits was comprised of increased coaching development opportunities (e.g., online webinars). In conclusion, it is recommended that coaches continue taking advantage of the online coaching development opportunities that were developed during the COVID-19 pandemic. Due to the lack of training, venue spaces, and adolescent dropout due to the COVID-19 pandemic, adolescent sport organizations may benefit from providing multiple training sessions and venue spaces to coaches who coach at different levels of sport (e.g., recreational, and elite). Providing multiple training and venue options may address the adolescent dropout rate that occurred during the COVID-19 pandemic.

Psychological predictors in performance: An exploratory study of a virtual ultra-marathon

Michael McTighe, Rochester Institute of Technology

The COVID-19 pandemic caused the cancellation of many sporting events, which led to an increase in virtual ultra-marathons. This study assessed how participation in virtual races relates to levels of physical activity. Moreover, traditional ultra-marathons are known for being physically and emotionally challenging. This study also assessed how two psychological

constructs, emotion regulation (ER) and mental toughness (MT) predict performance. 83 virtual runners participating in a 4-month 1000K race with the option to exceed 1000K completed a survey exploring performance in the virtual race. They also completed the Difficulties in Emotions Regulation Scale and the Sports Mental Toughness Questionnaire. Logistics regressions assessed constructs' utility in predicting completion of the 1000K. Multiple regression was used to predict the total distance traversed beyond 1000K. Neither MT nor ER significantly predicted completion of the 1000K; however, both variables included together were marginally significant predictors of total miles beyond 1000 K ($p = .051$). Also, participation in the event promoted an increase in healthy activity. Participants ran and walked more in the four months during the event than the four months prior to it ($p < .001$). This study intended to explore how psychological constructs relate to performance in a virtual type of event, and how involvement in these types of events related to levels of activity. Higher levels of MT and lower levels in difficulties in ER trend with greater performance. Participation in the event promoted an increase in athletic activity. Future psychological skill training aimed at improving ER and MT may enhance athletic performance. Future investigations into these events could explore how general participation may influence these constructs over time. Finally, these data suggest that participation in this accessible and affordable type of sport can promote greater involvement in fitness related activity.

A scoping review of Canadian fringe team sports

Jason Mergler, University of Manitoba; Leisha Strachan, University of Manitoba

Fringe team sports are those group activities not as popular, funded, well attended, or intricately woven into the cultural fabric of society as mainstream team sports (e.g., ice hockey, soccer) and play a part in keeping Canadians active for life. To date, little research has been conducted on Canadian fringe team sport. As such, it is important to clarify the scope of extant research in this area through an exploratory scoping review performed in accordance with the JBI methodology for scoping reviews (Peters et al., 2020), with key information sources including SPORTDiscus, PSYCInfo, Web of Science (all databases), Ovid MEDLINE, and CINAHL. Only English-language, peer-reviewed studies investigating or referencing adult (aged 18+) Canadian, typically developing athletes from at least one fringe team sport, whether discussed individually or alongside other sports, were included. Outcomes for fringe team sport athletes must have also been reported. Research with officials, coaches, parasport athletes, solely mainstream sport athletes, or non-Canadian athletes was excluded. There was no date limit for the search, but unpublished, historical, and grey literature were also excluded. All relevant articles were collated, uploaded to, and deduplicated in Covidence (Veritas Health Innovation, Melbourne, Australia) and screened by the principal investigator (PI) for assessment against inclusion criteria. Data was extracted from included papers by the PI using an iteratively developed data extraction tool. Preliminary results revealed that out of 44 articles, 30 were quantitative, with the rest ($n = 14$) following a qualitative methodology. Canadian authors were the most interested in Canadian fringe team sport athletes ($n = 40$), with the majority originating from Ontario ($n = 23$). The most common field of study was physiology ($n = 9$), while curling and rowing ($n = 12, 9$, respectively) were by far the most researched fringe team sports.

Results will be discussed highlighting the need for more research, specifically related to fringe team sport and athlete development.

Additional substitutions in soccer benefit young players in strong teams and load management in decided matches

Johannes Meyer, German Sport University Cologne; Stefanie Klatt, German Sport University Cologne

In 2020, the International Football Association Board (IFAB) introduced two additional substitutions in professional football leading to a reduction in player load and a promotion of young players (Meyer & Klatt, 2021, 2023). This study aimed to answer whether teams (by final ranking) benefit differently from this rule change, how these factors effect performance-relevant measures (goals differential, expected goal differential, points), and whether the additional substitutions are beneficial for load management in matches with large score differentials (tie, 1 goal, 2 goals, > 3 goals differential). 1224 Bundesliga matches (2018/19 vs 2020/21 season) with 4303 substitutions were analysed. The results showed that a team's ranking significantly effects the proportionate use of young players in the total load reduction, $F(17,1185) = 1.697$, $p = .038$, $h^2 = .024$. The better a team is ranked, the more playing time is given to young players, $p = .005$, $r = -.114$. This is particularly interesting considering that in games with large score differences, additional substitutions lead to more minutes played by the U21-players, $F(3,1221) = 5.441$, $p = .001$, $h^2 = .013$. In addition, with a larger goal difference in the final result the number of substitutions used also increased with additional substitution options, $F(3,1221) = 12.382$, $p < .001$, $h^2 = .030$. With regard to performance factors, no significant correlation with the analysed effects were found (all $ps > .05$). Additional substitutions are specifically beneficial for load management in matches with large score differential, as the current regulation prevents more substitutions in games that have already been decided. Following this finding, especially young players in the better teams profit from the rule change. The effects investigated do not seem to interact with any performance indicators, and the suspected negative effects such as interruptions of play and squat rotation seem therefore negligible. Funding source: Union of European Football Associations.

A mixed-methods investigation of elite US figure skaters' social media use and the perceived implications on their mental health and sport performance

Hannah Hunter Miller, West Virginia University; Dana K. Voelker, West Virginia University; Daniel Gould, Michigan State University

Despite the surge in social media use and its positive and negative impacts on the general population (e.g., McCrory et al., 2020), there remains a critical need to explore the implications of social media on athlete mental health and performance. Initial evidence suggests the popularity of elite athletes makes them increasingly vulnerable to negativity through social media platforms (e.g., David et al., 2018), though sport-specific data is limited. Using a sequential explanatory mixed-methods design, this study investigated social media use and the perceived psychological implications among senior level U.S. figure skating championship

competitors ($M_{\text{age}} = 23.27$ years). Thirty-seven skaters (46% response rate) completed a self-report survey on what, why, and how much they used social media and the perceived implications of that use on their mental health and performance. To garner explanatory understanding of these experiences, eight participants (62% response rate) were purposively selected from the original sample for a semi-structured interview. Among the key descriptive findings, the greatest proportion of skaters (46%) reported using social media for one to two hours per day with nearly a quarter of skaters citing over three hours of use daily. Approximately 70% of skaters reported changing their social media use surrounding major competitive events, predominantly to safeguard their mental health and mental preparation. Interviews suggested skaters' social media use was associated with greater social comparison, unwanted thoughts and emotions, and pressure to maintain an ideal online presence, as well as greater connection to fans, recognition, and motivation. Though participants perceived both positive and negative psychological consequences of social media use, the perceived negative effects were most pervasive across data sources. The development and evaluation of interventions designed to assist elite skaters in leveraging the benefits, while minimizing the detriments, of social media are needed to support their mental health and performance.

Mental health implications of body image and mother's age at menarche associations in female collegiate athletes

Eva V. Monsma, University of South Carolina; Toni Torres-McGehee, University of South Carolina; Stephanie Allyson Nicole F. Sy, University of Georgia; Melat Mekonnen, University of Georgia; Abigail K. Huggins, University of Georgia; Madaline C. Kerestman, University of Georgia; Jennifer L. Gay, University of Georgia

There is a known correlation between mother and daughter menarcheal timing, as well as between menarcheal timing and mental health disorders. Little evidence describes potential tracking of maturation across generations with body image (BI) variables which are also known correlates of mental health disorders. This study examined the association between mother-daughter ages at menarche and whether mother's menarcheal timing may be a correlate of daughter's BI dissatisfaction and social physique anxiety (SPA) in a sample of collegiate athletes. The sample ($n = 865$) was 83.5% White, 9.2% Black or African American, and 63.2% of participants were in aesthetic sports. Participants completed online questionnaires including an adapted Figural Stimuli Scale, the Social Physique Anxiety Scale and self-reported height, weight, and ages at menarche. The average age (years) at menarche was 13.10 ± 1.45 for daughters and 13.35 ± 1.63 for mothers ($r = 0.40$, $p < 0.001$). Mother's age at menarche was significantly associated with daughter's BMI ($r = -0.14$, $p < 0.001$), and was a statistically significant predictor of daughter's BI dissatisfaction in uniform ($B = 0.05$, $p = 0.008$) and approached statistical significance for BI dissatisfaction in daily clothing and SPA after accounting for covariates. This study provides emerging evidence that the timing of maturation in mothers may be associated not just with the timing of maturation in daughters, but also with the mental health of daughters. More research is needed to understand the past and current mental health of mothers and their associations with the mental health of daughters to inform the next steps for research and practice.

The Whole Day Matters Toolkit for Primary Care: A consensus-building study to promote optimal movement behaviours in primary care in Canada

Tamara L. Morgan, Queen's University; Michelle Fortier, University of Ottawa; Rahul Jain, University of Toronto; Kirstin N. Lane, University of Victoria; Kaleigh Maclaren, Independent Communication Specialist, Ottawa, Ontario; Taylor McFadden, Canadian Medical Association; Jeanette Prorok, Canadian Frailty Network; Jill Robison, Nova Scotia Health; Zach Weston, Canadian Society for Exercise Physiology; Jennifer R. Tomasone, Queen's University

Despite the advent of the Canadian 24-Hour Movement Guidelines for Adults (24HMG), most adults living in Canada are not engaging in recommended levels of physical activity, sedentary behaviour, and sleep. Primary care providers are optimally situated to promote the 24HMG; however, they have reported low confidence and skill for discussing these topics. We conducted a scoping review that identified the need for tools to guide integrated discussions on the 24HMG, and subsequently developed and tested the usability of a 24HMG tool and user guide for primary care providers. This resulted in the addition of a preamble and handout, which were collectively termed the “toolkit”. The purpose of this study was to build consensus on the toolkit among primary care providers in Canada. Providers (i.e., physicians, residents, nurses, nurse practitioners, dietitians, pharmacists, psychologists, social workers, and registered psychotherapists working in family health teams) were invited to complete two to three modified Delphi online surveys from January to March 2022. Consensus per survey item was defined a priori as $\geq 60\%$ of participants indicating they “somewhat agree”, “agree”, or “strongly agree” and a mean score of ≥ 6 on a 7-point scale. Toolkit components that needed improvement were revised after each survey round and a summary of changes was shown to participants in the subsequent round. After three rounds, 55% of items reached consensus; the remaining 45% approached consensus. Results can inform future health promotion tool development work, advance modified Delphi methodology, and help increase 24HMG promotion in primary care. The final toolkit was launched nationally in September 2022 and dissemination metrics (i.e., for reach) are being evaluated across multiple timepoints. Funding source: Public Health Agency of Canada; Ontario Graduate Scholarship.

Examining dancers’ imagery based on how often they train at the studio

Irene L. Muir, Pennsylvania State University Altoona; Krista J. Munroe-Chandler, University of Windsor

Young dancers use imagery that is multi-sensory in nature to enhance performance (e.g., for rehearsal, technique refinement, stage presence; Muir et al., 2018). A variety of imagery types such as technique/feedback, and metaphorical/role are used to achieve this. Dance instructors influence the content of dancers’ imagery and their ability to create these images (Nordin & Cumming, 2006). However, researchers have yet to explore whether these imagery characteristics are influenced by how often dancers train in the studio. Therefore, this study examined imagery use and ability in dancers with different training frequency. Participants were 60 dancers between 7-14 years old ($M = 11.07$, $SD = 1.87$) who trained in various dance

styles (e.g., hip-hop, jazz, tap). They were separated into two training frequency groups: (a) low frequency = those training 1-4 times per week ($n = 36$; $M_{\text{age}} = 10.86$, $SD = 1.83$), and (b) high frequency = those training 5-9 or more times per week ($n = 24$; $M_{\text{age}} = 11.38$, $SD = 1.92$). To identify imagery differences between these two groups, independent samples t -tests were performed. Consequently, those with high training frequency used metaphorical/role imagery significantly more (3.41 ± 0.77) than those with low training frequency (2.98 ± 0.80), $F(1,58) = 4.30$, $p = .042$. Moreover, Pearson's correlation coefficients were computed to identify relationships between each variable. Moderate positive correlations were found between each of the five imagery types ($p < .01$), apart from the small positive correlation between technique/feedback imagery and metaphorical/role imagery ($p < .01$). Similarly, moderate positive correlations were found between each imagery ability perspective ($p < .01$), with kinesthetic imagery ability also positively correlated with both goal and motivational imagery ($p < .05$). Overall, the findings suggest that dance instructors should continue to implement metaphorical/role imagery when teaching young dancers. To do so, interventions that teach dance instructors how to properly delivery imagery in their classes is warranted.

Exploring personal motivations for participation in community-based exercise programs designed for persons with physical disabilities.

Marley Alana Rose Schlieman Mullan, Queen's University; Brittany McLaren, Queen's University; Kristiann E. Man, Queen's University; Angela J. Fong, Queen's University; Amy E. Latimer-Cheung, Queen's University; Jennifer R. Tomasone, Queen's University

Participation in community-based exercise programs (CBEPs) for persons with physical disabilities results in both physical (e.g., balance and mobility improvements) and psychological benefits (e.g., self-confidence, feelings of belonging). However, there is a paucity of research exploring members' personal motivations for engaging in CBEPs. Understanding individual motivations for engaging in CBEPs can provide clearer justification for establishing and maintaining CBEPs for persons with physical disabilities. Further, understanding motivations for engagement may better inform future program structure to increase program member participation and retention. This study aims to qualitatively explore members' motivations for joining a CBEP for persons with physical disabilities. One-on-one semi-structured interviews were conducted either in-person or over the phone with seven CBEP members prior to their first training session in a CBEP. Interviews focused on developing an understanding of members' previous experiences with physical activity and their expectations for program participation. Guided by an interpretivist approach, interview transcripts were analysed using inductive and deductive thematic analyses to identify common themes and map them onto the quality participation framework. Findings highlighted similarities between motivations for previous participation in physical activity and those for enrolling in the CBEP. Goal achievement, social environment, and positive subjective experiences were among the common themes discussed by participants. Intrapersonal and interpersonal motivations for participation in CBEPs were most meaningful for participants. Program providers should strive to understand the individual motivations for member involvement to better foster the desired program environment.

Action capabilities shape decision-making in an invasive sport

Daniel Müller, Vrije Universiteit Amsterdam; Xanthe Mayer, Vrije Universiteit Amsterdam; David Mann, Vrije Universiteit Amsterdam

Decision-making skills have been predominantly studied through the lens of cognitive psychology, where decisions are viewed in isolation from the action capabilities of the decision-maker (Williams et. al, 2011). In the case of team sports, where decisions are expressed through movements (Craig & Watson 2011), the question arises to what extent decision-making success can be derived from the action capabilities of the mover. An ideal context to study decision-making in invasive sports is 1v1 actions, where a ball-carrying attacker is attempting to pass their direct opponent and thus lowering the interpersonal distance. The interpersonal distance between two players has been shown to influence the likelihood of a successful outcome on the part of the ball carrier, and it seems reasonable to expect that this relationship mediates the relative action capabilities of the two players. The action capabilities of individual players (e.g., their maximal speed and acceleration) can be directly measured during games using in-situ data (Morin et. al, 2021) and compared to decision-making performance. The aim of this study was to evaluate the degree to which decision-making performance is constrained by the action capabilities and the interpersonal distance between players. We calculated the action capabilities of professional football players within actual matches ($N = 54$) from a set of open-source data. The decision-making was considered successful when the dribbling was followed by a non-intercepted attacking pass. A logistic multiple regression with varying intercepts was used to calculate the relative contribution of action capabilities to both the interpersonal distance and the decision-making success. The results revealed that decision-making success could be attributed to the interpersonal distance between the players, especially at the end of the dribbling action ($p < .05$, OR = 1.98), but not explained by the action capabilities alone. The findings of this study shed light on the extent to which physical action capabilities constrain the decision-making process.

“That’s good!” Moral behaviour and portrayals of the Canadian ice hockey family during the 2023 IIHF World Junior Championship

Alex Murata, Queen's University at Kingston; Jean Côté, Queen's University at Kingston

As seen within both the sport psychology literature as well as more colloquial media offerings, the parents and guardians of Canadian youth ice hockey players have been portrayed and described across a spectrum of extremes. More specifically, the narratives surrounding this population often suggest these individuals demonstrate extreme caring and dedication in the development of their children as young hockey players or, conversely, over-investment and fanatical tendencies. Coupled with the growing professionalization of youth sport programming across Canada—and North America more broadly—the normalization of extreme parental behaviours is an important issue to explore given the effects that undesirable parenting styles and displays can have on developing athletes’ motivation to continue participating in sport. Given the importance of the annual International Ice Hockey Federation’s (IIHF) World Junior

Championship (WJC) as a cultural institution for thousands of young hockey players as well as their parents and guardians in Canada, the purpose of this project was to analyze the messaging and portrayals of the Canadian ice hockey family and, specifically, Canadian ice hockey parent behaviours during television broadcasts of the 2023 IIHF WJC tournament. Thirty-five hours of video (i.e., all team Canada pre-and post-game shows and games) were recorded and assessed for relevant content. Content related to ice hockey families or parents (e.g., stories, interviews, commercials) was isolated and analyzed thematically (text and image-based). Constructed themes portrayed Canadian ice hockey families and parents as community leaders, positive examples, and morally good. Future work—both indirectly and directly—should consider the consequences of media moralization and portrayals of sport parents, particularly given the extreme nature that many of their behaviours can often take. Funding source: Social Sciences and Humanities Research Council of Canada.

Self-report and device measured movement behaviours and mental health: A compositional analysis

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Movement behaviours (i.e., light physical activity: LPA, moderate to vigorous physical activity: MVPA, sedentary behaviour: SB, and sleep) are part of a time composition whereby higher levels of MVPA (for example) implies that individuals spend less time in the other behaviours. Movement behaviours can be measured subjectively (self-report) or using a device (accelerometer). The relative amount of time individuals spend in a movement behaviour during a day relates to mental health. The purpose of the current study was to examine whether subjective and/or objective measures of the time composition of movement behaviours relate to mental health outcomes. We used data from Cycle 22 of the NDIT longitudinal cohort study. Participants ($n = 791$) self-reported levels of LPA, MVPA, SB, and sleep and a subset of participants ($n = 324$) wore accelerometers which measured LPA, MVPA, and SB (subjective reports of sleep were added to calculate the overall time composition). Subjective and device-measured activity levels were analyzed as separate movement behaviour compositions and tested as correlates of mental health indicators including depression, coping, and self-reported overall mental health. According to self-report, participants spent 51% of their time in sleep, 45% of their time in SB, 2% of their time in LPA, and 1.5% of their time in MVPA. According to accelerometer data, participants spent 36% of their time in sleep, 46% of their time in SB, 15% of their time in LPA, and 2% of their time in MVPA. Across both subjective and device-measured compositions, time spent in SB was positively correlated with depression and time spent sleeping was negatively correlated with depression. Self-reported MVPA, relative to other self-reported movement behaviours, correlated with higher levels of coping and mental health, but device measured MVPA did not. Overall, the amount of time people think they spend engaging in movement behaviours may be as important or even a more important indicator than the amount of time people spend in movement behaviours when measured by device.

Initial validity evidence for responses to the well-being actions self-efficacy scale from adults with obesity under an exploratory approach

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Multidimensional well-being actions self-efficacy has been defined as the degree to which an individual believes they have the capacity to take actions that may improve their status in six key domains of their life: interpersonal (i.e., their relations with significant individuals), community (i.e., the surrounding area within which they live), occupational (i.e., their performance in their primary occupation), physical (i.e., their wellness and physical health), psychological (i.e., their emotional experiences), and economic (i.e., their financial outlook). This set of domain specific well-being actions self-efficacy beliefs is purported to be measured by the newly developed Well-Being Actions Self-Efficacy (WBASE) scale. The objective of this study was to provide initial validity evidence for responses to the WBASE scale from adults with obesity under an exploratory latent variable approach. Longitudinal data ($N_{baseline} = 667$ and $N_{30\text{ days post-baseline}} = 550$) from the Well-Being and Physical Activity study (*ClinicalTrials.gov*, identifier: *NCT03194854*), which deployed the Fun For Wellness (FFW) online intervention, were analyzed. The a priori measurement model exhibited close fit to baseline data within an exploratory framework. Similarly, there was strong evidence for at least partial temporal measurement invariance for the a priori WBASE scale measurement model. Convergent (and divergent) correlations between concordant (and discordant) pairs of well-being actions scores at baseline and latent well-being actions self-efficacy factors at 30 days post-baseline were observed. There was mixed evidence for the effectiveness of the FFW online intervention to exert a direct effect on latent well-being actions self-efficacy at 30 days post-baseline. These results provided: (a) strong evidence for the proposed internal structure of responses to the WBASE scale from an exploratory perspective across time and (b) moderately strong evidence for proposed relationships between latent well-being actions self-efficacy beliefs and other theoretically relevant variables. Funding source: Erwin and Barbara Mautner Charitable Foundation.

Detecting early warning signals of injuries and health problems in elite youth soccer players

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Injuries and health problems of athletes may appear abruptly and are often unexpected. However, hypotheses from complex systems theory suggest that these events can be preceded by so-called early warning signals (EWSs). We tested whether injuries and health problems can be anticipated with a specific type of EWS, that is critical fluctuations. Over two competitive seasons, we collected psychological and physiological self-reports (i.e., self-efficacy, motivation, mood, rating of own performance, enjoyment, and recovery) and data from heart rate sensors

on every training and match day from 14 elite youth soccer players (16-20 years). In addition, we recorded time-loss injuries and players filled in the Sports Trauma Research Center Questionnaire on Health Problems (OSTRC-H2) once a week. We calculated the dynamic complexity (DC) of the self-reports and sensor data to test for increased critical fluctuations before the onset of injuries and health problems. Results showed that players experienced 5.6 injuries and 8.4 health problems on average (range = 1-18 and range = 2-26, respectively). 55% and 37% of those players revealed a peak in DC up to five days before injuries and health problems, respectively ($SD = 39\%$ and $SD = 25\%$, $Min = 0\%$ and $Min = 0\%$, $Max = 100\%$, and $Max = 83\%$). These results suggest that critical fluctuations may be a promising EWS for real-time anticipation of injuries and health problems in sports practice. Future research should test for the robustness of these results within and between individuals. Finally, finding out how warning signals can be communicated to soccer players and staff is an important avenue for practice. Funding source: ZonMw (Dutch organization for health research and innovation).

How everything is connected: Mapping performance determinants of athletes in personalized networks

Niklas D. Neumann, University of Groningen; Nico W. Van Yperen, University of Groningen; Jur J. Brauers, University of Groningen; Ruud J.R. Den Hartigh, University of Groningen

Research in the field of sports performance has mostly been conducted (a) at a single point, or at most, a few points in time; (b) on the group level; and (c) as a causal chain of monodisciplinary predictor and outcome variables. In the present study, we argue and demonstrate that the next important step should be to monitor, analyze, and visualize the dynamic and individual-specific interactions of multidisciplinary determinants of sports performance. We, therefore, applied a recently developed analytical method, that is, (time-varying) vector-autoregressive (TV-VAR) modeling, which is particularly suited to capture the intra-individual interactions and changes of multidisciplinary determinants. We first measured critical psychological (e.g., confidence, motivation) and physiological (e.g., load, recovery) variables of youth male players from a professional soccer club on a daily basis across one season. Next, we assessed the temporal dynamics (i.e., autoregressive and cross-lagged effects) of those variables and visualized the findings in changing network graphs. We highlight the results of two players, showing how multidisciplinary key determinants of sports performance dynamically evolve across a season in individual-specific ways. For instance, the results of player 1 revealed a stable network across the season in which self-efficacy was the strongest predictor of other determinants. The network of player 2, however, revealed changing effects over time, more overall relations, and no central determinant. These new insights improve our understanding of how key determinants of sports performance are dynamically related in individual athletes. Accordingly, they may allow practitioners to develop and implement athlete-specific interventions at the right time. Future studies may apply (TV-)VAR models to study patterns in the networks of individual athletes in periods of performance gains and losses, injuries, or health problems. Funding source: ZonMw (Dutch organization for health research and innovation).

Inclusive leadership in sport: A scoping review

Margaret Nieto, St. Francis Xavier University; Justin Worley, Utah State University; Sebastian Harenberg, St Francis Xavier University; Laura Kuo, Ithaca College; Justine Vosloo, Ithaca College; Belisa Gonzalez, Ithaca College

Inclusion describes the feeling of belonging to a group without giving up one's unique identity (Mor Barak, 2015; Shore et al., 2011). To date, it is unclear how sport leaders (e.g., coaches) can create inclusive environments for their athletes. Research outside of the realm of sport (e.g., organizational psychology) indicates that inclusive leaders focus on trust building, shared decision making, and valuing each individual for their contribution to the team (Dezenberg, 2017; Latino, 2010; Randel et al., 2018; Shore et al., 2011). While these behaviors are addressed in the sport psychology and coaching literature, evidence of their connection to feeling of inclusion in sport is presently absent. Hence, the purpose of the present review was to explore the link between coach leadership and athletes' feelings inclusion in sport teams. To summarize the evidence in the area of inclusive leadership in sport broadly (Sabiston et al., 2022), a scoping review method was chosen. Searching through nine databases (e.g., SportDiscus, Dissertation and Theses Global), articles were identified that addressed coach behavior resulting in inclusive, welcoming, and safe environments. Over 10,000 articles were identified using key search terms and abstracts were reviewed by two researchers as well as a third for discussion and disagreements. Next, through the reviewing of full texts, a final group of articles were selected. Key characteristics from the studies (e.g., demographics, study method, key findings) were extracted. Evidence suggests that there is a connection between coaching behaviors and athletes' feelings of inclusion, yet studies exploring this relationship directly are sparse. As such, research in this area is clearly warranted as it may provide guidelines how coaches can create environments that promote feeling of inclusion for all athletes. Further gaps in the literature, limitations, and future research directions are discussed.

Acute effects of intense interval and moderate-aerobic exercise on inhibitory control in preadolescent children

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High-intensity interval training (HIIT) has been identified as an alternative strategy of traditional aerobic exercise for transiently enhancing inhibitory control, an ability to suppress irrelevant distractors while focusing on relevant information in facilitating goal-directed behaviors. Such a cognitive benefit of HIIT, especially its associated neural correlates, has rarely been examined in preadolescent children, despite HIIT is a dominant physical activity pattern in this age group and has the potential for wider implementation in school settings due to its time-efficiency and flexibility for variation. This study randomly assigned 77 8-10 years old children to the HIIT ($n = 27$), moderate-intensity continuous aerobic exercise (MICE, $n = 25$), and sedentary control (rest, $n = 25$) groups to determine whether inhibitory control performance and associated

neuroelectric alterations (N2 and P3 of the event-related potential) can be enhanced after a 20-min bout of HIIT ($> 80\%$ HR_{max}) in relative to the commonly used MICE (70% HR_{max}) and sedentary activity. Although the accuracy of the inhibitory control performance improved overtime across three groups, response time was selectively improved only for the HIIT (pre: $471 \pm 18\text{ms}$, post: $453 \pm 18\text{ms}$, $t = 3.0$, $p = .039$) but not the MICE and rest groups. Analysis on N2 showed a time-related decrease in N2 latency selectively for the HIIT (pre: $316 \pm 6.5\text{ms}$, post: $301 \pm 6.4\text{ms}$, $t = 4.1$, $p < .001$) but not the other groups. Analysis on P3 showed a time-related decrease in P3 amplitude for the HIIT (pre: $13.5 \pm 0.9\text{uv}$, post: $12.1 \pm 0.9\text{uv}$, $t = 3.0$, $p = .015$) and rest (pre: $16.5 \pm 0.9\text{uv}$, post: $15.0 \pm 0.9\text{uv}$, $t = 3.6$, $p = .004$) groups while P3 amplitude for the MICE group maintained over time and was larger at post-test ($15.9 \pm 0.9\text{uv}$) than the HIIT group ($t = 2.9$, $p = .021$). These findings suggest that a single bout of HIIT has facilitating effects on the behavioral and neural processing speed involving inhibitory control processes in preadolescent children but not neuroelectric index of attention allocation that has been associated with MICE. Funding source: Clifford B. Kinley Trust

The impact of sexism on psychophysiology, performance and wellbeing in female athletes. A mixed methods approach.

Jessica O'Kelly, University of Greenwich; Claire Rossato, University of Greenwich

The prevalence of sexism in sporting environments has been well-documented and its impact on performance and wellbeing is a topic of concern. While the psychophysiological response evoked by exposure to sexism is pertinent to athletic performance, it remains under-explored. In the present study, a mixed-methods design was chosen to understand the multifaceted effects of exposure to sexism on psychophysiology, performance, and wellbeing among female athletes. The study employed a convergent parallel within-subject design, in which female athletes ($N = 15$, ($M_{\text{age}} = 27.21$, $SD = 7.49$) were exposed to sexist stimuli via a video while their heart rate variability (HRV) was measured. A repeated-measures ANOVA was used to determine differences between control, baseline, and experimental conditions. Post-hoc tests identified that high frequency-HRV was significantly lower in the experimental condition ($M = 24.99$, $SD = 3.64$) compared to the control condition ($M = 28.55$, $SD = 5.07$), $t(14) = -3.75$, $p = .002$. Results indicated that exposure to sexism reduces parasympathetic activity, indicating an anxious response. In the qualitative phase, open-ended questions were used to explore the influence of sexism on performance and wellbeing. Thematic analysis identified that performance was impacted due to the presence of systemic barriers to progression via a lack of opportunities and a widespread focus on appearance rather than athleticism. Mental skills such as concentration and motivation were also affected. Wellbeing was affected due to the impact on identity from the internalisation of chronic diminishment. Female athletes identified how exposure to sexism impacts their mental health, specifically, the presence of anxiety, depression and eating disorder symptoms. Although limitations are present, the convergence of findings on the damaging impact of sexism on female athletes highlights the need for increased awareness and the development of interventions tailored to address these issues. Sports psychologists may consider incorporating self-compassion as an efficacious intervention.

Do learning disabilities or mental health diagnoses modify the association between physical activity behaviour regulation and physical activity?

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The Behavioural Regulation in Exercise Questionnaire (BREQ) assesses motivation underpinning engagement in physical activity (PA). Limited evidence suggests that individuals with learning disabilities (LD; e.g., ADHD, dyslexia) or mental health diagnoses (e.g., anxiety, mood disorder, eating disorder) may have difficulty with self-regulation, including in regard to PA. Specifically, individuals with LD or MHD score lower on autonomous (intrinsic) motivation and those with MHD have higher levels of controlled regulation (external). To add to this evidence base, we examined effect modification by LD or MHD status (separately) in the association between PA behaviour regulation and meeting PA guidelines. Data were available for $n = 647$ and $n = 614$ young adults participating in the ongoing longitudinal Nicotine Dependence in Teens Study, in a cross-sectional and a 2-year longitudinal study design, respectively. Effect modification was examined in multivariable logistic regression models which included an interaction term (MHD or LD x PA regulation) and controlled for age, sex, and educational attainment. No differences were observed on PA regulation and % meeting PA guidelines by MHD or LD. 9.2% and 20.5% of participants reported a LD and/or MHD, respectively. In 20 models (i.e., LD or MHD x 5 PA regulations X 2 study designs), only one interaction term was significant. Specifically, MHD x introjected regulation predicted a lower odds of meeting MVPA guidelines two years later (OR (95%CI) = 0.6 [0.4, 0.8]; i.e., participants with MHD and higher scores on introjected regulation were less likely to meet PA guidelines compared to those without MHD and higher introjected regulation scores). However, because of the number of associations modeled, this finding may have been due to chance alone. Overall, our results (i.e., that MHD and LD do not generally appear to modify the association between PA regulation and MVPA). Future research should replicate these findings in larger samples longitudinally. Funding source: Canadian Institutes of Health Research.

Collegiate student-athletes' commitment to school and sport: The role of academic and athletic identification

Liam O'Neil, Utah State University; Justin T. Worley, Utah State University; Sarah E. Schwartz, Utah State University; Scott Pierce, Illinois State University; Anthony J. Amorose, Illinois State University

In striking a balance in their dual role, collegiate student-athletes have been found to experience different forms (i.e., constrained versus enthusiastic) and levels of commitment to school and sport (O'Neil et al., 2021). This research has identified adaptive and maladaptive patterns of commitment to school and sport that are linked to positive and negative school and sport outcomes, respectively. However, little is known about the mechanisms underpinning collegiate student-athletes' commitment to school and sport. An under-explored but promising psychological mechanism is academic and athletic identification. Hence, the purpose of our

study was to examine the between- and within-domain associations among academic and athletic identification and school and sport commitment in an NCAA Division I collegiate student-athlete sample ($N = 248$; age: $M = 19.87$ years, $SD = 1.33$ years). To test these associations, we used generalized estimating equations (GEE). The within-domain findings of academic identity revealed a negative effect on school constrained commitment ($b = -.46$, 95% CI $[-.61, -.32]$) and positive effect on school enthusiastic commitment ($b = .52$, 95% CI $[.39, .64]$). The within-domain findings of athletic identity revealed a negative effect on sport constrained commitment ($b = -.57$, 95% CI $[-.76, -.39]$) and positive effect on sport enthusiastic commitment ($b = .49$, 95% CI $[.33, .65]$). The between-domain findings of academic identity revealed no effect on sport constrained commitment ($b = .06$, 95% CI $[-.09, .21]$) and negative effect on sport enthusiastic commitment ($b = -.15$, 95% CI $[-.28, -.03]$). The between-domain findings of athletic identity revealed a positive effect on school constrained commitment ($b = .16$, 95% CI $[.01, .31]$) and no effect on school enthusiastic commitment ($b = -.14$, 95% CI $[-.29, .02]$). These findings demonstrate potentially beneficial within-domain and detrimental between-domain effects of identification on commitment in school and sport.

The interplay of friendship quality and peer acceptance in youth sport: A comparison of variable-centered and person-centered approaches

Liam O'Neil, Utah State University; Justin T. Worley, Utah State University; Alan L. Smith, Utah State University

Sport psychology researchers hypothesize that the nature of friendship quality and peer acceptance effects on motivation may better be represented in combination than in isolation (Smith et al., 2006). This hypothesis can be tested using both variable-centered and person-centered data analytic approaches. However, the concordance of these approaches in reflecting the combined interplay of peer relationships variables has not been explicitly considered. Our purpose was to compare both approaches to examining the combined associations of positive friendship quality (PFQ), friendship conflict (FC), and peer acceptance (PA) with intrinsic motivation, perceived competence, and sport enjoyment. We conducted secondary data analysis on a dataset that merged two independent samples of youth athletes, providing the statistical power to detect latent-based combined effects ($n_1 = 243$, $n_2 = 186$, $N = 429$; $M_{age} = 11.7$ years, $SD_{age} = 1.1$ years). Using a variable-centered approach (i.e., latent moderated structural equations), we found a significant three-way (PFQ x FC x PA) interaction effect on intrinsic motivation ($b = .83$, $p = .024$), two-way (FC x PA; PFQ x FC) interaction effects on perceived competence ($b = .30$, $p = .009$; $b = -.22$, $p = .031$), and no significant interaction effects on enjoyment. With a person-centered approach (i.e., latent profile analysis), we found four profiles characterized by different combinations of PFQ, FC, and PA. These approaches yielded distinct and similar interpretations of the motivational salience of peer relationships. For example, variable-centered findings showed FC to moderate the associations of PFQ and PA with intrinsic motivation, whereas person-centered findings showed FC not to contribute to profile differences on intrinsic motivation. Setting aside these distinct findings, the collective outcomes show FC not to detract from motivation when PFQ and PA are at moderate or greater

levels. This study reveals that unique and shared conclusions can emerge from variable-centered and person-centered examinations of sport peer relationships.

Emotional intelligence and mental well-being of college student athletes during the COVID-19 pandemic

Kelly O'Neill, Denison University; Gregory Lott, Denison University

In recent years, the mental health of college students in the United States has substantially worsened; the COVID-19 pandemic exacerbated the problem (Kumar & Nayar, 2021). Student athletes in particular experienced a drastic change in routine due to the pandemic, adding to the volume of typical stressors. Because student athletes are hesitant to use mental health resources, there is utility in exploring alternatives to conventional services. Emotional intelligence (EI) has been found to correlate to positive mental health trends, but the relationship is not yet well-enough understood to guide programs that develop such competencies as a strategy to protect student athlete mental health. The present study therefore examined: (a) is there a correlation between student athlete EI and their well-being, and (b) did student athlete mental well-being or emotional intelligence levels change over the course of the COVID-19 pandemic school year? Utilizing a pretest-post-test non-equivalent-group design, student athletes ($N = 476$) completed the Assessing Emotions Scale (AES) and The World Health Organization Well-Being Index (WHO-5), with $N = 122$ completing both the pretest and post-test. The first research question was analyzed using linear regression which found a statistically significant, moderate negative relationship ($r = -.329$; $p < 0.00$) between WHO-5 scores and AES scores. Using a paired sample t -test, WHO-5 scores statistically significantly decreased for student athletes ($t = -5.89$; $p = 0.000$) while AES scores were not significantly different ($t = 0.42$; $p = 0.673$) over the course of the pandemic. Results supported past findings in that the mental health levels of students declined over the pandemic and that one's EI remains stable unless specific interventions are employed. Results indicated that aspects of EI, such as awareness of emotions and empathy could adversely impact one's mental health through tumultuous situations. There is benefit in exploring interventions to develop other specific aspects of EI to combat the trend of declining mental health in student athletes.

Academy for student-athlete development: An environmental scan to inform a feasibility study

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Low rates of organized sport participation are reported amongst individuals with disabilities. Quality sport experiences may improve the wellbeing of individuals with disabilities. Individuals with disabilities experience barriers to sport participation, which for high-performance youth student-athletes, may be compounded by conflicting social, academic, and athletic responsibilities. Despite the potential value in this research, there is limited work on para-

student-athlete development. The aim of this study was to conduct an environmental scan to identify gaps in the high-performance pathways for aspiring high-performance youth student-athletes. Canadian community sport leaders and researchers were emailed an online survey with six questions focused on (a) existing tools or resources that exist for para-athlete development; (b) key existing literature; (c) theories, models, or frameworks for use in para-sport; (d) individuals or organizations that would help to further knowledge of para-athlete development; (e) recommended publications; and (f) additional comments and feedback. A total of 21 participants completed the survey. Inductive thematic analysis of the raw data was conducted. The researcher-interpreted themes were framed within six categories: athletes (4 themes), coaches (6 themes), caregivers (1 theme), the organization (2 themes), sport policy (1 theme), and researchers (2 themes). Many of the themes could be embedded within multiple categories. The final thematic analysis was visually represented within a “mind map,” where some themes were cross-cutting, emphasizing the link between different elements of para-athlete development. The findings from the environmental scan highlighted a current gap in para-athlete development: the need to link the category of “organization” with “athletes.” These results are being used to inform a feasibility study exploring the quality participation experiences of para-athletes in a 10-session monthly high-performance sport program. Funding source: Sport Canada.

A study of collegiate athletes' sport commitment, accountability, and flourishing

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Sport commitment, an individual's psychological desire to persist in sport over time, is influenced by social agents within the sport context. In addition, athletes vary in terms of who they see themselves as accountable to (e.g., themselves, teammates, coaches, & family) and how accountable they are to others. Finally, athletes may vary in flourishing, which includes both feeling good and functioning well in relationships. The aim of this study was to investigate sport commitment, accountability, and flourishing in athletes involved in high and low interdependent (team vs. individual) sports. We predicted that social support (antecedent of sport commitment) would have a strong and positive association with accountability and flourishing. Collegiate athletes ($N = 240$, M age = 19.5; 50.4% male) provided demographic information and completed established measures of sport commitment, accountability, and flourishing. Athletes were from low (golf = 11, cross country = 40, swim & dive = 40) and high (soccer = 41, volleyball = 23, football = 54, basketball = 31) interdependent sports. Indirect effects analysis tested whether social support-emotional (SSE) and accountability mediated a relationship between sport interdependence and flourishing. PROCESS model 6 was run, with the predictor of high vs. low sport interdependence, mediators of SSE and accountability, and the outcome variable of flourishing. Sport interdependence had indirect effects, but not a direct effect on flourishing. Specifically, one significant indirect effect model showed that sport interdependence level (1.29^{***}) predicted flourishing in athletes via SSE ($.51^{***}$) and accountability ($.51^{***}$). Another significant indirect effect model showed that if accountability was not included, the model remained significant ($.74^*$). SSE was essential as a mediator in

these models, and without it, sport interdependence was unrelated to accountability (-.87) or flourishing (2.48). Examination of social support enhances our understanding of significant others and their influence in the sport context.

Examining the interaction between social support and cognitive errors to predict physical activity during pregnancy

Jenna Osborne, Brock University; Kirina Angrish, Brock University; Andrea Aguirre Meza, Brock University; Taniya Nagpal, University of Alberta; Sean Locke, Brock University

Physical activity during pregnancy elicits several health benefits for both the pregnant person and future newborn, however, there are several barriers to being physically active throughout gestation. Exercise-related cognitive errors (ECEs) represent a negative bias that causes individuals to exaggerate the struggle associated with their perceived physical activity barriers, which can deter physical activity as shown in the general population. Social support can act as a “stress buffer” allowing individuals to overcome their activity barriers. The purpose of this study is to (a) evaluate if and how ECEs are related to physical activity during pregnancy and (b) whether social support is most important when ECEs are high. It was hypothesized that ECEs and social support would individually and interact to predict physical activity within pregnant persons. Pregnant adults from North America were recruited to complete an online survey ($N = 360$ $M_{age} = 27.96$, $M_{weeks\ pregnant} = 21.95$) using the exercise-related cognitive errors questionnaire, the social support for exercise scale (subscales: family and friends), and the Godin-Leisure Time Questionnaire. Using Hayes’ PROCESS in SPSS (moderation analysis; Model 1), ECEs independently predicted ($B = -.19$, $p < .001$) and interacted with social support from friends ($B = .05$, $p = .03$) to predict physical activity ($r^2 = .12$); social support from friends was not an independent predictor. There was a significant negative relationship between ECEs and physical activity when social support from friends was low or moderate, but no significant relationship when social support was high. Social support from family did not predict or interact to predict physical activity. Findings build on previous research demonstrating the association between ECEs and physical activity now extending to pregnancy as well. High levels of social support might be a protective factor in helping pregnant individuals to be physically active when they have cognitive errors that exaggerate the challenge associated with their physical activity barriers.

Testing measurement invariance of the 7-item Social Physique Anxiety Scale

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Individuals experience social physique anxiety (SPA) when they perceive others are negatively evaluating their physique or appearance, potentially resulting in negative influences on physical activity participation. However, the relationship between SPA and physical activity is complex. Gender and age are sometimes reported as potential moderators of this influence. SPA is

commonly measured in exercise psychology by administering one of three versions of the Social Physique Anxiety Scale (SPAS). Although a 12-item and 9-item version of the SPAS exist, a 7-item version has become a popular tool to measure this construct despite the need to examine its measurement properties further. Studies often use the 7-item SPAS but the factor structure and measurement invariance across groups are typically overlooked. The scale's factor structure refers to the validity of the measured construct and the number of construct dimensions represented by the scale items. Measurement invariance evaluates how measurement properties generalize over multiple groups, occasions, or situations. Invariance testing is critical because if the measurement tool is operating differently between groups, comparing the estimates of parameters could be invalid. The purpose of the current study was to confirm the previously reported unidimensional model factor structure and examine the measurement invariance of the 7-item SPAS across age, gender, body mass index, typical exercise mode, and education level. Similar to past work, confirmatory factor analysis model modifications were needed to achieve adequate fit in our large sample of physically active men and women ($N = 1009$; M age = 28.6 ± 10.6 years). Multi-group latent analysis revealed configural, metric, strong, and strict measurement invariance for the education level grouping variable; configural and metric measurement invariance was found for the other grouping variables. Researchers and practitioners should be aware of these measurement issues when using the 7-item scale, as they may influence our understanding of social physique anxiety.

Situational judgment test in sport scoring system : Comparing consensus and expert item ratings

Peter Papadogiannis, York University; Aryan Lalani, York University

For too long, sport psychology researchers have relied on self-report measures to assess athlete mental skills. Reliance on self-reports raises concern over the validity of responses because of distortions and biases (i.e., athletes are not always the most accurate assessors). Also, the items within many self-report measures often lack situational information. It is expected that mental skills will differ across situations and should be measured with sport-specific contexts in mind. Situational judgment tests (STJ) have been widely accepted and used in other fields of study effectively for decades (Lieven et al., 2008). A situational judgment test quantifies an individual's situational decision-making by posing a scenario and asking them to identify a fitting response (Libbrecht & Lievens, 2012). Research has found that faking has less impact on SJTs than self-report inventories as the SJT format makes correct answers appear less apparent. The current poster presentation will focus on the development of a new situational judgment test in sport (SJTS). More specifically, the authors will discuss the comparison between consensus and expert scoring for 25 SJTS items that comprise 6 separate scales. Each SJTS item has a hypothetical sport-relevant situation that an athlete experiences either before, during, or after they compete. Each SJT item has 5 options and is scored on a 1 to 5 scale (from very ineffective to very effective). The sample consisted of 36 athletes (i.e., the consensus group) from various sports including hockey, basketball, soccer, combat sports, and running, as well 12 sport/performance psychology consultants (i.e., the expert group). The results showed that the experts and the consensus groups answered in a similar fashion with similarity rates ranging

from 96.8% (regulation scale) to 89.5% (adaptability scale). The level of convergence between the consensus and expert scoring samples demonstrates that correct answers to the test items may exist.

The conceptualization and development of a new situational judgment test in sport

Peter Papadogiannis, York University; Sean Cepeda, University of Toronto; Gennaro Quintieri, York University; Neelam Bal, University of Guelph-Humber

For too long, sport psychology researchers have relied on self-report measures to assess mental skills. Reliance on self-reports raises concern over the validity of responses because of distortions and biases. Situational judgment tests (SJT) have been accepted and used in other fields of study effectively for decades (Lieven et al., 2008); however, they have not been undertaken for athlete assessment and development. A situational judgment test quantifies an individual's situational decision-making by posing a scenario and asking to identify a fitting response (Libbrecht & Lievens, 2012). The verbal presentation will focus on the development of a new situational judgment test in sport (SJTS). More specifically, the presentation will focus on the early stages of establishing the test's content validity. Seven participants (4 males and 3 females) served as an expert panel and rated all 50 SJTS items for clarity and relevance. The expert panel came from the fields of sport, performance, and clinical psychology, as well as counseling and sport coaching. Six of the reviewers had master's degrees, while one reviewer had a doctorate degree. The clarity questions asked each of the participants to assess how clearly each of the items was written and are they understood. The clarity questions were scored on a 4-point scale (1 = the item is not written clearly/not understood to 4 = the item is written clearly and is understood). The questions regarding relevance focused on how essential/important each of the items is and whether they should be included in the test. The relevance questions were also scored on a 4-point scale (1 = the removal of the item would not affect the measurement to 4 = the item is relevant and should be included). The results showed that the panel's review for item clarity had a mean score of 3.74 and ranged from 2.85 to 4. The score for relevance was 3.65 and ranged from 3.29 to 4. The majority of items were deemed appropriate/interpretable based on the raters' feedback. However, some items were modified based on the opinions of the participants.

Lessons learned when we RE-AIM our focus: Assessment of the UWorkItOut UWin program

Melissa Pare, University of Windsor; Irene Muir, Pennsylvania State University, Altoona; Krista Munroe-Chandler, University of Windsor; Todd Loughhead, University of Windsor; Chad Sutherland, University of Windsor

University students are experiencing the highest prevalence of mental health issues across Canada (ACHA, 2016). There is empirical evidence highlighting that exercise-based interventions are effective in reducing anxiety and depression in this population (e.g., Huang et al., 2018; Muir et al., 2020). Specifically, the UWorkItOut UWin program is a six-week exercise training and counselling intervention aimed to improve the mental health of university

students. Significant decreases in anxiety and depression symptoms were found after program completion (Muir et al., 2020). In exit interviews, participants attributed several physical (e.g., increased strength), psychological (e.g., decreased anxiety and depression symptoms), and cognitive outcomes (e.g., increased motivation) to program completion, as well as coping skills (e.g., time management skills; Paré et al., 2022). The current study used the RE-AIM framework (Glasgow et al., 1999) to evaluate the broader scope of the intervention program and identify the strengths and weakness across the program's reach, evaluation, adoption, implementation, and maintenance. Data were collected between September 2017 and December 2022. Key findings from the RE-AIM framework included three strengths and two weakness. Strengths consisted of a low attrition rate (i.e., 12%) and a moderate referral to participation rate (i.e., 66%), experiential learning opportunities for students serving as trainers and counsellors (e.g., 32 undergraduate students and 7 graduate students), and continued adaptations of the program (e.g., incorporating nutrition-based infographics) that are essential for implementation and maintenance of the program. Weaknesses included program adoption that was impacted by a lack of dedicated exercise space and appropriate equipment, and continued funding that is required to transition from a research program to a service program. Based on these lessons learned from the UWorkItOut UWin program, future exercise training and counselling interventions can best serve their target populations. Funding source: University of Windsor.

Are you thinking what I am thinking? Measuring shared mental models using virtual reality in team sports

Hannah Pauly, University of Muenster; Charlotte Raue-Behlau, University of Muenster; Dennis Dreiskämper, University of Muenster; Bernd Strauss, University of Muenster

Shared mental models (SMMs) are known as one of the key cognitive components influencing team performance (Filho et al., 2022). Furthermore, SMMs should mediate antecedents of team performance such as collective efficacy (Filho et al., 2015) and team trust (Rico et al., 2008). Situation-specific approaches are needed to measure SMMs (e.g., McNeese et al., 2017) and research suggests that virtual reality (VR) outperforms computer screens (Pagé et al., 2019). Thus, we developed a VR-based method to measure SMMs. Herewith, we aim to confirm the influence of team trust and collective efficacy on SMMs, and the influence of SMMs on performance. In line with the a priori G*Power analyses which revealed a needed sample size of 66, in total 34 handball middle block teams ($N = 68$ player, $M = 23.97$ years, $SD = 4.35$) participated. Participants completed two conditions (self & partner) with 35 VR videos, where they either indicated their own action or their partner's action. Team trust was measured with a short version of the Perceived Trustworthiness in Sport questionnaire (Dreiskämper et al., 2016). Collective efficacy was measured with the Collective Efficacy Questionnaire for Sports (Short et al., 2005). Team performance was operationalized objectively (i.e., team's league ranking, number of teams & league) and subjectively (i.e., satisfaction with the team performance; Ohlert et al., 2015). The results of the structural equation modeling could not confirm the hypothesized influence. Only team trust significantly negatively influenced objective team performance ($\beta = -0.36$, $p = 0.02$). All other coefficients were close to zero or reached no significance. Even though the results did not confirm our hypothesis, this

methodological approach increases the ecological validity and allows further investigation of situation-specific SMMs. Furthermore, in an explorative step, we aim to elaborate the influence of the participants' sex, as the stimulus material is female, to investigate the (in)congruence.

Examining coping within sports teams: Shifting from individual perspective to team perspective

Emilie Pété, Nantes Université; Julien Chanal, University of Geneva; Julie Doron, Nantes Université

Stress and coping in sport psychology have mainly been examined from an intrapersonal perspective, which limits our knowledge of how athletes collectively cope with sport-related demands as a team. It appears therefore important to further examine how coping takes place within sports teams as a communal process (i.e., coordinated and shared strategies to collectively deal with stressors) and to what extent coping is part of team efforts (i.e., coping *of* a team) rather than an aggregation of individual efforts (i.e., coping *in* a team). Thus, the aims of the present research were firstly to examine to what extent communal coping strategies are shared within sports teams, and secondly to provide further evidence of communal coping as a team construct by examining the extent to which communal coping dimensions explain collective variables such as cohesion more strongly than individual coping dimensions. A total of 356 French team sport athletes (174 women, 182 men; $M_{\text{age}} = 22.03$ years, $SD_{\text{age}} = 4.99$ years) from 54 teams from regional and national levels completed an online questionnaire measuring individual coping, communal coping, and cohesion. Results of intraclass correlation coefficients showed that some communal coping strategies are strongly shared (i.e., motivational support, emotion-venting strategies), whereas some strategies are weakly shared (i.e., compensation, humour strategies). In addition, the high amount of variance in cohesion explained by communal coping indicated a meaningful relationship between both team constructs, and added validity to the communal coping as a team construct. The present study, therefore, advances knowledge on communal coping within sports teams by highlighting the shared nature of some communal coping strategies and suggests a move should be made from coping *in* a team toward coping *of* a team as an approach in future research and coping intervention programs among sports teams or groups.

Performance Recovery and Optimization for Teams (PRO-TEAMS): A psychological skills training program to enhance team functioning

Piotr Piasecki, Boston University; Edson Filho, Boston University; Maxwell Groen, Christchurch School

Team-based interventions are meant to enhance team functioning and team performance (Carron & Brawley, 2008; Filho, 2019). In practice, effective team building interventions allow teams the means to reach and sustain their performance potential (Filho & Tenenbaum, 2020). Notably, while extensive research on team dynamics exists, there is limited research on team-based interventions in professional sport settings (Eys et al., 2019). Accordingly, we developed

and implemented an intervention aimed at enhancing team functioning, tilted Performance Recovery and Optimization for Teams (PRO-TEAMS). In total, 17 male professional frisbee athletes participated in the PRO-TEAMS program which consisted of eight workshop sessions on the following topics: performance profiling, shared values, team goals, team cohesion, peer-leadership, team confidence, and team coordination. Methodologically, the PRO-TEAMS was informed by a scientist-practitioner led approach (see Kegan, 2015). That is, based on our understanding of the literature on team dynamics, we proposed workshop topics that can be relevant to several teams. Noteworthy, the athletes perceived every session to be effective ($M > 6.00$ on a 10-point Likert scale), and the overall program to be beneficial to the team as a whole (grand $M = 7.05$; $SD = .50$). Testing the effectiveness of the intervention with different teams (i.e., multi-case studies) and through randomized controlled trials are important next steps for research (see Donohue et al., 2018; Pitt et al., 2020). Furthermore, besides evaluating the effectiveness of the sessions, we recommend practitioners and scholars to evaluate the effectiveness of the consultants delivering the sessions (e.g., Haberl & McCann, 2012). In closing, we highlight that the PRO-TEAMS can be adapted to different sports and levels of play, but consultants interested in doing so should first consider the context of their work and reflect on their philosophy of practice (see Kegan, 2015).

Creating an athlete questionnaire to assess coaching life skills

Scott Pierce, Illinois State University; Liam O'Neil, Utah State University; Martin Camiré, University of Ottawa; Corliss Bean, Brock University; Anthony Amorose, Illinois State University; Scott Rathwell, University of Lethbridge; Tarkington Newman, University of New Hampshire

In the implicit/explicit continuum of life skills development and transfer (Bean et al., 2018), life skills coaching is characterized as occurring on a continuum of intentionality, from implicit to explicit. Grounded in the implicit/explicit continuum, the Coaching Life Skills in Sport Questionnaire (CLSS-Q; Camiré et al., 2021) was developed and validated as a coach-reported instrument of life skills coaching. To conduct research with athlete populations, however, an athlete-reported instrument of life skills coaching is needed. The purpose of this study was to validate an athlete-reported version of the CLSS-Q. In total, 528 (high school, $n = 346$; college, $n = 182$) student-athletes completed the athlete-reported version of the 36-item CLSS-Q. To assess the factor structure of the athlete-reported CLSS-Q, we conducted a series of exploratory structural equation models (ESEM) and confirmatory factor analyses (CFA). A five-factor model was initially estimated that replicated the CLSS-Q. This model revealed that none of the practicing life skills factor items loaded onto their respective factor, with items either cross-loading or double-loading on other factors. Consequently, two practicing life skills items were removed and the two remaining items from this factor were collapsed into the discussing life skills factor. The resulting four-factor solution demonstrated excellent model fit ($\chi^2(431) = 1105.92$, $p < .001$ (CFI = .95, TLI = .93, RMSEA = .05, 90% CI [.05, .06], SRMR = .02). A CFA further supported the four-factor solution ($\chi^2(521) = 1265.11$, $p < .001$ (CFI = .94, TLI = .94, RMSEA = .05, 90% CI [.05, .05], SRMR = .03), with factor loadings ranging from .69 to .94. A noteworthy finding was strong factor correlations among the four factors (.69 to .90). This finding is discussed in terms of how athletes differentiate their coaches' life skills coaching. The

utility of the tool will be explored, moving assessment efforts beyond life skill outcomes, to deliberately examining how athletes perceive coaching efforts to support life skill development and transfer.

“What’re you wearing?”: Imitation of exercise partners and trainers with different body sizes and clothing styles IS THIS TITLE CORRECT?

Chris Pilioci, University of Toronto; Winter Muise, University of Toronto; Madison F. Vani, University of Toronto; April Karlinsky, California State University; Catherine M. Sabiston, University of Toronto; Timothy N. Sabiston, University of Toronto

Exercise is often conducted in pairs or groups, during which participants may imitate partners and trainers to perform specific movements. This paired/group exercise, however, can present complex social environments wherein preferences for others’ body sizes and clothing styles foster comparisons with oneself and influence exercise performance/motivation. Such preferences might also inform participant identification with in-group or out-group members during exercise, possibly impacting their imitation of partners and trainers. The current study examined the magnitude of imitation (i.e., imitation effect) that occurred in response to exercise partners and trainers with different body sizes and clothing styles. Men ($n = 10$) and women ($n = 10$) completed an online imitation task wherein they viewed 6 same-gender model images (3 body sizes [small, moderate-sized, large] by 2 clothing styles [tight/revealing, loose/concealing]). Within each block, participants imagined these models as their exercise partner or trainer. During each trial, a model was presented with their hand outstretched in a neutral position, before performing a random downwards or upwards hand motion; participants always performed a downwards hand motion in response. The magnitude of imitation was indicated by comparing response times between trials wherein the motion of a model hand was compatible (downwards) or incompatible (upwards) with a participant (i.e., incompatible trials vs. compatible trials). Collapsed across body size, significant imitation effects occurred in response to partners ($p < .05$), but not trainers ($p > .05$), with tight/revealing clothing. By comparison, non-significant but trending imitation effects occurred in response to partners and trainers with loose/concealing clothing ($p > .05$). These findings suggest that a trainer wearing tight/revealing, relative to loose/concealing, clothing, may restrict participant imitation during paired/group exercise, possibly also indicating that such clothing styles limit identification with in-group members and could impact exercise performance.

The prevalence of mental illness symptoms among developing athletes in Quebec

Lara Pomerleau-Fontaine, Université de Sherbrooke; Véronic Boudreault, Université de Sherbrooke; Sophie Brassard, Université de Sherbrooke; Juliette Maurin, Université de Sherbrooke; Amélie Soulard, Université de Sherbrooke

In the last few years, there has been an increased interest in athletes’ mental health due to a combination of several events, including athletes’ testimonies in the media, the upheavals experienced by athletes during the COVID-19 pandemic, and the results of emerging empirical

studies. Although research has shown that elite athletes are at risk of experiencing symptoms of mental illness (e.g., depression, anxiety), the majority of studies have included athletes who were competing at the Olympic/Paralympic level, leaving other populations, such as developing athletes (identified as next generation), understudied. There is currently no data available regarding this population, despite the unique risk factors they experience (e.g., the lack of funding from their sporting federations). The aim of the current study was to identify the prevalence of symptoms of mental illness and the level of well-being of developing athletes in five different sporting contexts (collective, individual, esthetic, technical, and weight-category sports). 139 male and 198 female athletes ($N = 337$) completed an online survey. The results revealed that 21.6% ($n = 68$) of athletes met the criteria for clinical depressive symptoms, 8.7% ($n = 27$) for clinical eating disorders symptoms, and 19.9% ($n = 63$) for clinical anxiety symptoms. 64.7% ($n = 196$) reported sleeping difficulties and 54.1% of athletes reported a low to not flourishing level of well-being. Based on the regression analysis, competing in a technical sport was a predictor of an increased level of depressive symptoms ($\beta = 1.635$, $p = 0.041$, $R^2 = 0.126$). The results also showed that athletes who competed in collective sports were 2.29 more likely to report a flourishing level of well-being ($\beta = -0.827$, CI [0.270, 0.708], $p = 0.001$). These results present a first glimpse of developing athletes' mental health and highlight that symptoms of mental illness are prevalent among them. These data provide suggestions to adapt interventions to the needs of developing athletes to promote their well-being in their respective sporting context. Funding source: Social Sciences and Humanities Research Council of Canada, Mitacs.

Quality participation in exercise interventions to improve mental health and quality of life in people with spinal cord injury: A systematic review

Matteo Ponzano, The University of British Columbia; Robert Buren, The University of British Columbia; Nathan Adams, The University of British Columbia; Jane Jun, The University of British Columbia; Kathleen Martin Ginis, The University of British Columbia

Exercise interventions have been used to try to improve mental health (MH) and health-related quality of life (HRQoL) in individuals with spinal cord injury (SCI). However, aspects of quality exercise participation (QP) valued by people with physical disabilities are often ignored, which could impact intervention effectiveness. This systematic review aimed to quantify the use of QP strategies within exercise interventions for people with SCI. We searched five databases and included randomized controlled trials that: (a) involved participants >18 years old with a SCI; (b) administered an exercise or physical activity intervention; (c) measured MH or HRQoL outcomes. Two authors independently performed screening and data extraction. Using a checklist based on the QP framework for parasport, each study was coded for inclusion of strategies to foster the seven aspects of QP: autonomy, belongingness, challenge, engagement, mastery, meaning, and validation. 1604 abstracts and 184 full texts were assessed, and 17 studies were included. Most interventions combined different forms of exercise, with an average intervention duration of 3.5 ± 2.3 months for 3.2 ± 1.1 days a week. The included studies used $15\% \pm 20\%$ of the strategies to promote autonomy, $11\% \pm 7\%$ to promote belongingness, $34\% \pm 25\%$ to promote challenge, $24\% \pm 26\%$ to promote engagement, $26\% \pm 1$

7% to promote mastery, $4\% \pm 11\%$ to promote meaning, and $16\% \pm 24\%$ to promote validation. Aspects of QP are still infrequently included in exercise trials in people with SCI. Given that the aspects of QP align with theories and models that improve MH and HRQoL (e.g., self-determination theory, PERMA+ model), interventionists are encouraged to incorporate and report on such elements when designing interventions in people with physical disabilities. Future studies are needed to draw definitive conclusions on the impact of aspects of QP on health-related outcomes.

A systematic review on children's executive functions through physical activity: The role of aerobic and/or cognitively engaging programs

Ioanna Pournara, National and Kapodistrian University of Athens; Marcelo Cabral De Andrade, Michigan State University; Spyridoula Vazou, Michigan State University; Myrto Mavilidi, University of Wollongong; Maria Koutsouba, National and Kapodistrian University of Athens; Fotini Venetsanou, National and Kapodistrian University of Athens

In recent years, there is a growing body of research indicating that the participation in physical activity (PA) programs contributes to the improvement of not only physiological but also cognitive parameters, such as executive functions (EFs). However, it is not clear which one of the program elements is the most beneficial for EFs. The purpose of this systematic review was to examine the existing literature regarding the impact of PA programs that emphasize on: (a) the intensity of PA, (b) the cognitive demands of PA, and (c) the combination of those, on school-aged children's EFs. A search of the literature was conducted for published studies in PubMed, Google Scholar, and Sport Discus databases, using terms: (a) related to PA, such as physical activity, physical education, sports, exercise; and (b) regarding the three core EFs, such as executive functions, working memory, inhibitory control, and cognitive flexibility, as keywords. From the identified studies, 51 met the criteria. Among them, 18 studies focused on the acute effects of PA and 33 studies on the effects of long-term PA programs on EF skills. Results showed that not only the systematic implementation of a PA program over several weeks, but also the administration of a single PA session can benefit the three main EFs in school-aged children. Comparing the three EFs, inhibitory control seems to profit the most. Also, regarding the intensity and cognitive demands of the PA, it seems that PA programs containing either moderate-to-vigorous PA (MVPA) or cognitively engaging motor activities are effective for enhancing EFs in children. In addition to the effectiveness of the PA programs, discussion on the characteristics of the programs and the measures of EFs will be provided. Further research is necessary to identify the elements (e.g., frequency, duration, intensity, type of PA) of PA programs that will offer the greatest benefits to EFs.

"Being locked down, the outdoors was always available": The impact of COVID-19 on self-efficacy and autonomy in outdoor recreation

Sara Powell, California State University, Monterey Bay; Katheryn Carpenter, Missouri State University; Melinda Novik, Missouri State University; Hugh Gibson, Missouri State University

Outdoor recreation (OR) provides activity participation for individuals in an outdoor environment with the additional benefits of physical activity (PA) and traditional leisure. Many activities are included in OR, from birdwatching, hiking, camping, paddling, trail running, snow sports, to simulated indoor experiences such as rock climbing. Physical and psychological benefits of engaging in OR include improved physiological function, increased cardiovascular endurance and muscular strength, successful cognitive and physical aging, and improved psychological well-being. Further, OR increases participants' perceptions of motivation, self-efficacy (SE), and autonomy. Given the positive benefits of OR participation, this study examined the relationship of SE and autonomy on OR behaviors among U.S. adults during the COVID-19 pandemic. A secondary purpose of the study identified COVID-19 related barriers and facilitators of OR. Self-report survey information was gathered from 995 U.S. adults (93.6% white, 64.0% female) who identified levels of SE (Outdoor Recreation Self-Efficacy Scale; Mittlestaedt & Jones, 2009) and autonomy (Modified Recreation Experience Preference Scale; Kyle et al., 2004) OR behaviors, and changes in OR during COVID-19. A qualitative open-ended question at the end of the survey asked participants to provide further information regarding their OR experiences during the pandemic. Participants reported engaging in hiking/walking, biking, paddle sports, running, and snow sports most frequently during the COVID-19 pandemic. Significant positive correlations existed between autonomy and SE ($r = 0.138, p < 0.01$), and SE and pre/post pandemic OR behaviors ($r = 0.158, p < 0.01$), ($r = 0.129, p < 0.01$). Responses to the open-ended question were coded into themes. This data identified barriers and facilitators to OR participation including social, psychological health, and increased or changed OR/PA as a result of the COVID-19 pandemic. This information may be used to promote physical and psychological well-being among OR participants.

Identifying gaps to build bridges: Our students need social justice and inclusion-based kinesiology curriculum

Sara Powell, California State University, Monterey Bay; Kimberly Fasczewski, Appalachian State University; Caitlyn Hauff, University of South Alabama

Despite known benefits of physical activity (PA), the majority of U.S. adults do not meet recommended guidelines. For persons in special populations (i.e., weight-stigmatized individuals, mobility-limited individuals, older adults), lack of PA may be attributed to discomfort and lack of self-efficacy in PA settings. A focus on social justice-based experiences and inclusivity is a vital component to creating positive PA environments. However, training for pre-professionals on social justice, diversity, and inclusion relative to PA is lacking. This study asked current students in kinesiology-related disciplines to identify competencies and deficiencies for working with special populations in PA settings. The sample included 145 current kinesiology/exercise science students from three U.S. institutions. Using mixed-methodological data collection, students rated self-efficacy for working with special populations, rated use-frequency of culturally competent terminology in their classes, and provided responses to three qualitative case studies including the aforementioned special populations. Results indicated that students have moderate levels of confidence for working with special populations. Scores ranged from 6.0 ± 2.5 (individuals with cognitive/intellectual

limitations) to 7.4 ± 2.4 (individuals with a different gender identity) on a scale of 1 to 10. Further, most students expressed familiarity with cultural terms such as “implicit bias, cultural competence, inclusion, and access.” Qualitative themes derived from case study responses demonstrated that students lack the ability to critically analyze confrontational situations or intervene as future professionals. Although some students indicated they felt they possessed knowledge for working with special populations in PA settings, this knowledge was obtained outside of academic coursework. Therefore, future work should focus on creating a social-justice based curriculum for kinesiology-related disciplines that may tangibly encourage skill development for working with special populations in PA settings. Funding source: California State University.

Assessing eye-movement performance and executive functioning after concussion

Emma Pownall, Trent University; Liana Brown, Trent University

When a concussion occurs individuals can experience several different subtle changes to eye-movements and performance that go easily unrecognized. To understand how eye-movement problems affect the recovery process the study (a) investigated the impact of concussions on eye-movement performance, and (b) evaluated the relationship between eye-movement performance and tests of executive functioning (EF) due to anatomical visual projections in the frontal lobe. Demographic information, symptom severity using the SCAT-5 and the Beck Depression Inventory Questionnaire was obtained from 60 participants. Standardized EF tasks were administered: digit span, trail-making test, coding, and verbal fluency. Eye-tracking data on tasks of saccades, smooth pursuit, and multiple object tracking (MOT) was collected from healthy controls (HC), injury controls (IC), and concussed (C) individuals. Participants completed 48 trials of an anti-saccades, two smooth pursuit trials at varying speeds and a MOT task requiring the participant to track one to five objects of 10 on 25 trials. Saccadic reaction time (RT), number of eye-movements, inflection time, midpoint time, and percent accuracy were obtained from the eye-tracking data. The mean age of the participants was 21.9 (C, $M = 22.0$; OC, $M = 22.85$; HC, $M = 21.05$), 39 identified as female and 21 as male. C participants were still experiencing concussion type symptoms up to three years post injury. SCAT-5 reports of symptom severity, number of symptoms, and verbal fluency distinguished the C participants from the IC and HC. A mixed ANOVA indicated that the C group made proportionally more two eye-movement trials than the other two groups ($p = .001$). Smooth pursuit lag time distinguished the C participants from the IC ($p = .292$) and the HC ($p = .005$). These findings add to the evidence that C participants show persistent eye-movement difficulties up to three years post injury. Eye-movement performance and symptom severity assessment should be included in brain injury and recovery evaluation beyond the typical recovery period. Funding source: Mitacs.

Evaluating a co-created a yoga program for adults diagnosed with gynecologic cancer: A focus group study

Jenson Price, University of Ottawa; Jennifer Brunet, University of Ottawa

Collaborating with target audiences to create physical activity programs tailored to fit unique circumstances is a way to improve relevance, suitability, and acceptability of a program. A community-based integrative knowledge translation approach, informed by the knowledge-to-action framework, was used to create a preliminary yoga program and instructor guidebook for the Ottawa Regional Cancer Foundation based on recommendations from adults with gynecologic cancer, yoga instructors, researchers, and Foundation representatives. The preliminary program is a bi-modal 12-week hatha yoga program with 2 60 min group classes/week for 5-7 participants/class with optional supplemental features. The objective of this qualitative study was to gather the target audiences' (i.e., adults with gynecologic cancer, yoga instructors) feedback on the program's potential to address their needs. Eleven yoga instructors (100% women, M age = 50.6 ± 10.3) and 6 adults with gynecologic cancer (100% women, M age = 44.6 ± 14.5) who provided initial recommendations for the program evaluated the co-created program and instructor guidebook in 5 focus groups conducted via Microsoft Teams. Participants' feedback suggests the program would meet the target audiences' needs. Participants believed adults with gynecologic cancer would be able to do what is asked of them, engage with and use the program as intended, and would not be at risk for adverse events. They highlighted the value of program features for supporting positive experiences, and the instructor guidebook was considered to offer adequate guidance for the delivery of the program. Participants provided refinement suggestions and important considerations for the delivery of the program. By gathering the target audiences' feedback on the co-created program prior to delivery, it was possible to enhance the program and address potential issues to ensure it better meets their needs. The next step is to evaluate the feasibility and acceptability of implementing the program at the Foundation, and benefits of the program. Funding source: Social Sciences and Humanities Research Council of Canada.

Athletic therapists' exposure and response to psychological challenges associated with athlete injury recovery

Francesca Principe, University of Toronto; Gretchen Kerr, University of Toronto

Athletes face difficulties in understanding psychological challenges associated with sport injury and seeking help for them, which affects their injury outcomes and return-to-play (RTP). Currently, there is no standardized care approach to attending to the psychological recovery of sport injuries and RTP, and sport therapists, the ones that work most closely with injured athletes, often need to provide psychological care. The purposes of this study were to understand athletic therapists' perspectives on the psychological challenges that athletes experience during injury recovery and assess their perceived level of preparedness in addressing these psychological challenges. A total of 49 certified athletic therapists from across Canada completed a 14-item, online survey that included questions about demographics, their exposure to psychological aspects of injury, and how equipped they perceive they are to address the psychological issues that athletes present during recovery. Results indicate that athletic therapists are aware of the psychological and social challenges facing injured athletes and believe they play a role in assisting injured athletes in their psychological recovery, but do not feel equipped to do so. Also, very few athletic therapists had extensive exposure to

psychological aspects of injury in their education, which they shared was very disappointing. The most commonly used skills by athletic therapists included listening and providing empathy, while teaching psychological skills and providing advice were the least utilized. These findings point to a significant gap in theory and practice: while athletic therapists are aware of the various psychological challenges facing athletes and know they play a role in helping athletes' psychological recovery, they do not necessarily have the skills to do so. Future research could further investigate athletic therapists' perspectives regarding the psychological components of their education and examine the coverage of psychological aspects of injury in athletic therapy programs across different countries.

Self-compassion moderates the relationship between self-oriented perfectionism and disordered eating in a sample of health and exercise professionals

Danika A. Quesnel, University of Toronto; Maryam Marashi, University of Toronto; David M. Brown, University of Toronto; Erin O'Loughlin, University of Toronto; Catherine M. Sabiston, University of Toronto

Health and exercise professionals (personal trainers, exercise physiologist, and health coaches) often present with complicated personal histories of disordered eating. Additionally, being an exercise professional has been related to a greater risk of eating disorder onset. Perfectionism is another factor that can foster underlying ED behaviors and onset. Identifying modifiable strategies to minimize the effects of perfectionism on ED, in particular among health and exercise professionals working with clients, is of critical importance. Self-compassion (identified by aspects of common humanity, self-kindness, and mindfulness) may be a strategy that can be used to limit the association between perfectionism and ED among exercise professionals. The current study aimed to explore the association between self-oriented perfectionism and disordered eating in health and exercise professionals and explore self-compassion as a moderator of the association. Participants ($N = 124$, $M_{age} = 34.7$, $SD = 7.9$, 45.5% exercise, sport, or health coach) completed an online self-report survey. The PROCESS macro for SPSS was used to explore the moderator effect. Self-oriented perfectionism was positively related to disordered eating ($b = 7.97$, $p < .001$), and self-compassion significantly moderated the effect ($b = -1.87$, $p = .004$). Specifically, moderation was observed for self-compassion at one SD below the mean ($b = 3.18$) and at the mean ($b = 1.93$), but not at one SD above the mean ($b = .69$, $p = .25$). Results highlight that the relationship between self-oriented perfectionism and disordered eating is strengthened in individuals with lower self-compassion scores. Thus, supporting self-compassion in health and exercise professionals may offer a strategy to decrease the risk of EDs. Highlighting the value of self-compassion among health and exercise professionals may also lead to these professionals integrating self-compassion into their professional work with clients.

Methodological considerations when conducting participatory design workshops with autistic adults

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Technology plays a significant role in the lives of many autistic individuals, including methods for training and support. Autistic individuals often exhibit lower gross motor skill performance that is linked to physical inactivity (PA). Given many autistic individuals are interested in technology, and the links between physical literacy (PL), PA and overall health, the present study used a participatory design to engage autistic adults in discussions on PL to explore their experiences on using applications (app) to be physically active. Eight autistic adults and eight communication partners (sibling, parent) participated in semi-structured interviews in two phases of on-line and in-person workshops (four autistic adults and four partners per phase). During the eight workshops, a sample of four apps contributing to PA and PL development were presented to the participants. Participants shared their reflections on the appropriateness, applicability, and usability of the apps. Including communication partners was an effective strategy for sharing ideas, helping autistic adults understand the topic and reflect with more depth. Managing on-line sessions was challenging, especially for longer time periods (over one hour), and specifically in turn taking. Including additional people (app designers) to demonstrate the app installation was effective for ease of use but added to the complexity of keeping participants focused. Providing the device (tablet) and having the apps installed before the session increased the likelihood of participants using the apps. During in-person workshops, participants found it hard to initiate conversations at first but were gradually more comfortable in engaging in the discussions and sharing. In-person workshops were also valuable for the facilitators to connect with the participants and build trust. Conducting on-line workshops enabled the research during COVID-19; however, building trust and engaging participants was enhanced in in-person workshops. In all cases including communication partners in the workshop promoted deeper reflections. Funding source: Social Sciences and Humanities Research Council of Canada, Mitacs.

Chaos caused by different cut-off dates: The relative age effect and redshirting in United States collegiate volleyball

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The relative age effect (RAE) is a phenomenon in athletics related to an over-representation of individuals born closer to an arbitrary cut-off date. The RAE has been revealed in many different countries, at many different levels, and in many different sports. However, no studies have been conducted on volleyball in the United States. Therefore, the purpose of this study was to examine RAE in NCAA women's and men's volleyball to identify: (a) the birth quarter (BQ) distributions of NCAA volleyball student-athletes relative to both school and club cut-off dates, and (b) the relationship between the RAE and the delaying of athletes in kindergarten and the delaying of athletes through freshman redshirting at the collegiate level. Publicly available data

was collected from the websites Division I women's and division I/II men's volleyball programs (e.g., birthdate, year in school, home state cut-off date, athletic timing (i.e., on-time or delayed), and red-shirt status). Data from 1,253 female student-athletes and 164 male student-athletes were collected. Chi-squared goodness of fit tests and odds ratio comparisons were used to test BQ distributions. The analyses revealed significant findings for the women's club cut-off date, with a high BQ2 and low BQ4 ($p < .05$). Women's school ($p < 0.05$), men's "on time" school ($p < 0.05$), and women's "on time" school ($p < 0.001$) were all significant with BQ1 > BQ2 > BQ3 > BQ4 trends. Women's "on time" club was also significant ($p < 0.05$), showing a high BQ2/BQ3. Women's "delayed" school was significant ($p < 0.001$) with a high BQ4, while women's "delayed" club was also significant ($p < 0.001$) with a high BQ1 and a low BQ3. The findings suggest school cut-off dates are driving the RAE in women's volleyball. This study provides a unique insight into the prevalence of the RAE in United States collegiate volleyball related to both the school and the club cut-off dates and offers implications for coaches and administrators on ways in which to potentially reduce the effects of the RAE.

Drawing team members together: Intersection of socialization tactics and proactive behaviors with cohesion

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Socialization is a process in which newcomers learn behaviors and attitudes to become productive members of a team (Van Maanen, 1978). Organizations (e.g., sport teams) can implement socialization tactics to help newcomers onboard within a group (Van Maanen & Schein, 1979), which can influence the way new and existing members perceive their team (e.g., cohesion; Leo et al., 2020). However, members can play an active role in the socialization process by instigating proactive behaviors that influence interpersonal relationships and task interactions (Reichers, 1987). The present study explored how athlete perceptions of proactive behaviors moderate the relationship between socialization tactics and group cohesion. Athletes ($N = 405$, M age = 19.69) completed a survey package that allowed them to reflect on team socialization tactics (Benson & Eys, 2017) and cohesion (Carron et al., 1985), as well as their own proactive behaviors (Ashford & Black, 1996; Major & Kozlowski, 1997). Regression analyses (via PROCESS; Hayes, 2018) were conducted to examine potential moderating effects of proactive behaviors on relationships between socialization tactics and cohesion. Overall, proactive behaviors and socialization tactics independently and positively related to group integration-task and -social dimensions of cohesion, though there was no evidence of moderation. However, positive relationships between socialization tactics (coach-initiated role communication and social inclusionary tactics) and the cohesion dimensions attractions to the group-task and -social were stronger at lower levels of proactivity. In sum, socialization tactics and proactive behaviors are important aspects to consider when attempting to foster high perceptions of group cohesion in a sport context. The inclusion of socialization tactics may be particularly beneficial for athletes who are less likely to be proactive in determining task and social contributions to their team. Future research should explore these relationships via experimental designs and through the inclusion of intact teams.

An examination of positive body image, sport-confidence, and sport performance evaluations in Jamaican athletes

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Body image research in sport has primarily examined athletes' risk for developing body-related psychopathologies (e.g., negative body image, eating disorders), despite evidence of higher positive body image in athletes compared to non-athletes. Sport participation allows for an enhanced appreciation of the body's form and functionality, which is shown to have positive implications for athletes' sport experiences and outcomes. Guided by the sport-confidence model, this study examined a path model of the associations among a positive body image (i.e., body and functionality appreciation), sport-confidence, and sport-performance evaluations. It was hypothesized that (a) body and functionality appreciation would exert positive direct effects on sport-confidence, (b) sport-confidence would exert a positive direct effect on sport performance evaluations, and (c) body and functionality appreciation would exert positive indirect effects on sport performance evaluations through sport-confidence. Using a cross-sectional design, this study recruited a purposive sample of 314 Jamaican athletes (male = 70.7%; $M_{\text{age}} = 22.85$; $SD = 4.89$). Participants completed measures of body and functionality appreciation, sport-confidence, and subjective sport performance. Results from path analysis provided evidence for good model-data fit ($\chi^2(2) = 2.22$, $p = .330$; RMSEA [CI_{90%}] = .019 [.000, .116], CFI = .998, TLI = .990, SRMR = .021). Body ($B = 9.03$, $p < .001$) and functionality ($B = 4.93$, $p = .036$) appreciation exerted positive direct effects on sport-confidence. Sport-confidence exerted a positive direct effect on sport performance evaluations ($B = 0.09$, $p < .001$). Body ($B = 0.79$, CI_{95%} [0.44, 1.17]) and functionality ($B = .43$, CI_{95%} [0.05, 0.92]) appreciation exerted positive indirect effects on sport performance evaluations through sport-confidence. These results provide support for the hypothesized model. Encouraging the development of a positive body image in athletes may be a potential avenue to foster sport-confidence and promote positive performance outcomes. Funding source: Michigan State University.

An investigation of coach autonomy support, life skills acquisition, and positive youth development in Botswana athletes

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The sport context provides opportunities for positive youth development (PYD), life skills acquisition, and various positive outcomes. Autonomy supportive coaching is a consistent predictor of youths' life skills development, among other positive outcomes. Using Benson & Saito's PYD Framework, this study examined the associations among coach autonomy support, life skills development, and PYD in Botswana youth athletes. This cross-sectional study recruited

a purposive sample of 300 youth athletes ($M_{\text{age}} = 17.16$; $SD = 1.28$; male = 53%) from public schools in Botswana. Participants completed measures of coach autonomy support, life skills development, and PYD. Correlational analyses indicated that coach autonomy support was significantly related to the life skills of teamwork ($r = .25, p < .001$), goal setting ($r = .28, p < .001$), social skills ($r = .26, p < .001$), time management ($r = .27, p < .001$), emotional skills ($r = .24, p < .001$), problem solving and decision making ($r = .25, p < .001$), leadership ($r = .26, p < .001$), and interpersonal communication ($r = .29, p < .001$), as well as confidence ($r = .20, p < .001$), character ($r = .31, p < .001$), caring ($r = .19, p = .001$), and connection ($r = .21, p < .001$) dimensions of PYD. Results from path analysis indicated that coach autonomy support exerted positive direct effects on life skills acquisition ($B = 0.17, p < .001$) and PYD ($B = 0.05, p = .042$). Life skills acquisition exerted a positive direct effect on PYD ($B = 0.12, p = .011$). Coach autonomy support exerted an indirect effect on PYD through life skills acquisition ($B = 0.02, CI_{95\%} [0.01, 0.04]$). These findings support previously established associations between coaching climate and life skills development, but also indicate that the interpersonal climate provided by coaches may be more meaningful for social and personal, as opposed to physical dimensions of PYD in Botswana athletes. Though coach autonomy support has direct implications for life skills acquisition and PYD, it may also serve as an indirect pathway through which Botswana youth can attain positive outcomes. Funding source: Alliance for African Partnership, Michigan State University.

Exploring the relationship of muscle dysmorphia, orthorexia, social physique anxiety, and disordered eating behavior in male bodybuilders

Frank Rinaldi, Michigan State University; Chelsi Ricketts, Michigan State University; Andrew Driska, Michigan State University; David Ferguson, Michigan State University

Muscle dysmorphia (MD) is a psychological disorder characterized by perceptions of insufficient muscularity among individuals with immense muscle mass. Pathological comorbidities associated with MD include social physique anxiety (SPA), orthorexia (ORTO), and disordered eating behaviors (DEBs). Individuals with MD tend to over-engage in resistance training to build muscle mass. This study examined (a) predictors of MD symptoms in a sample of male competitive bodybuilders (CBB), recreational bodybuilders (RBB), and eSport athletes; and (b) whether MD symptoms predicted ORTO and DEBs. Predictors of MD symptoms were categorized as group membership (CBB, RBB, eSport athletes), individual behaviors (years & hours resistance training), and physique-related perceptions (SPA). Using a cross-sectional design, this study recruited a convenience sample of 212, comprised of CBB ($n = 70$), RBB ($n = 70$), and eSport athletes ($n = 72$), ages 18 – 57 years ($M = 24.86$; $SD = 5.82$) from local gyms and social media. Participants completed measures of MD, SPA, ORTO, and DEBs. Preliminary analyses indicated significant group difference on MD ($F(2) = 21.97, p < .001$), SPA ($F(2) = 4.15, p < .001$), ORTO ($F(2) = 8.86, p < .001$), and DEBs ($F(2) = 8.33, p < .001$), with CBBs and RBBs reporting significantly higher scores compared to eSport athletes. Hierarchical regression analyses indicated that only group membership ($R^2 = 0.174$;) and SPA ($R^2 = 0.220$) explained unique variance in MD scores. Results from multivariate multiple regression indicated that scores on MD significantly predicted ORTO ($B = .19, p < .001$) and DEBs ($B = 0.44, p < .001$). These

findings suggest that group membership and self-perceptions are more meaningful predictors of MD compared to individual behaviors. Particularly, males in active pursuit of muscularity and with greater physique concerns appear more susceptible to pathological engagement with muscularity. These findings also support previously established associations between MD symptoms and unhealthy weight compensatory behaviors such as ORTO and DEBs.

A preliminary investigation of mindsets in sport coaches

Benjamin S.P. Rittenberg, Dalhousie University; Lori Dithurbide, Dalhousie University

Mindsets, also known as the implicit theories, are beliefs about the nature of human attributes. Growth mindset-oriented individuals believe that everyone has the potential to improve their attributes with the proper motivation, opportunity, and instruction. Mindsets have largely been studied in education, with both students and teachers. Research with teachers has demonstrated that those with a growth mindset used feedback that was more supportive of learning and displayed higher self-efficacy, engagement, and overall performance. Furthermore, teachers' mindsets have also been shown to influence students' mindsets and outcomes (e.g., psychological experiences, academic motivation, etc.). To date, there is limited research investigating this area with sport coaches. Therefore, the purpose of this study was to explore the mindsets of sport coaches and determine how specific coaching variables were influenced by their mindset. Eighty-five certified sport coaches ($M_{\text{age}} = 38.0 \pm 12.79$ years; 50.6% women) completed a one-time survey that gathered demographic and coaching-specific information (coaching experience, sport(s) coached, etc.), and measured mindset of athletic ability, feedback style, leadership behaviours, coaching efficacy, and coaching engagement. Results indicated that, overall, sport coaches were highly growth mindset-oriented ($M = 4.33 \pm 0.52$, scale = 1-5). Regression analysis revealed that coaches who were more growth mindset-oriented used more adaptive feedback (i.e., feedback that was more supportive of learning), displayed more leadership behaviours (e.g., used more positive feedback), had higher coaching technique efficacy, and were more emotionally engaged in their role. These findings support previous research in education and provide initial evidence for the importance of a growth mindset in sport coaches. Future research should explore the direct influence of coaches' mindsets on their athletes and determine the efficacy of growth mindset interventions in this population. Funding source: Social Sciences and Humanities Research Council of Canada.

Play to Lead: Designing, implementing, and evaluating a one-year leadership development program for adolescent girls in sport.

Morgan Rogers, University of Calgary; Cari Din, University of Calgary; Penny Werthner, University of Calgary

In their most recent report, Canadian Women & Sport (2022) highlight the urgency of gender equity in sport, and call for girls' programming that is safe, welcoming, and supports leadership development. However, programs must be intentionally designed, as sport participation alone does not automatically ensure leadership development (Eva et al., 2019; Gould & Voelker,

2012). As well, an intersectional approach to leadership development in sport is critical as the unique needs of girls from equity deserving groups are often overlooked and a gap in the research literature (Hoyt & Kennedy, 2008; Joseph et al., 2022). The present research addresses these recommendations through designing, implementing, and evaluating a leadership program, Play to Lead, for adolescent girls in sport. Integrated knowledge translation informed this project, an approach which involves knowledge users in all phases of the research process to make research more impactful (Graham et al., 2018). The CIPP (context, input, process, product) model guided this program evaluation (Stufflebeam, 2003). Participants were 35 adolescent girls, their sport coaches (25), and program staff (3), based in the province of Ontario. An open-ended survey and focus groups were conducted with the girls and coaches, as well as interviews with a subset of girls, coaches, and Canadian Tire Jumpstart staff. Additionally, participant-observation data and program documents were used to inform program evaluation. Data was analyzed using reflexive thematic analysis (Braun & Clarke, 2020). Results highlight the importance of conducting formative evaluation and making ongoing adjustments to the program, the efficacy of project-based learning, and the value of developing interpersonal connection between participants within a program. This research contributes to our understanding of developing leadership with adolescent girls from equity-deserving groups. Mitacs, Canadian Tire Jumpstart, Social Sciences and Humanities Research Council of Canada.

Physiological and self-report indices of emotional experience during the mammalian dive response

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The mammalian dive response (DR) occurs when holding one's breath and simultaneously immersing chemoreceptors of the face in cold water. The DR elicits oxygen store conservancy through a decrease in heart rate (HR) and an increase in peripheral vascular resistance. Lower heart rate is associated with an increase in parasympathetic nervous system activity and greater heart rate variability (HRV). Higher HRV is regarded as a psychophysiological marker of increased emotion regulation capability. A decrease in HR occasioned during the DR would translate to an increase in HRV and concurrent change in affect. Whether and how the DR manifests in self-report and physiological indices of affect remains unknown. The purpose of the present study, therefore, was to determine if and to what degree the DR elicits a unique affective experience as indexed by HRV and self-reported measures of pleasure and arousal. We hypothesized that the DR would cause an increase in HRV, a decrease in perceived arousal and an increase in perceived pleasure. HRV and Affect Grid responses were recorded as participants ($N = 41$, $M_{age} = 20.0 \pm 1.3$ years) completed four randomized test conditions: seated breathing (control), seated breath-hold (breath hold), seated facial submersion with snorkel (snorkel), and seated facial submersion while holding breath (DR). Conditions involving exposure to water generated an increase in HRV (snorkel, $p < .001$, dive response, $p < .001$) compared to baseline. HRV increased from the DR's rest period compared to control ($p < .01$).

Self-reported arousal levels increased ($p < .001$) from pre- to post breath hold, snorkel, and DR, while pleasure did not change from pre- to post conditions. Our results highlight that the DR may reveal a unique affective experience as indexed by an increase in HRV and self-reported arousal. Implications are discussed regarding how the DR and/or exposure to water may impact emotional reactivity and human performance.

Psychological effects of passive recumbent cycling in able-bodied and spinal cord-injured adults

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Congruent with reviewed literature and preliminary data, active (AC) and passive (PC) cycling demonstrate changes in psychological measures, despite the lack of physiological changes in heart rate (HR) and rating of perceived exertion (RPE) during passive cycling (PC) in healthy controls. Passive cycling has been suggested as a therapeutic activity for improving psychological well-being in individuals with disabilities. It was hypothesized that there would be significant differences in affect as a result of PC in comparing those with and without spinal cord injury (SCI). Also, those without SCI would exhibit greater activity enjoyment compared to those with SCI. Participants with SCI ($N = 25$, $M_{age} = 27.32 \pm 7.2$ years) and without SCI ($N = 34$, $M_{age} = 21.20 \pm 2.9$ years) participated in an acute bout of passive (motor-driven) recumbent cycling for 30-min @ $65 \text{ r} \cdot \text{min}^{-1}$. HR, RPE, enjoyment, and affect (calmness, tension, energy, tiredness, state anxiety [SA]) were measured before (pre-0), immediately after (post-0), and 30 minutes after (post-30) each cycling bout. Participants without SCI had a higher heart rate ($M_{diff} \pm SE = 8.63 \pm 3.14$, $p = 0.01$) compared to those with SCI during the cycling bout. Energy increased from pre-0 to post-0 ($p = 0.02$) and decreased below baseline at post-30 ($p = 0.002$). Tiredness increased from post-0 to post-30 ($p = 0.007$). Tension decreased from post-0 to post-30 ($p = 0.016$). Calmness decreased during PC ($p = 0.002$) and returned to baseline at post-30. There was no change in SA between those with and without SCI during or following PC. These results suggest that PC in those without SCI may not have been entirely passive. Further, those without SCI found PC significantly more enjoyable than those with SCI, suggesting greater participation in the future. The suggested way to test the mind-body mechanisms associated with PC is to continue work in those without sensation and volitional control (i.e., SCI). Future studies should work to continue deciphering the mechanisms associated with affective change as a result of passive cycling. Funding source: Oakland University.

Exploring gender equity in Canadian para-sport: A case study of Défi-Sportif AlterGo

G. Siobhan Rourke, University of Ottawa; Diane M. Culver, University of Ottawa; Tiago Duarte, University of Ottawa; Maji Shaikh, University of British Columbia; Timothy Konoval, University of Alberta; Penny Werthner, University of Calgary

While the interconnection of gender+, disability, and sport has been explored, there is a distinct lack of research examining the gendered experiences of women and girls with a disability in para-sport contexts (Culver et al., 2022). Défi-Sportif AlterGo (DS-A) is an annual multi-sport

event for para-athletes put forth to advance universal accessibility (i.e., full participation of people with a disability) through the levers of sport, leisure, and culture. Providing sport opportunities from youth and first-contact athletes to Paralympians, DS-A presents an interesting case to explore the interaction of gender+ and disability in para-athletes' participation. Our data consists of eight semi-structured interviews with decision-makers and volunteers, two athlete focus groups, and informal observations at the 2022 event. Data were collected, coded, and analyzed over a six-month period using reflexive thematic analysis. Our results showed the event acts as a potential gateway for para-athletes to engage in sport, across levels of skill and impairment. DS-A decision-makers see disability as the critical marginalizing characteristic to address in order to advance their mission of "universal accessibility." Impairment degree was the predominant marker of inclusion efforts in recruitment when compared against gender+ or other identifying characteristics. DS-A focuses on increasing the participation of para-athletes with severe impairments and developing competitions for those whose impairments have prevented them from participating in traditional adapted categories. Subsequent to our questions related to gender+ equity the decision makers have adopted a more intentional gender lens in their programming (e.g., a planned girls-only day for 2023). Funding source: eAlliance.

IPLAY Intervention: Examining the impact of a novel movement behaviour program for refugee youths transitioning to Canada

Taylor Rowe, Brock University; Jeffrey Graham, Brock University; Jennifer Konopaki, Brock University; Matthew Kwan, Brock University

Physical literacy (PL) is a multidimensional concept that includes the domains of movement competence, confidence, motivation, and the knowledge and understanding necessary for regular engagement in physical activity. The Immigrant-focused Physical Literacy for Youth (IPLAY) program is a pilot 8-week program designed to enhance the PL among newcomer youth, implemented within a supportive group environment. This study aimed to examine the impact of the IPLAY program on PL development among a cohort of Afghan refugee participants. There were 36 youth participants that took part at the baseline assessment (range: 12-16 years); however, only 24 completed the program with 20 participants having complete data for both pre-and post-test assessments ($n = 10$ females, $M_{age} = 14.25 \pm 1.25$). Assessments of PL included an objective measure of movement competence (PLAYbasic) and a subjective measure (self-reported questionnaire) to assess the other domains of PL. Based on the data from the 20 participants who completed both pre-and post-test assessments, findings indicated that movement competence significantly increased over time ($\Delta = +5.11$, $t = 5.25$, $p < .001$). Although confidence ($\Delta = +0.15$, $t = 0.79$, $p = .48$), motivation ($\Delta = +0.02$, $t = 0.11$, $p = .92$), and knowledge and understanding ($\Delta = +0.92$, $t = 1.87$, $p = .08$) also increased over time, these changes were not statistically significant. Similarly, the PL composite scores increased over time ($\Delta = +4.72$, $t = 1.6$, $p = .12$), but the changes did not reach statistical significance. Overall, findings from the present study are encouraging as they provide initial evidence for the support of community-based PL programs such as IPLAY to help newcomers develop their PL. Data collection for this pilot study is ongoing with new cohorts of refugees; however, future research

with control groups is necessary to better understand the efficacy of such interventions.
Funding source: Social Sciences and Humanities Research Council of Canada.

Mapping interpersonal emotion regulation onto positive youth development programs in sport

Kelsey Saizew, Queen's University; Svenja A. Wolf, Florida State University; Karl Erickson, York University; Luc J. Martin, Queen's University

Emotions tend to be heightened in the sport context, with feelings of extreme joy, frustration, or sadness fluctuating throughout a competition. As such, sport has been positioned as an ideal avenue to teach crucial emotion regulation skills (e.g., Côté et al., 2014; Holt et al., 2017). However, most research in youth sport has focused on intrapersonal emotion regulation, largely overlooking important social aspects (Tamminen et al., 2016). The omission of interpersonal emotion regulation (IER) in youth sport is interesting given that adolescence is a pivotal point in emotion regulation development whereby youth begin to seek support from peers rather than adults (e.g., parents, coaches) while also being increasingly aware of the emotions of others (Gross, 2015; Kunzman et al., 2018). It is anticipated that understanding and influencing others' emotions would have a positive impact on their interpersonal functioning long term. A context that could be ideal for teaching IER skills is through positive youth development (PYD) programs. PYD programs aim to foster the development of personal assets such as social-emotional skills (Gould & Carson, 2008). In particular, it has been shown that organized PYD programs are excellent environments for building youth's emotional abilities, such as emotional competence, empathy, and intrapersonal emotion regulation (Kunzmann et al., 2018; Larson & Brown, 2007). To explore how IER can be mapped more specifically within PYD interventions, this presentation will comprise two main sections. First, we will explore what is currently known about IER generally, as well as the sport-specific antecedents, outcomes, and contextual factors. Second, we will discuss how social-emotional skills are currently developed within select youth sport programs from a PYD perspective. We will conclude with suggestions on how IER training could be implemented within a youth sport context. It is hoped that this presentation will serve as a first step for assessing how IER skills could be adopted into PYD programs.

Is exergaming useful for promoting mental health in university students?

Esther S. Santos, Immerysve, Inc.; Philip M. Wilson, Brock University; Diane E. Mack, Brock University

Diminished mental health has been reported by university students leading to calls by post-secondary education leaders to identify more effective ways to promote mental health on campus. Physical activity has been linked to better mental health in university students yet limited research has evaluated the role of exergaming (i.e., videogaming with motion sensor technology) relative to both positive and negative dimensions of mental health in this cohort. The purpose of this study was to compare the efficacy of exergaming for promoting mental

health reported by university students during final exam week. Using a post-test only randomized experimental design, participants ($N = 91$) were randomly assigned to 1 of 6 groups where they read a vignette emphasizing a male or female “target” engaged in either (a) pet therapy or (b) exergaming or (c) no exercise. After reading the vignette, participants rated each target’s levels of stress, anxiety, flourishing, and subjective vitality expected during final exam week. Separate multivariate analyses of variance using stress and anxiety (Pillai’s Trace = 0.23, $F = 2.21$, $p = .02$, partial eta-squared = 0.12) then flourishing and vitality (Pillai’s Trace = 0.20, $F = 1.90$, $p = .05$, partial eta-squared = 0.10) identified omnibus differences between groups. Lowest stress and anxiety scores plus higher vitality scores were evident in the exergamer condition. Higher scores on flourishing were evident if the hypothetical target was portrayed as female only. Overall, this study reinforces the notion that exergaming may be a viable platform to consider by university administrators seeking to optimize mental health of university students during final exam week. These findings also highlight the need for greater research attention defining the conceptual bandwidth representing positive dimensions of mental health reported by university students. Funding source: Ontario Trillium Foundation.

National Collegiate Athletic Association coaches’ basic psychological need satisfaction and frustration: A person-oriented investigation

Ari Sapinsley, West Virginia University; Daniel Leyhr, Eberhard Karls University of Tübingen; Tucker Readdy, Bering Global Solutions; Johannes Raabe, Bering Global Solutions

Especially at elite levels of sport, such as the National Collegiate Athletic Association (NCAA), coaches must navigate various personal, social, and organizational challenges which pose a potential threat to their psychological functioning and well-being (Norris et al., 2017). According to self-determination theory (Ryan & Deci, 2017), the quality of individuals’ cognition, affect, and behavior is determined by their perceptions of the basic psychological needs of autonomy, competence, and relatedness. To date, research on basic psychological needs in sport has almost exclusively focused on athletes’ experiences. The limited number of studies with coaches (e.g., Morbée et al., 2020) have all been conducted with variable-centered approaches in which average scores for the basic psychological needs are computed across the respective samples. In contrast, a person-oriented perspective (Bergman & Magnuson, 1997) allows insight into different profiles of need satisfaction and frustration among participants, including potential shape and/or level effects in the perceptions of the three needs. This study was designed to explore profiles of need satisfaction and frustration among NCAA coaches. $N = 1,218$ NCAA Division I and II coaches from multiple sports participated in the research. Latent profile analysis ($BIC = 17,078$, Entropy = .83) revealed five profiles: moderately high need satisfaction/moderately low need frustration, average need satisfaction and frustration, low competence satisfaction/high competence frustration, low relatedness satisfaction/high relatedness frustration, low need satisfaction/high need frustration. The findings highlight variations in participants’ perceptions of autonomy, competence, and relatedness in what might initially appear like a homogenous group of coaches. Patterns that emerged in the current study can help to facilitate greater accuracy in targeting at-risk individuals for focused

interventions to improve coaches' need fulfilment. Theoretical and methodological implications to enhance future research will be discussed.

When is “tough love” too much? An exploratory study of tough love coaching in sport

Sarah Saxton, West Virginia University; Daniel Gould, Michigan State University; Andrew Driska, Michigan State University

“Tough love” is often discussed and utilized in sport but is not clearly defined or well-understood. Without an understanding of what tough love coaching is (and what it is not), the use of tough love could cross into abuse or maltreatment. The purposes of the current study were to propose a definition of tough love coaching; identify tough love strategies commonly used by coaches and whether athletes perceive them as effective, ineffective, or harmful; and better understand when tough love becomes abusive or neglectful. Semi-structured interviews were conducted with 12 current and former athletes. Participants took part in a wide range of sports ($N = 18$) at a variety of levels (i.e., recreational, competitive, collegiate, and professional). Following interview transcription, thematic analysis (Braun & Clarke, 2006) was conducted to identify relevant themes across the data. Based on the results, a definition of tough love coaching was proposed; tough love strategies that participants identified as effective, ineffective, and/or harmful are presented; and participants' perceptions of when tough love crosses the line into abuse or maltreatment are discussed. Results will be presented relative to existing abuse and maltreatment literature, as well as other extant sport psychology literature. Practical recommendations, as well as future research directions, will also be provided.

“You cannot be serious!” Self-compassion predicts less anger and a lower likelihood of defending oneself when falsely accused of making an error

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People make mistakes, and when they do, research overwhelmingly supports the value of responding with self-compassion. But sometimes people are accused of making mistakes that are not mistakes at all. And although self-compassion facilitates adaptive responding to mistakes, it is unclear if self-compassion affects how people respond when falsely accused of making mistakes. In false accusations scenarios, we posit that those who are highly self-compassionate are less angry at the accuser which should, in turn, predict a lower likelihood of defending oneself against the false accusation. We tested these hypotheses in two online studies with participants familiar with the sport of tennis (Study 1 $N = 422$; Study 2 $N = 492$). In both studies, participants first completed the self-compassion scale (Neff, 2003) to assess general levels of self-compassion. They then read a hypothetical scenario which asked them to imagine that they were playing an important tennis match and the umpire incorrectly called one of their serves to be out of bounds, causing them to lose the match. Finally, they answered items assessing how angry they would be in response to the umpire's decision, and the

likelihood that they would formally challenge it. Using Hayes' (2017) PROCESS macro, we found that, in both studies, self-compassion was negatively associated with feelings of anger in response to the umpire's decision. Anger, in turn, was positively associated with intentions to challenge the umpire's decision. These results mean that those who are highly self-compassionate may be less angry when accused of making mistakes that they did not commit which, in turn, decreases the likelihood of them standing up for themselves and challenging their accusers. These findings are important because self-compassion is typically linked with positive, adaptive responses to difficulties. However, these findings suggest that being self-compassionate may backfire when falsely accused of making a mistake.

The Valkyrie exercise group: The impact of leader's identity entrepreneurship on participants' online exercise class experience.

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Based on the social identity approach (SIA), leaders can act as *identity entrepreneurs*, using their words and actions to craft and maintain a sense of "we-ness." Little is known about the effectiveness of a leader's identity entrepreneurship in an online exercise class setting. The present two experimental studies manipulated a leader's use of identity entrepreneurship to examine the causal impact this had on participants' experience in a 10-minute high-intensity interval training (HIIT) class. In the low identity entrepreneurship condition (LIEC), the class leader did not establish a shared identity and used the singular pronoun "I." In the high identity entrepreneurship condition (HIEC), the leader created a shared identity, the Valkyrie exercise group, and used the collective pronoun "we." The experimental manipulation was the first test with an online sample ($N = 204$) who watched a two-minute clip of their assigned conditions exercise class. The experimental manipulation worked with participants in the HIEC, producing significantly higher levels of identity entrepreneurship and shared class identification than participants in the LIEC. No other main effects were reported, but identity entrepreneurship significantly indirectly affected participants' class experience. In study 2, 158 in-person participants completed either the HIEC or LIEC. Subjective and objective measures were used to compare conditions. The manipulation was successful: participants noted significantly higher leader identity entrepreneurship and shared class identification in the HIEC compared to the LIEC. There were no significant main or indirect effects of participants' objectively measured effort (heart rate) and performance (counted exercise repetitions). However, consistent with study 1, identity entrepreneurship significantly indirectly affected participants' class experience. Overall, these studies demonstrate the successful manipulation of identity entrepreneurship and its impact in an online exercise class. Its limitations provide guidance for future extensions of this research. Funding source: University of St. Andrews.

Diversity, physical activity, and referral of university students utilizing campus healthcare services

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Physical activity (PA) reduces the risk of chronic disease and is associated with a range of positive mental health-related outcomes. Despite those benefits, most university students are insufficiently active to meet the national PA guidelines. University healthcare settings are ideal for PA intervention for several reasons, including equitable access to large numbers of diverse students. Indeed, nearly a third of university students report utilizing on-campus healthcare. Thus, the purpose of the present study was to identify the diversity, PA, and PA referrals of university students utilizing campus healthcare. Data were collected from university healthcare service initial visits that occurred during the second eight weeks of the fall semester ($n = 1030$, $M_{age} = 21.14 \pm 4.36$ years). PA was measured using the Physical Activity as a Vital Sign (PAVS) questionnaire. The present sample was predominantly female (74.6%), non-Hispanic or Latino (83.2%), and White (60.9%). Fifty-seven percent of the sample were insufficiently active, reporting less than 150 minutes of moderate-to-vigorous PA per week. Independent t -tests revealed men and White students reported significantly more weekly minutes (min/wk) of PA than women and students of color, respectively ($ps < .01$). There were no significant differences in min/wk of PA between ethnic groups ($p = .39$). PA referrals by campus healthcare providers were completed in less than 1% of the sample despite over half of the sample reporting insufficient PA. Taken together, findings suggest most university students utilizing campus healthcare are insufficiently active to meet national PA guidelines, yet there are dismal rates of PA referrals by campus healthcare providers. Interventions to increase PA among diverse samples of university students and PA referrals among campus healthcare providers are sorely needed.

Exploring links between physical activity characteristics and perceived cognitive impairment in young adults after cancer treatment

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Cancer-related cognitive impairment (CRCI) can diminish young adults' quality of life. Evidence on the cognitive benefits of physical activity (PA) for cancer survivors is mixed, though some studies and narrative accounts suggest it may be a promising form of self-management. Rather than dismissing the role of PA, it is important to investigate which (if any) PA characteristics are related to CRCI. Thus, in this descriptive study, we explored links between certain PA characteristics (i.e., intensity, frequency, type, location, setting, timing, and social context) and young adults' perceived cognitive impairment (PCI) after cancer treatment. As part of a larger study, participants ($N = 46$; $M_{age} = 31.4 \pm 5.4$ years; 91.3% female; $M_{time\ since\ diagnosis} = 3.2 \pm 2.9$ years) completed a web-based survey assessing sociodemographic/medical characteristics, PCI, and PA behavior. On average, descriptive statistics showed that participants reported clinically meaningful CRCI on the Functional Assessment of Cancer Therapy-Cognition questionnaire ($M = 44.7 \pm 17.4$; range = 4-69) and were active based on self-reported moderate-to-vigorous PA (MVPA; $M = 27.3 \pm 20.6$; range = 0-70). Bivariate correlations showed small-to-moderate correlations ($r = 0.14$ - 0.31) between PCI and both PA intensity (MVPA and vigorous, but not light or moderate) and social context (alone or with others), and ANOVAs showed small effects ($\eta_p^2 = .02$ - $.03$) for PA type (endurance or combined endurance/strength), location (home, center-based [e.g., gym], or other [e.g., parks]), and timing (morning, afternoon, or

evening/night). PCI was not linked to PA frequency nor setting (indoor or outdoor). Despite limitations, results cautiously suggest that mixed findings in the literature could be attributed to differences in PA characteristics whereby some (but not all) PA may be linked to CRCI. Accordingly, continued investigation into which specific PA characteristics are related (rather than only assessing total amount of PA) is needed to help guide the development of PA interventions and recommendations for CRCI self-management in young adults. Funding source: Social Sciences and Humanities Research Council of Canada.

Assessing the factorial validity of the Shared professional Leadership Inventory for Teams

Mason Sheppard, University of Windsor; Todd Loughead, University of Windsor; Krista Munroe-Chandler, University of Windsor; Gordon Bloom, McGill University

Researchers have often assessed the leadership behaviours of athletes with inventories that were originally developed from other fields of research (e.g., military, coaching leadership). The two most common inventories are the Leadership Scale for Sports (Chelladurai & Saleh, 1980) and the Differentiated Transformational Leadership Inventory (Callow et al., 2009). The psychometric properties of these two inventories are shown to be valid and reliable in the athlete leadership literature. In order to provide researchers with additional leadership behaviours to assess, Grille and Kauffeld (2015) advanced a four-factor model of leadership comprised of task-, relations-, change-, and external-oriented behaviours originally developed for the organizational setting. The purpose of this study was to test the factorial validity along with the internal consistency of this four-factor model with a sample of 584 athletes competing in a variety of sports. First, the items of the Shared Professional Leadership Inventory for Teams had to be transformed to fit an athlete leadership context using a think-aloud protocol with athletes. Second, an expert panel was utilized to evaluate and comment on the suitability of the items for an athlete population. Third, the McDonald's omega (w) internal consistency values ranged from .84 to .91. Finally, the factor structure was analyzed using Confirmatory Factor Analysis (CFA) and Exploratory Structural Equation Modelling (ESEM). Hu and Bentler's (1999) criteria assessed model fit. The results of the CFA indicated good model fit of a 20-item, four-factor model ($\chi^2 = 480$; $df = 164$, CFI = .95, TLI = .95, RMSEA = .057 [.052-.063], $p < .001$, SRMR = .02). In order to allow simultaneous cross-loadings between factors, an ESEM was conducted on the 20-item inventory, where the results indicated good model fit ($\chi^2 = 342$; $df = 116$, CFI = .97, TLI = .95, RMSEA = .058 [.051-.065], $p < .001$, SRMR = .023). Based on the results, this inventory is valid and reliable that researchers can use to measure the leadership behaviours of athletes.

Examining the predictive validity of the Shared Professional Leadership Inventory for Teams: Testing the athlete leadership-cohesion relationship

Mason Sheppard, University of Windsor; Megan Kalbfleisch, University of Windsor; Todd Loughead, University of Windsor

Athlete leadership has been defined as an athlete occupying a formal or informal role within a team who influences a group of team members to achieve a common goal (Loughead et al.,

2006). A positive relationship has been shown between athlete leadership and cohesion (Callow et al., 2009; Vincer & Loughhead, 2010). The athlete leadership-cohesion relationship has been typically measured using two behavioural inventories; the Leadership Scale for Sports (Chelladurai & Saleh, 1980) and the Differentiated Transformational Leadership Inventory (Callow et al., 2009). Recently, Sheppard et al. (2023) provided researchers with another valid and reliable inventory to assess athlete leadership behaviours. Specifically, Sheppard et al. found that the Shared Professional Leadership Inventory for Teams (SPLIT; Grille & Kauffeld, 2015) demonstrated factorial validity along with adequate internal consistency values. The SPLIT measures four athlete leadership behaviours; task-, relations-, change-, and external-oriented leadership. Thus, the purpose of this study was to test the predictive validity of the SPLIT and cohesion. Athletes ($N = 584$) completed the Group Environment Questionnaire (Carron et al., 1985) to measure perceptions of cohesion and the SPLIT to assess athlete leadership behaviours. using structural equation modelling (SEM), the results showed the athlete leadership dimensions of task- and change-oriented leadership were positively related to the cohesion dimensions of ATG-T ($\beta = .19, p < .05$; $\beta = .62, p < .05$, respectively) and GI-T ($\beta = .16, p < .05$; $\beta = .62, p < .05$, respectively). Furthermore, relations-oriented leadership was positively related to ATG-S ($\beta = .37, p < .05$), GI-T ($\beta = .24, p < .05$) and GI-S ($\beta = .27, p < .05$). Lastly, external-oriented leadership was related to ATG-S ($\beta = .29, p < .05$) and GI-S ($\beta = .34, p < .05$). The present study positively supports the athlete leadership-cohesion relationship, further justifying the validity of the SPLIT. The results validate the predictive nature of the SPLIT in relation to the four dimensions of cohesion.

Blood, sweat and fears: The life-long challenge of using exercise as a form of agency while living within my chronically diseased body

Christopher Shields, Acadia University

One's body is a key contributor to overall self-esteem as it is the only clearly identifiable, outwardly facing component of self. Body-image is the subjective interpretation of one's body-reality, in terms of form, function and health, as influenced by social pressures and expectations. People are often thought of as living within a single body-reality that simply shifts as we age; however, living in a dual body-reality, one that is "healthy" and exercising as well as chronically diseased is less commonly considered by those working with these individuals. The current study uses autoethnography to explore and deconstruct the intersection of these two influences on body-image. Autoethnography is a qualitative methodological approach which uses self-reflection and first-person narratives to deepen our understanding of larger social issues. Critical examination of the researcher's lived experiences through youth, adolescence, and young adulthood, "middle-age," and into the current day gave rise to four narratives or stories: (a) doc says just listen to your body, (b) the paper athlete, (c) the exercising body as problematic, and (d) reuniting with exercise; each of which represent key events and interactions that shaped his body-image. The findings reaffirm the importance of body-image to the sense of self as well as the notion that both exercise and living with chronic disease are separate, powerful factors that can influence body-image. In this way, the findings map well onto existing literature on body-image, and identity formation. Further, a consistent thread

through all of the narratives is a tension around agency and control over one's own body. The tension around agency highlights how important it is that health care providers recognize their impact on how people living with chronic disease navigate or understand their body/body-related perceptions. As such, this work offers an illustrative example that could be used to inform health care providers' approach with "healthy" exercising individuals living within a chronically diseased body.

Which strategies are important for optimizing participation in military adapted sport? Examining the perspectives of Invictus Games nation staff

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Quality participation is an important component of adapted sport participation to promote psychosocial well-being, physical health, and long-term physical activity participation. However, questions remain as to the ideal strategies for delivering optimal quality participation experiences. In previous studies, the research team conducted qualitative observations and interviews across 20 countries, as well as a review of documentation and literature, identifying 165 strategies representative of approaches to fostering the six elements of quality participation experiences (autonomy, belonging, mastery, challenge, meaning, engagement). This study sought to determine which of these strategies were most important for optimizing quality participation experiences in adapted sport for military service members and Veterans with physical and/or psychological illnesses and injuries. A Qualtrics survey was distributed to Invictus Games nation staff asking them to rate the importance of each strategy on a Likert scale anchored at 1 (*very unimportant*) to 7 (*very important*). Twenty nation staff ($n = 10$ male, $n = 9$ female) representing 7 countries (Australia, Denmark, Germany, New Zealand, Romania, Republic of Korea, United Kingdom) completed the survey. Individuals held diverse roles on their teams including team manager, coach, medical staff, recovery support officer, and sport psychologist. A total of 166 strategies had an average score of 5 or greater indicating a rating of *slightly important* or higher on the Likert scale. Of these strategies, 56 were rated as *slightly important* or higher by all participants. Three strategies relating to coach identity and team selection processes were rated unimportant. Findings will inform the development of a training workshop for individuals seeking to deliver adapted sport programming to military service members and veterans with illnesses and injuries. Funding source: Forces in Mind Trust.

The Physical Self Comparison Scale (PSCS): Scale development and validation

Kelsey Sick, Western University; Harry Prapavessis, Western University; Eva Pila, Western University

The physical self is a pervasive domain of social comparison, particularly for adolescents and young adults. However, current instruments that assess one's tendency for engaging in body comparison appraisals are limited to physical appearance-related domains (e.g., body weight,

shape, size, attractiveness), despite evidence that self-perceptions and evaluations vary across various physical self facets (e.g., physical ability). In the present paper, a theory-informed instrument was constructed and validated to measure one's tendency to engage in novel and understudied social comparisons related to the physical self—*Physical Self Comparison Scale* (PSCS). In Study 1, an extensive item pool ($n = 86$) was generated using deductive and inductive methods. Content validity was examined through the use of expert judges ($n = 13$) and analysis of item relevance, representativeness, and technical quality. In Study 2, the factorial validity of the refined 55-item PSCS was comprehensively examined using confirmatory factor analysis (CFA) and various (i.e., original, bi-factor, hierarchical) exploratory structural equation modeling (ESEM) approaches. An online sample of adults ($n = 653$; $M_{age} = 37.21$, $SD = 12.37$ years) were asked to complete the PSCS. Analyses indicated that the original 10-factor CFA model had good model fit, but resulted in very high latent correlations between similar physical self dimensions. Conversely, 9-factor, bi-factor, and hierarchical ESEM solutions resulted in superior fit to the data than their CFA counterpart, and in reduced estimates of factor correlations. In Study 3, further evidence for the internal structure, convergent and discriminant validity, and 1-month test-retest reliability of the PSCS subscale scores was demonstrated using an independent sample of young adults ($n = 217$; $M_{age} = 20.33$ years, $SD = 1.63$ years). The development and validation of the PSCS has important theoretical and practical implications for our understanding of physical self-related social comparisons, and how this construct is currently conceptualized and measured. Funding source: Western University Social Sciences and Humanities Research Council Internal Grant.

Examining the within- and between-person associations between body-related emotions and device-measured physical activity among university students

Kelsey Sick, Western University; Jenna Gilchrist, University of Waterloo; Matthew Bourke, Western University; Eva Pila, Western University

Body-related shame and guilt are theorized to be time-varying affective determinants of physical activity, yet existing research has predominantly relied on between-person associations using self-report measures of physical activity. The present study examined within- and between-person association between body-related shame and guilt, and subsequent time spent in moderate-to-vigorous physical activity (MVPA) measured by continuously worn accelerometers using ecological momentary assessment. University student participants ($N = 98$; $M_{age} = 19.45$) were prompted 49 times over 7-days to self-report body-related shame, guilt, and wore activPAL accelerometers to continuously monitor movement behavior. Experiencing higher levels of body-related guilt ($b = 0.33$, 95% CI [0.09, 0.58], $p = .009$), but not shame ($b = 0.15$, 95% CI [-0.09, 0.38], $p = .216$), compared to one's weekly average was related to higher subsequent time spent in MVPA. Contrary to existing literature, neither body-related shame ($b = 0.50$, 95% CI [-0.10, 1.11], $p = .100$) nor guilt ($b = 0.28$, 95% CI [-0.31, 0.87], $p = .333$) were significantly associated with average levels of MVPA between individuals. These findings lend support to theoretical propositions that body-related guilt may impact engagement in physical activity in daily life.

Sport and physical activity for the promotion of mental health outcomes in children at risk of mental illness: A systematic review

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Mental illness is one of the leading causes of disease burden globally. Childhood and adolescence are recognised as key periods for the potential onset of mental illness; however, some children may be exposed to risk factors that further increase the likelihood of developing a mental illness. A popular approach to intervention in this field is to utilise sport or physical activity to promote protective factors for mental health (e.g., resilience) or improvements in symptomatology. We aimed to assess the effectiveness of sport- and physical activity-based interventions for promoting positive mental health-related outcomes in children and adolescents with an increased risk of mental illness. We conducted a systematic review using six databases of academic literature (MEDLINE, EMBASE, PsycINFO, CINAHL, SPORTDiscus, and PaBSC) and two databases of grey literature. Our search yielded 34 articles and theses on 33 studies conducted between 1995 and 2021. Young people ($n = 2816$, age range = 6 – 20) were considered at-risk due primarily to socioeconomic status ($k = 11$) and exclusion from mainstream school ($k = 5$). Preliminary analysis revealed that the most common intervention approaches included multi-sport interventions ($k = 9$), yoga ($k = 8$), and surfing ($k = 4$), indicating that researchers have tended to (a) promote activities outside of ‘traditional’ (e.g., team) sports, or (b) provide children with the opportunity to experience a range of activities. The provision of multiple activities was predominantly effective, corroborating an autonomy-supportive approach to intervention. Researchers most frequently targeted self-evaluative outcomes, such as self-esteem—10 of 16 studies showed significant improvements in self-evaluative outcomes (or significantly better scores than controls) following intervention. Our findings highlight that, if delivered appropriately, sport- and physical activity-based interventions may be effective in promoting mental health-related outcomes in children and adolescents at risk of mental illness. PROSPERO registration: CRD42022315464

Rival or role model? How perceived teammates’ displays of pride predict emotional responses and behavioral consequences related to performance

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Drawing on the emotions as social information (EASI) model, the spontaneous displays of pride athletes exhibit after a victory provides crucial information to teammates (van Kleef, 2009). A teammate’s displays of pride signal the relevance of an achievement (i.e., personal success), thereby boosting their status (Tracey & Matsumoto, 2008); the revealed superiority thus

triggers an emotional response (i.e., admiration, benign and malicious envy) in onlooking teammates (Lange et al., 2018; Lange & Crusius, 2015; van de Ven et al., 2011). In turn, these emotional responses have specific motivational action tendencies that influence the level of participation in corresponding behaviors, either benefiting or damaging individual and team athletic performance (Keltner & Haidt, 1999; van de Ven et al., 2015). To examine this phenomenon, we studied a Division I men's golf team over their spring 2023 competition season. Athletes completed a minimum of four testing periods evaluating three randomized teammates per period. The testing period starts twenty-four hours after a competition (i.e., post-competition survey) assessing: perception of teammates' displays of pride and own emotional response (i.e., admiration, benign and malicious envy) and ends 48 to 24 hours before the next competition (i.e., behavior reflection survey) assessing: own effort, compassion towards teammate, antisocial behavior towards a teammate, and affiliation motive. Using the data gathered, a strong relationship between authentic pride and admiration was discovered, $r(4) = .80$. Additionally, an inverse relationship was found between hubristic pride and admiration, $r(4) = -.64$. Interestingly, we found no significant relationship between authentic pride and benign envy or hubristic pride and malicious envy. Teammates' responses to success may have the potential to engender positive consequences for the rest of the team, at least on an emotional level. The extent to which this translates to adaptive behaviors and improved performance still needs to be investigated.

The effect of descriptive norms on performance and effort during a simulated home workout and the moderating role of social identification

Mark Stevens, The Australian National University; Olivia Davies, The Australian National University; Tegan Cruwys, The Australian National University

Evidence suggests that people's physical activity behaviours are shaped by their perceptions of the typical physical activity behaviours of others (i.e., descriptive norms). However, previous research has predominantly used cross-sectional designs, focused on people's physical activity intentions or self-reported overall physical activity, and failed to attend to how the normative referent affects the norm-behaviour relationship. In a pre-registered experiment (current $N = 64$) with a pre-post between-subjects design, we manipulated the descriptive norm to explore its effect on participants' objectively assessed effort during, and performance on, an exercise task – a simulated home workout comprising five exercises. We also measured the strength of participants' social identification as a member of the norm reference group as a potential moderator. Participants who were told that the number of repetitions of the workout exercises (e.g., sit-ups, squats) that they completed during a baseline trial was below average (high norm condition) increased the number of repetitions they completed during Trial 2 significantly more than participants who were given no normative feedback (control condition). Participants in the high norm condition also demonstrated significantly greater increases in their average and maximum heart rate during the workout from baseline to Trial 2 compared to those in the control condition. Moderation analyses provided some evidence for a norm \times social identification interaction, such that the effect of the norm manipulation tended to be stronger for participants who identified more strongly as a member of the norm reference

group. Results suggest that descriptive norm messages can improve people's effort and performance on physically demanding tasks, and indicate that descriptive physical activity norms may be more influential when the norm reference group is subjectively meaningful. Updated results from a larger sample will be presented (estimated $N = 100$), and opportunities to fruitfully deploy norm messages in applied contexts will be discussed.

A social identity perspective on parental involvement in competitive youth sport

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Parental involvement is integral to the functioning of youth sport, as their varying roles facilitate program logistics and athlete participation (Fredricks & Eccles, 2004). Beyond their personal involvement, parents form a social group with their peers, facilitated by the considerable time spent together (Dorsch et al., 2015; Wiersma & Fifer 2008). Indeed, conceptualizing sport parents as a social group yields valuable insights into their behaviours and attitudes, specifically through the lens of social identity theory (Sutcliffe et al., 2020, 2022). However, most of the current literature on social identity in sport has been conducted with a quantitative methodology. As such, the present study aimed to qualitatively investigate the factors in the youth sport context that contribute to or detract from perceptions of social identity in parents. Guided by the Social Identity Questionnaire for Sport Parents (SIQS-P; Sutcliffe et al., 2022), semi-structured interviews were conducted with 8 youth sport parents. The ensuing data was then analyzed using reflexive thematic analysis (Braun & Clarke 2006, 2021). Four themes were constructed through the analytical process: (a) youth sport as a platform to boost social status, (b) a sense of community, (c) connections are made with other “good parents”, and (d) finding subgroups with similarities. These results demonstrate that perceptions of social identity in sport parents stem largely from the perceived material and social outcomes of the relationships formed within the context. Obtaining these benefits results in a collective “buy in” to the group's culture. As such, youth sport organizations should facilitate socialization opportunities for parents to develop connections with their peers and leverage feelings of social identity to positively influence parental behaviours and attitudes.

A closer look at differential treatment in sport

Cheryl Stuntz, St. Lawrence University; Connor Lambert, West Virginia University

While past work has demonstrated that higher expectancy athletes generally receive better treatment, including more instruction and higher quality social interactions than lower expectancy athletes (see Horn et al., 2020), the nuances of differential treatment are not well understood and findings can be counter-intuitive. For example, Stuntz and Boreyko (2017) found that while in general being yelled at by a coach lowered psychological need satisfaction, some athletes who perceived they were yelled at by their coach more than their teammates had higher psychological need satisfaction. The current study explored the complexities of differential treatment, including the nuances regarding what factors lead to differential

treatment, in what ways coaches treat athletes differently, and what positive and negative outcomes result from differential treatment. We conducted a qualitative exploration of differential treatment in sports. Individual interviews were conducted with 10 college athletes from different individual and team sports. Reflexive thematic analysis revealed the following key themes: (a) athletes desired for their coach to know them, and their interpretations of differential treatment often hinged on athletes' perceptions of their coach-athlete relationship, (b) athletes recognized when they were treated differently, but they also recognized that individual treatment was necessary at times, (c) athletes were more likely to be accepting of differential treatment when their coaches were more transparent about the reasons they have for their actions and when the coach's view aligned with the athlete's view, (d) athlete responses to differential treatment were not uniformly positive or negative – athletes often used perspective-taking to consider how differential treatment impacted the well-being of others on the team, and (e) the quality of the coach-athlete relationship depended upon both how the coach and how the athlete acted, despite often being depicted as a result of coach behaviors alone. Implications for coaches will be discussed.

The effects of mental fatigue and weight dissatisfaction on physical activity behaviours.

Samira Sunderji, University of Toronto; Melissa L. deJonge, University of Toronto; Catherine M. Sabiston, University of Toronto

Mental fatigue (MF) is a broad yet complex phenomenon that is characterized by feelings of exhaustion, tiredness, and an overall lack of energy. MF can alter physical activity (PA) self-efficacy and outcome expectancies, which elevates the subjective costs of engaging in PA behaviour and influences PA decision-making. Drawing on objectification processes, attention on the body (e.g., body surveillance) may potentiate the effects of MF on PA behaviour. This study explored the association between MF and PA behaviours (aerobic moderate and vigorous intensity, and resistance training) with weight dissatisfaction as a moderator. University students ($N = 3145$, 70.2% female; $M_{\text{age}} = 20.6 \pm 3.1$ years) completed the National College Health Assessment 2019 survey to assess their health habits, behaviours, and perceptions. Data were analyzed using cluster analysis techniques (to explore groups of students based on MF indicators) and a MANOVA model with follow-up univariate effects to explore group differences in MF on PA behaviours. Weight dissatisfaction served as a proxy for body surveillance and tested as a moderator. The model accounted for sex and gender. Two clusters were identified for MF (interpreted as high [49%] and low [51%]). These clusters differed significantly ($p < .05$) in days of vigorous PA ($M_{\text{High}} = 1.01 \pm 1.54$; $M_{\text{Low}} = 1.18 \pm 1.54$) and strength training ($M_{\text{High}} = 1.90 \pm 1.50$; $M_{\text{Low}} = 2.18 \pm 1.70$), and not on days spent in moderate-intensity PA ($M_{\text{High}} = 3.17 \pm 2.12$; $M_{\text{Low}} = 3.26 \pm 2.06$). Weight dissatisfaction did not significantly moderate the relationship between MF and PA behaviour ($p = .06$, $\eta_p^2 = .001$). University students experience high levels of MF and low levels of PA engagement, which have negative implications on academic performance, social functioning, and overall health and wellbeing. Results support the need for future research to explore the intolerance and intensity of MF, as well as the cognitive and emotional domains of MF, to provide strategies that can increase PA participation within this population.

Developing physical literacy among newcomers to Canada: Qualitative examination of the IPLAY pilot intervention

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Newcomer children and youths have consistently been found to be less active than their Canadian-born peers. One reason for this shortfall may be related to reduced access to culturally relevant opportunities or physical literacy (PL) programs to help maintain long-term healthy active lifestyles. PL is a multidimensional concept comprised of movement competence, confidence, motivation, and knowledge and understanding towards physical activity. The Immigrant-focused Physical Literacy for Youth (IPLAY) program is a pilot 8-week program aimed at enhancing PL among newcomer youth. The purpose of the current study was to conduct a qualitative analysis of the perceived impact of IPLAY from the participant perspective. Participants included 10 youths ($M_{\text{age}} = 14.8 \pm 3.8$; $n_{\text{males}} = 6$), with interviews taking place shortly after the completion of the IPLAY program. Virtual one-on-one interviews, or interviews with the presence of a translator, were conducted between December 2022 and January 2023. Preliminary findings suggest an overall positive evaluation of this novel movement intervention, with many youths discussing how they like the different activities they got to trial. Results also indicate that peer involvement and enhanced feelings of belonging were important to them for ongoing engagement and overall program enjoyment. Many participants discussed the social benefits of interacting and spending time with their friends and peers. While most interviewees discussed the difficulties of a language barrier in meeting friends and participating at school, this program offered a chance for youth to engage with others who they had more in common with, including a shared language. Overall, findings from the present study suggest that PL-based interventions may be effective for helping newcomers engage in physical activities, and that such group-based programs may also result in positive mental well-being. Future studies with broader community implementations are required. Funding source: Social Sciences and Humanities Research Council of Canada.

Understanding the experiences of female sport officials in male-dominated sports

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Sport officials are tasked with making quick and accurate decisions, maintaining order, communicating with athletes and coaches, and enhancing athletes' safety—all while being under intense scrutiny from athletes, coaches, and spectators. In most sports, more male than female sport officials are recruited and retained. The limited research focusing on female sport officials suggests that their experiences are generally adverse. Since the nature of experiences is connected to one's likelihood of continuing that experience, further understanding female sport officials' experiences is imperative for learning more about their intentions to begin and continue (rather than quit) as officials. The purpose of this study was to explore the positive and negative experiences of female sport officials who operated in sports where the officials

were primarily male. Seven sport officials participated in semi-structured interviews lasting 60 to 90 minutes. Thematic analysis was used to identify and code common themes within the data, many of which demonstrated clear links to the principles of self-determination theory. The main themes discussed herein relate to (a) officials' perceived ability (feeling the need to prove themselves as competent sport officials), (b) gender-based discrimination (lack of respect afforded to female sport officials within or outside of competitions), and (c) perseverance (coping strategies used by female sport officials to continue, rather than quit). These themes highlight the inequality females are confronted with in the sport officiating environment, but they also provide helpful tools to promote a more positive environment. By using these tools, female sport officials are more likely to continue and thrive as officials, rather than resign. Recommendations will be provided for sport governing bodies, officiating organizations, and sport officials, which might contribute to future policy changes that lead to increased recruitment and retention of female sport officials. Funding source: Social Sciences and Humanities Research Council of Canada.

Associations of masculinity and femininity with positive body image and resistance training

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Positive body image (PBI), referring to affective authentic and hubristic pride relative to fitness and appearance as well as the cognitive processes of functionality and body appreciation, is linked with participation in physical activity (PA) among women. However, less is known about PBI and specific types of PA, such as resistance training (RT). Additionally, gender identity and gender stereotypes may predispose women to different associations between perceptions of PBI and PA and RT; however, these associations lack empirical testing. The purpose of this study was to explore how masculinity and femininity relate to PBI, moderate-to-vigorous physical activity (MVPA), and engagement in RT. The participants of the study were self-identifying women ($N = 394$, $M_{\text{age}} = 25.63$ years) who completed self-report questionnaires and were mean split into groups according to their high (H) or low (L) reported masculinity (M) and femininity (F): HF HM (29.7%), HF LM (18.8%), LF HM (23.6%), LF LM (27.9%). Preliminary correlation analyses demonstrate positive associations between PBI with MVPA ($r = .15 - .35$) and RT ($r = .18 - .53$). A multivariate analysis of variance exploring the constructs of PBI across profiles yielded a difference between groups: participants with HM generally reported more positive PBI than those in groups with LM. The results of a chi-square analysis show profile differences in RT engagement ($\chi^2 = 8.72$, $p < .05$): participants in groups with HM were nearly two times more likely to engage in RT than those with LM. The chi-square relative to MVPA across the masculine/feminine profiles was not significant. The findings from this study suggest that embracing masculine qualities (i.e., confidence, leadership, assertiveness) may benefit women's PBI and RT behaviour.

Choking susceptibility and mental toughness

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Choking susceptibility (CS) is the likelihood of choking under pressure. According to Mesagno et al. (e.g., 2008), CS is operationally defined as an individual's relative scores on certain scales of anxiety, self-consciousness, and coping. Specifically, individuals who score above the 75th percentile on two out of the Self-Consciousness Scale, Sport Anxiety Scale, and the Coping Styles Inventory for Athletes and above the 50th percentile on the remaining score are deemed CS. Mental toughness (MT) is conceptualized as a quality that will influence how an individual copes or thrives under pressure, especially in sport. Therefore, it is surprising that there has been little research examining the relationship between choking under pressure and MT. Furthermore, no research has examined MT in relation to CS (Mesagno & Hill, 2013). The purpose of this study was to examine if individuals designated as CS differ in MT from those designated as non-CS. Athletes ($N = 415$) were recruited online through Qualtrics. Participants completed the Mental Toughness Index (Gucciardi et al., 2015) and Mesagno et al.'s (2008, 2009) CS protocol. A Welch's t -test revealed that MT did not significantly differ between the two groups (CS $n=67$, non-CS $n=348$), $F(1, 107.96) = 0.945$, $p = 0.33$. The results of this study highlight and reinforce the inconsistent relationship MT has with performance, which in part, is likely due to the use of various MT conceptualizations and measures. Additionally, the CS protocol is still in its infancy and should be further researched. Future research could explore the use of different MT measures, whether MT and CS interact to predict choking or non-choking behaviours in sport, and whether the results of this study extend to other samples.

Evaluation of a systems convener on a social learning space promoted by a tennis federation for sports coach development in Brazil

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Social learning theory (SLT) has helped to promote the development of sports coaches. Among some of the SLT concepts, social learning spaces (SLS) are important for sharing experiences among professionals. The collaborative learning (CL) in these SLS can be translated as value creation (VC), which can be facilitated by systems conveners (SC), such as coach developers (CD) that seek to unite people from different places to make a difference. Since it is important to understand the application of these concepts, this study aimed to analyze the evaluation of an SC on an SLS for the VC of coaches. The ethics committee of the Federal University of Santa Catarina approved this study. One semi-structured interview with SC, with 22 pages of transcription, was analyzed using interpretive phenomenological analysis. At the time of the interviews, SC was 35 years old, had a Ph.D. in physical education, and had 18 years of experience as a coach and ten years as a CD. He works in clubs, federations, and a sports confederation, in addition to having experiences in different universities and international courses. SC was still vice president and head of the federation's coach education department. For SC, several values were created in training with the coaches: (a) immediate value – need for everyone to mature for CL, positive feedback from coaches, and incentive to reflection; (b)

potential value – new ideas for future programs; (c) applied value – meaningful training for coaches, different actions connected to learning and positive program management; (d) realized value – better relationships with face-to-face meetings, the importance of monitoring the evolution of coaches, improvements in training with greater confidence in the SC, greater motivation of coaches and growing engagement of coaches; (e) transformative value – innovation and CL about training coaches. “I think it’s the future” (CL); “I think there’s no going back here” (SC). These values show the challenges and possibilities of CL for the coaches’ development through the support of a SC. Funding source: CAPES.

Everything but para’llel: Privilege, marginalization, and adaptation processes of Olympic and Paralympic athletes

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High-performance sport is accompanied with large amounts of uncertainty and psychological stress. Little is understood about the psychological well-being (PWB) of elite athletes over time as they attempt to adapt to challenges associated with high-performance sport. Furthermore, sport psychology research often fails to account for athletes’ diverse and intersecting social identities that shape their abilities to act in ways that support, protect, and enhance their PWB (Sparkes, 2013). Such research reproduces social inequities and marginalizes certain athletes by obscuring their experiences and minimizing what they need to survive and thrive. The purpose of this study was to examine how intersectional identities that produce marginalization and privilege shape elite athletes’ appraisal, coping, adaptation, and PWB over time. Life history interviews were employed at three time points with 14 athletes (8 Paralympic; 6 Olympic) and data was analyzed using a narrative thematic analysis (Reissman, 2008). Two themes were constructed: *high-performance sport built by and for able-bodied people* and *managing the façade, until you can’t*. In the first theme athletes discussed how structural and systematic barriers are magnified during challenging periods eliciting disparity, disconnection, deprivation. Paralympic athletes have less funding, less access to resources, and are forced to train in non-accessible environments, subsequently limiting their ability to thrive. In the second theme, athletes discussed how perfunctory efforts of inclusivity and equality in sport organizations resulted in a devastating impact to their PWB. Paralympic athletes faced greater challenges when they pushed back against the façade of inclusivity and equality, often silenced and dismissed. Findings extend our theoretical knowledge on how the PWB of athletes with diverse social identities is affected over time after continual marginalization. Findings will also contribute to development of a toolkit, workshops, and podcasts for sport stakeholders to develop an understanding of how to foster PWB. Funding source: Social Sciences and Humanities Research Council of Canada.

Basic psychological need profiles, mental toughness, and team resilience of White and non-White baseball athletes

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Basic psychological needs (BPN) theory can be used to investigate the antecedents of athletes' mental toughness and team resilience (Mahoney et al., 2014; Morgan et al., 2013). As BPNs (i.e., autonomy, competence, relatedness) can be satisfied and frustrated simultaneously, researchers have recommended person-centered methods, such as cluster analysis, to examine their multidimensionality (Vansteenkiste et al., 2020). Thus, our aim was to explore BPN profiles, their racial/ethnic composition, and differences in mental toughness and team resilience based on profile and race/ethnicity (White vs. non-White). Baseball athletes ($N = 150$, $M_{\text{age}} = 20.65$, $SD = 1.52$) at NCAA Division I, II, and III and NJCAA Division I colleges answered demographic questions and items measuring BPN satisfaction and frustration, mental toughness, and team resilience on an online survey. Hierarchical and nonhierarchical cluster analyses indicated a two-cluster solution: an adaptive (moderately high BPN satisfaction, moderately low BPN frustration; $n = 111$) and a maladaptive profile (very low BPN satisfaction, high BPN frustration; $n = 39$). A chi-square test indicated profile composition was not significantly different across race/ethnicity, $\chi^2(1) = 0.225$, $p = .635$. 2×2 (profile x race/ethnicity) ANOVAs showed the adaptive profile, compared to the maladaptive profile, reported significantly higher mental toughness ($M = 6.11$ vs. 5.23), $F = 36.34$, $p < .001$, $\eta_p^2 = .20$, resilient characteristics ($M = 5.65$ vs. 4.85), $F = 14.47$, $p < .001$, $\eta_p^2 = .09$, and lower vulnerabilities under pressure ($M = 2.40$ vs. 3.16), $F = 7.97$, $p < .01$, $\eta_p^2 = .05$. Non-White athletes ($M = 3.20$) had significantly higher vulnerabilities under pressure than White athletes ($M = 2.46$), $F = 6.86$, $p = .01$, $\eta_p^2 = .05$. Findings suggest incorporating BPN support into mental toughness and team resilience interventions could be facilitative, especially for non-White baseball athletes. Coaches and sport psychology professionals can have athletes develop their own pressure training tasks and adjust them if too difficult.

Positioning mental health: An investigation into Canadian Olympic sport organization websites

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Sport participation has concurrently been associated with the development of mental health resources while also exposing athletes to factors that may magnify mental health concerns. Sport organizations have a duty of care to protect and promote athlete mental health. Negative mental health in athletes may be further exacerbated by discrimination based on cultural influences. The purpose of this study was to conduct a website audit to document current approaches to promote and safeguard athlete mental health as reported by Canadian Olympic sport organizations (COSO). Adopting a descriptive, cross-sectional design, a systematic search for general and/or specific mental health strategies within publicly available COSO websites ($N = 49$) was completed. Guided by existing research, a coding instrument was developed to capture 21 individual mental health strategies. The presence or absence of each mental health strategy was coded as "yes" or "no" by two independent reviewers. Most COSO websites

acknowledged the importance of mental fitness (i.e., psychological skills training) to improve performance ($n = 43$; 87.8%) and the importance of safeguarding athletes from abuse and harassment ($n = 45$; 91.8%). Explicit identification of mental health organizations ($n = 44$; 89.8%) were prominently featured. Clear identification of an explicit mental health strategy tailored for athletes within a given COSO ($n = 4$; 8.2%) were less conspicuous. Specific reference to mental health strategies based on cultural influences occurred in less than 20.0% of COSO websites. These results verify the importance of mental health by COSO. Yet several of the most frequently identified strategies are indirectly related to athlete mental health. Conclusions emanating from the data support the need for COSO to explicitly develop mental health strategies with added consideration of cultural influences for athletes under their care. Funding source: VPR Canada Games Grant, Brock University.

Perceived behavioural control, barriers and the physical activity intention-behaviour gap in people with disabilities: A three-way interaction model

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Intention has been widely demonstrated to be associated with physical activity (PA) behaviour. However, some people who have developed an intention to engage in PA might not take any action, which is known as the “intention-behaviour gap.” Identifying variables that could mediate or moderate such association is crucial to bridge this gap. Accordingly, the aim of this study was to explore, through a three-way interaction model, the joint effects of intention, perceived behavioural control (PBC) and social ecological barriers (SEB) on moderate-to-vigorous physical activity (MVPA). A sample of 978 persons with different kinds of disabilities completed self-administered measures of intention, PBC, SEB and MVPA. A regression model was tested in three steps to predict MVPA. Intention was included as a single independent variable in Step 1 and PBC and SEB were added in Step 2. Finally, the intention \times PBC \times SEB was introduced in Step 3. All the models were controlled for sex and disability type. In Step 1 (adjusted $R^2 = 0.13$), lower intention to exercise was associated with MVPA. In Step 2 (adjusted $R^2 = 0.18$), lower intention and lower PBC were associated with lower MVPA, while lower SEB were associated with higher MVPA. Finally, in Step 3 (adjusted $R^2 = 0.22$), the three-way interaction (intention \times PBC \times SEB) was found to be significant. Overall, the strength of the relationship between intention and MVPA increased as PBC increased and SEB decreased. Nevertheless, intention still translated well into MVPA when barriers were high, as far as PBC was high as well. Since PBC and SEB play a significant joint moderating effect on MVPA, interventions aimed at encouraging physically active lifestyles in this population should consider those variables in order to be more effective. Funding source: Ministry of Science and Innovation (Spain).

Understanding physical activity behaviour in people with spinal cord injury: A pilot application of the multi-process action control framework

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Engaging in regular physical activity (PA) has been shown to provide a wide range of benefits for people with spinal cord injury (SCI). Despite those benefits, this population is more likely to be inactive compared to the general population, since they experience several psychosocial and environmental barriers which prevent them from engaging in physically active lifestyles. Increasing PA levels of people with SCI should thus be a relevant goal of public health policies. To this end, theory-based interventions that consider the factors associated with PA in this population are needed. Social cognitive theories (e.g., theory of planned behaviour), which consider intention as the main determinant of behaviour, have been widely used for this purpose. However, these theories do not consider the intention-behaviour gap (i.e., the discrepancy between intention and actual behaviour). Action control theories, such as the multi-process action control (M-PAC) framework, aim to bridge this gap by considering not only reflective processes but regulatory and reflexive processes as well. Against this backdrop, the aim of this study was to explore the utility of the M-PAC for understanding action control of two kinds of PA (aerobic activities and strength training) in a sample of adults with SCI. At baseline, participants completed M-PAC measures of reflective, regulatory, and reflexive processes as well as intention to engage in PA, while PA behaviour was measured one week later. A discriminant function analysis showed that the translation of intention into behaviour was associated with different reflective, regulatory, and reflexive constructs, which varied by the behaviours (aerobic activities and strength training). The findings provide support for the use of the M-PAC framework to understand PA behaviour in people with SCI and show the importance of targeting post-intentional constructs to encourage their PA engagement. Funding source: Conselleria d'Innovació, Universitats, Ciència i Societat Digital.

Comparing walking experiences of inactive women at moderately high intensity while listening to guided mindfulness and listening to a podcast

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Dual-mode model states that affective responses during exercise emerge from interoceptive cues, cognitive appraisals, or a combination depending on exercise intensity (Ekkekakis, 2003). Dissociation from the interoceptive cues of exercise has been a primary intervention strategy to support positive affect. Distraction strategies (e.g., music) indeed result in positive exercise experiences across exercise intensity levels (e.g., Hutchinson et al., 2018; Jones et al., 2014). A less explored associative strategy is mindfulness, which is the awareness of, and attention to the present moment with acceptance, openness, and nonreactivity (Bishop et al., 2004). A previous study found that a guided mindful experience during exercise resulted in more internal focus and state mindfulness compared to a dissociated experience using music but did not differ in affect valence (Cox et al., 2020). A mindful internal focus was similar to listening to

music in pleasure experienced. Participants self-selected their pace, which was highly variable and moderate at 50% heart rate reserve (HRR) on average. Whether these results for mindful associative attention hold at higher intensities is not clear. Therefore, the purpose of this study was to compare a guided mindful exercise condition to a podcast (dissociative) exercise condition on core affect, remembered affect, forecasted affect, and feelings of satisfaction and accomplishment at consistent higher exercise intensity levels than Cox et al., (2020; i.e., 70-80% estimated HRR). Data collection on this within-subjects experimental study is ongoing. Preliminary results ($N = 6$) supports that the experimental manipulation of mindfulness produces higher ($ps < .05$) state mindfulness and internal focus in the mindfulness condition compared to the podcast condition. No other significant differences ($ps > .05$) emerged across the two conditions on any affect or motivational outcomes assessed. Preliminary results support the use of guided mindfulness at higher intensity levels for a non-active sample of women.

A model of social influence in sports

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Social facilitation has been a long-standing topic in social psychology (starting with Triplett, 1898). Recently, the existing evidence on motor performance was systematically summarized, to identify that effort-based tasks are generally facilitated by merely present observers (van Meurs et al., 2022). Studies on active spectators, however, are scarce: both field- and lab-based studies have reported contradicting evidence or null effects. Nonetheless, spectator effects are hypothesized to arise from mediators like threat perception (e.g., Lazarus & Folkman, 1984), self-presentational tendencies (e.g., Baumeister & Steinhilber, 1984; Wallace et al., 2005), emotional support (e.g., Hennessy et al., 2009), or increased importance (e.g., Latané, 1981; Strauss, 2002), and lead to performance pressure and skill breakdown, or facilitation (cf. Strauss et al., 2023). Performance pressure is potentially moderated by the type and behaviour of the audience, the athlete, the sport, and the specific skill (e.g., Epting et al., 2011). The present systematic review attempts to map the existing studies of active spectators on motor performance to identify mediating and moderating factors in sports or motor performance and highlight gaps to inform future research. In forward searches, we found 11,015 records in eleven databases (Scopus, PsycINFO, PsycArticles, Sport Discus, Web of Science, ProQuest Dissertations, OvidSP, PsyArXiv, OSF Preprints, SportRxiv, Theses Commons). At the time of submission, after title- and abstract-screening, 97 studies are retained for the full-text eligibility check. The included studies will be summarised, and their suggested mediators and moderators will be integrated into a verifiable model. The model will guide future social-psychology research on the impact of spectators and might e.g., offer explanations for the inconclusive results of the archival home-advantage studies (see Strauss et al., 2023).

Body-related shame negatively impacts attentional focus over time among adolescents

Madison F. Vani, University of Toronto; Kristen M. Lucibello, Brock University; Timothy N. Welsh, University of Toronto; Catherine M. Sabiston, University of Toronto

Social status and appearance are salient during adolescence, which is a particularly vulnerable time for experiencing negative body image. Body-related shame is a negative self-conscious emotion that is founded on social and appearance tenets and is heightened during adolescence. Informed by objectification theory, body-related shame may impact the cognitive resources required to effectively engage in tasks such as physical activity (PA) and attention-based tasks. While research findings show an association between higher shame and lower PA, the relationship between body-related shame and attentional focus (a foundational aspect of PA) has not been explored among adolescents. This study tested the association between body-related shame and attentional focus. Adolescents ($n = 145$; $M_{\text{age}} \pm SD = 16.03 \pm 0.98$ years; 82% girls) completed online self-report measures of body-related shame at baseline (Time 1) and attentional focus three months later (Time 2). Stepwise regression was used to examine the association between body-related shame and attentional focus, with weight perception included as a covariate. In the results, higher body-related shame significantly predicted worse attentional focus three months later ($\beta = -0.50$, $p < .001$, $R^2 = .17$), after controlling for weight perception. These findings extend previous and predominantly cross-sectional studies based on the objectification theory tenets by providing support for the longitudinal association between body-related shame and self-reported attentional focus among adolescents. The results highlight the potential importance of targeting body-related shame in an effort to reduce the negative impact on attentional focus, which may have implications in adolescent PA participation and experiences. Funding source: Social Sciences and Humanities Research Council of Canada.

Examining changes in functionality appreciation and physical self-concept: A resistance training intervention for women diagnosed with breast cancer

Madison F. Vani, University of Toronto; Maryam Marashi, University of Toronto; Erin K. O'Loughlin, University of Toronto; Catherine M. Sabiston, University of Toronto

Women diagnosed with breast cancer (WBC) experience changes to their bodies that can impact their body-related perceptions and thoughts. Among women without a history of breast cancer, resistance training (RT) improves body functionality appreciation and physical self-concept. Also, social support can help to facilitate positive body image and increase exercise participation. Yet little is known about the impact of RT on WBCs' body functionality appreciation and physical self-concept in a socially supportive program. This study examined the impact of an 8-week socially supportive RT intervention on body functionality appreciation and physical self-concept among WBC. Women ($N = 37$; $M_{\text{age}} \pm SD = 52.65 \pm 11.5$ years) were partnered and asked to engage in one virtual group-based RT session led by a qualified exercise professional (QEP) and one RT session with their partner per week for 8 weeks. WBC completed questionnaires assessing their time spent RT per week, body functionality appreciation, and physical self-concept at baseline (T1) and post-intervention (T2). Repeated measures analysis of variance models examined differences in time spent RT, body functionality appreciation, and

physical self-concept between WBC who were and were not meeting RT guidelines (2 sessions/week) at T2. Attendance in the QEP-led RT sessions ranged from 1-8 (*Mdn* = 6 sessions). WBC who were meeting RT guidelines at T2 (*n* = 27) increased their time spent RT ($p < .05$, T1: *M* = 27.5, *SE* = 7.43, T2: *M* = 93.70, *SE* = 6.71) and their body functionality appreciation ($p < .05$, T1: *M* = 4.21, *SE* = .11, T2: *M* = 4.56, *SE* = .09) from T1 to T2. Physical self-concept subscales did not differ over time. However, change in minutes RT from T1 to T2 was correlated ($p < .05$) with change in appearance ($r = .35$) and activity ($r = .64$) self-concept. Findings offer initial support for using partner and QEP-based RT interventions to improve body functionality appreciation and physical self-concept among WBC. The results also highlight that meeting RT guidelines may positively impact WBCs' psychological well-being. Funding source: Canadian Cancer Society.

Barriers and facilitators to initial and ongoing implementation of community-based exercise programs for persons with disabilities

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Community-based exercise programs (CBEPs) for persons with disabilities can provide support and resources to promote participation in physical activity. Despite their importance, few CBEPs for persons with disabilities exist in Canada. This may be due to the lack of research on the implementation process of CBEPs. Therefore, the purpose of this study was to explore CBEP providers' perceptions of the barriers and facilitators surrounding the initial and ongoing implementation of CBEPs. Using a modified targeted web-based search methodology, 15 eligible CBEPs were identified. Through contact information identified from the web search, CBEP representatives were emailed with a description of the study and an invitation to participate. Nine program providers expressed interest in participating and were sent preliminary surveys to gather program characteristics, which were followed by semi-structured interviews with multiple representatives from each CBEP such as program coordinators, directors, or managers. Interview transcripts were subjected to inductive thematic analysis, with codes being deductively mapped onto domains of the consolidated framework for implementation research. Results indicated commonly cited facilitators and barriers, including academic partnership and managing non-profit budgets, respectively, for both initial and ongoing CBEP implementation. Facilitators and barriers for initial and ongoing implementation alone included a focus on member retention and program growth, respectively. Findings regarding barriers can assist new program providers in anticipating challenges before they arise. Information on facilitators can increase the chance of CBEP success, thereby helping to increase opportunities for quality participation in physical activity for persons with disabilities.

Improving decision making and acting under stress: The effect of pressure training on self-defense skills in police officers

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The adages “practice how you play” or “train as you fight” imply that in high-performance domains, such sport, firefighting, medicine, and police, training should replicate the stressful conditions of the critical incident as closely as possible. Indeed, in line with processing efficiency theories, pressure training (PT) has been shown to counteract performance declines in perceptual-motor tasks despite elevated stress levels and increased mental effort. So far, these performance gains have only been demonstrated when the practiced skills were tested in the same task, either requiring decision making or action. This study tested whether PT also improves skill performance in a task that requires both cognitive and motor adaptations to a changing environment. Using a pretest-intervention-post-test design, 84 police officers trained knife-defense skills in various exercises without (control group, $n = 33$) or with stressors (experimental group, $n = 51$). Officers’ performance was assessed on several variables in reality-based scenarios before and after training by three independent police trainers using video analyses. Although the experimental group reported significantly more stress and mental effort during the training interventions than the control group, both the experimental and control group improved significantly in all performance variables after training (all $ps < .05$). Contrary to the existing literature, the additional use of (simulated) stressors did not improve the effectiveness of skill training that required both decision making and executing actions. The divergent results may be explained by the type of skill practiced and the difference in training and testing conditions.

Using orienteering to examine the interactions of exercise and cognitive training on human cognition

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High-intensity exercise improves cognition, and its effects may be augmented when simultaneously combined with cognitive training. Research in animal models suggests that lactate produced by contracting muscles during high-intensity exercise may drive increases in brain-derived neurotrophic factor to fuel neurogenesis and improve cognition. Orienteering is a sport that simultaneously combines high-intensity exercise with spatial navigation, and expert orienteers report greater hippocampal-dependent memory than non-orienteers. The present study examined whether lactate mediates the acute effects of orienteering on hippocampal cognition. It was hypothesized that orienteering at a higher intensity would increase lactate and boost cognition more than orienteering at a moderate intensity. To test this, recreationally active, healthy young adults ($N = 38$, $M_{\text{age}} = 20.8 \pm 2.5$ years, 63% female) with no orienteering experience were recruited to navigate an outdoor orienteering course while exercising at a high (80-85% of HRR) or moderate (40-50% of HRR) exercise intensity. A control group engaged in high-intensity exercise without navigation to test for the additive effects of orienteering. Lactate was measured throughout the acute session. Immediately before and after the session, high-interference episodic memory was tested using the Mnemonic Similarity Task. Preliminary results reveal higher peak lactate for high-intensity exercise with ($M = 5.78$, $SD = 2.43$) or

without orienteering ($M = 5.99$, $SD = 2.39$) compared to moderate-intensity orienteering ($M = 2.04$, $SD = 1.58$). The greatest percent change in memory was observed for the high-intensity orienteering group ($M = 15\%$, $SD = 52\%$) over high-intensity exercise without orienteering ($M = 9\%$, $SD = 86\%$) and was lowest for moderate-intensity orienteering ($M = -9\%$, $SD = 52\%$). These preliminary results suggest that by combining high-intensity exercise with spatial navigation, orienteering may improve memory more than exercise only, and will help guide intervention models to improve cognition across the lifespan. Funding source: Ontario Graduate Scholarship; Natural Sciences and Engineering Research Council of Canada.

Does a brief VR-based mindfulness meditation counteract the detrimental effects of ego-depletion in an experimental penalty shoot-out under pressure?

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Shaabani et al. (2019) showed that a brief mindfulness intervention mitigates the effects of ego depletion in a basketball free-throw task. The aim of this research was to replicate respective findings in an experimental soccer penalty shoot-out under pressure. For this purpose, 16 male participants with a mean age of 23.06 ($SD = 2.44$) years took part in a crossover study. Each participant completed two appointments in a randomly assigned order, during which they were asked to perform 20 penalty kicks at a soccer goal in four target squares (predetermined order) under pressure (auditive negative affirmations) before (pre) and after (post) the following conditions: ego depletion followed by a 15 min resting break (a), ego depletion followed by a 15 min VR-based mindfulness biofeedback breathing meditation (b). For ego depletion, the Stroop color-word interference test was administered after each pretest. Shapiro Wilk tests as well as a two-way repeated measures ANOVA (a x b) followed by two one-way repeated measures ANOVA (a; b) were conducted. No violation of the assumption of normality concerning the results of the penalty kicks could be detected (pre/a: $W(16) = 0.92$, $p = 0.183$; post/a: $W(16) = 0.98$, $p = 0.924$; pre/b: $W(16) = 0.97$, $p = 0.885$; post/b: $W(16) = 0.93$, $p = 0.286$). Results indicate a significant interaction between a and b ($F(1,15) = 33.87$, $p < 0.001$, part. $\eta^2 = 0.693$; $1-\beta = 1.00$). Main effects indicate that participants scored significantly fewer goals following an untreated ego depletion effect (pre/a: $mean = 16.44$, $SD = 1.46$; post a: $M = 15.19$, $SD = 2.29$; a: $F(1,15) = 9.15$, $p < 0.01$, part. $\eta^2 = 0.379$; $1-\beta = 0.81$) and that the number of goals increased when the ego depletion was followed by the mindfulness meditation (pre/b: $mean = 15.50$, $SD = 2.73$; post b: $mean = 17.81$, $SD = 1.52$, b: $F(1,15) = 36.22$, $p < 0.001$, part. $\eta^2 = 0.707$; $1-\beta = 1.00$). Results of this study suggest that a brief VR-based mindfulness biofeedback breathing meditation counteracts the effects of ego depletion in an experimental soccer penalty shoot-out under pressure.

Understanding sport adherence strategies in masters athletes: A grounded theory

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Large portions of the global population fail to meet physical activity (PA) guidelines (Guthold et al., 2018). Masters athletes (MAs) are a population of older adults that exceed PA guidelines through competition and sport-related training (Weir et al., 2002; Young & Medic, 2011). To be classified as a MA, the athlete must be (a) at least 35 years of age or older (this age may vary depending on the sport), (b) formally registered in identifiable events or sports, and (c) competitively oriented through training for competitions (Young, 2011). Creating theories using data from individuals who have adhered to sport and PA may address some of the limitations of current behaviour change theories, many of which originated from alternative fields and fail to capture contextual aspects of PA (Rhodes & Nigg, 2011). Straussian grounded theory (Corbin & Strauss, 2015) was used to understand MAs' adherence strategies for maintaining regular sport participation and competition during older adulthood. In total, 14 MAs ($M_{age} = 53.6$ years, $SD = 8.38$, range = 36–65 years) who compete in individual events/sports participated in semi-structured interviews. Data was analyzed via memoing and a process of open coding, axial coding, and theoretical integration. Adherence strategies were separated into categories based on stakeholders (i.e., individual, family, and friends/teammates). Individual strategies included various self-regulatory mechanisms such as goal setting, routines, and scheduling and tracking workouts. Family strategies included negotiating with spouses and training with loved ones. Friends/teammates strategies include training with a workout partner and the use of social media applications. By understanding the strategies that MAs use to maintain regular competition and training throughout adulthood, we hope to provide newer MAs, older adults, or stakeholders (e.g., clubs, governing bodies) with various information to help facilitate regular sport participation and long-term adherence.

“There’s something so pervasive”: A social norms approach to context specific, covert messages about disordered eating at professional ballet schools

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In response to allegations and cases of child maltreatment at international professional ballet schools, where students typically live, train, and attend academic school, there has been an increase in public and scholarly attention to experiences of harm at these schools. The purpose of the current study was to explore the nature of former professional ballet school students' experiences of harm. Participants included fifteen ($n = 15$, $M_{age} = 23.93$) former students who attended professional ballet schools across six countries. Using a social constructionist paradigm, online, semi-structured interviews were conducted and analyzed using reflexive thematic analysis. Although the interview guide did not include questions about disordered eating, participants identified engaging in and witnessing disordered eating behaviours as experiences of harm. Well-documented in decades of quantitative research on disordered eating, professional ballet schools are considered a high-risk environment (Piran, 1999). Using a social norms theory approach, results from the current study indicated that although overt behaviours such as body shaming, providing pseudo nutritional advice, or weighing students were still used at some schools, these were perceived as less frequent and dated. Participants described more insidious covert behaviours from leaders and peers as more prevalent, powerful, and harmful contributors to students' eating attitudes and patterns. Some examples

include perceived rewards for weight loss such as increased attention from ballet teachers and being selected for preferential roles, subtle references to the body, a hyper-focus on appearance, and inaction in response to obvious and unhealthy weight loss and disordered eating behaviours. This research addresses calls for qualitative data in this predominantly quantitative area of scholarship (Bar et al., 2017) and highlights the need for further research on identifying and addressing covert messages within the ballet context that may contribute to disordered eating.

“Just pretend to be okay!” – Interpersonal emotion regulation in collective team collapse situations

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The collective collapse of a team’s performance typically begins with the encounter of a critical event (e.g., performance failure, scoring of the opponent), followed by unhelpful emotions that are passed on and shared between team members and maintain the collapse (Wergin et al., 2018, 2019). However, not every critical event causes a team collapse (Wergin et al., 2022). Thus, differences in individual and interpersonal emotion regulation may determine whether a team experiences a collapse after a critical event. To examine this hypothesis, $N = 70$ (M age = 28.76) team sport athletes participated in an online survey consisting of the Emotion Regulation Questionnaire (Gross & John, 2003), Interpersonal Emotion Regulation Scale (Foti et al., 2022), and a qualitative interpersonal emotion regulation question. This survey was presented to participants twice in a randomized order, once relating to a game situation in the past where their team collapsed after a critical event, and once relating to a game situation where their team did not collapse. Athletes reported more unpleasant emotions (frustration, anger, anxiety, guilt; $ps < .05$) and fewer pleasant emotions (pride, gratitude; $ps < .001$) when a critical event was followed by a team collapse. They also reported using fewer individual emotion regulation strategies focused on cognitive reappraisal when a critical event led to a team collapse compared to when it did not ($d = 0.37$, $p = .023$). On a social level, athletes reported using more unhelpful interpersonal emotion regulation strategies (suppression of own emotions, encouraging others to suppress emotions; $ps < .05$) and fewer helpful emotion regulation strategies (providing positive feedback, modeling helpful emotions; $ps < .001$) if the critical event developed into a team collapse. Our results highlight the importance of individual and interpersonal emotion regulation strategies in team collapse situations. Practical implications including the use of interpersonal emotion regulation as an intervention for team collapse will be discussed.

Composite vignettes of high school coaches’ descriptions of facilitating life skills development through education-based athletics

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Education-based athletics refers to sport programs embedded within a school; in the United States, the National Federation of State High School Associations (NFHS) exists to support high school sports and hosts a member organization in each state. The NFHS includes in its mission statement a belief that school sport should “develop leadership and life skills.” Few studies have attempted to link education-based athletics’ mission statements with actual practice. Therefore, the purpose of the present study was to explore coaches’: (a) mission statement awareness, (b) perceptions of life skills development through sport, and (c) how coaches are evaluated in their ability to provide life skills development. Participants included four male coaches from different schools and sports (i.e., girls’ basketball, boys’ basketball, mixed track and field, mixed tennis) in the southeast US. Data was collected using semi-structured interviews. Inductive thematic analysis (Braun & Clark, 2016) was used to understand and code participant’s stories and responses to each interview question. Findings are presented through composite vignettes to represent the most relevant lived-experiences and perspectives from the participants as one unique voice. The coach participants had little knowledge of any mission statements nationally or locally; still, the coaches shared personal values and emphasized a “more than sport” mindset. All coaches defended sport as a context for life skills to be taught and developed yet uniformly described an informal execution of developing life skills that lacked structure, consistency, and evidence-based practice. Consistently, coaches felt supported by their athletic directors and principals to use sport as a place to develop life skills though none described being evaluated by their ability to develop life skills, and most coaches felt many parents focused more on performance-related outcomes. Future work could provide stronger avenues to support coaches and administrators in reaching the broader mission of their education-based athletic settings.

Is it good to be in a group? Relationship between mental health and perceptions of groupness during remote and in-person physical activity classes

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During the COVID-19 pandemic, health-related restrictions were negatively related to students’ mental health (Meda et al., 2021). However, physical activity (PA) has a positive effect on mental health among adults isolating during COVID-19 (Jacob et al., 2020). In general, perceiving the PA setting to be more like a group has been positively related to affect (Evans et al., 2019) and enjoyment (Graupensperger et al., 2019). The purpose of this study was twofold: (a) to explore how the mental health of students enrolled in PA classes changed over the course of the semester when classes were delivered remotely versus in-person; and (b) to examine the relationship between groupness and change in mental health. Participants ($N = 342$) were students enrolled in PA classes (e.g., basketball, tennis, kickboxing, yoga) delivered either remotely (Fall 2020-Spring 2021; $n = 220$) or in-person (Fall 2021-Spring 2022; $n = 122$). Questionnaires were completed at the start and end of the semester and included the Mental Health Inventory-5 (MHI-5) and Groupness Scale (Evans et al., 2019). A 2 (time: start/end) \times 2 (semester: remote/in-person) factorial ANOVA was performed to compare changes in mental

health. There was a significant interaction between time and semester ($p = .016$) such that mental health was reported to improve when in-person ($p = .008$) while no change was reported when classes were remote ($p = .667$). Secondly, multiple regression was performed to examine how perceived groupness (entitativity and group structure) and type of semester related to changes in mental health. The model was significant ($R^2 = 0.04$, $p = .002$) with change in mental health positively related to entitativity ($b = 0.7$, $p = .003$) and negatively related to group structure, ($b = -0.6$, $p = .005$). The negative relationship between group structure and mental health was unexpected. It may be the PA classes for credit may be a unique setting where more group structure may have been associated with more pressure. Future research should explore contextual factors that may explain these relationships (e.g., type of PA).

How do elite athletes self-regulate their recovery around training? Insights using the experience sampling method.

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Recovery is the multidimensional process of restoring performance capability between training sessions (Kellmann et al., 2018). Research often views recovery through its modalities, yet elite endurance athletes describe it as a wide array of strategies that they employ according to their goals, priorities, and contextual demands (Wilson & Young, 2023). Wilson and Young (2022) characterized this athlete-led process of implementing recovery as a series of self-regulatory competencies. We aimed to observe and describe how athletes self-regulate their recovery in situ, in a novel use of the experience sampling method (Larson & Csikszentmihalyi, 1983). Participants were 17 athletes (11 female, 6 male; $M_{\text{age}} = 25.6$ yrs, $SD = 5.5$) training with Canadian national teams (able-bodied, $n = 13$; para, $n = 4$) in four cycling disciplines. Over five days around two key training sessions, they received a text message randomly within each two-hour waking period. Texts linked to a form asking them to rate their perceived recovery, stress, and use of recovery-related self-regulatory processes in the past half-hour. On average, each athlete completed 72.2% of the forms they received ($M_{\text{forms}} = 22.8$, $SD = 4.9$), within which they reported thinking about their recovery on 77.7%, mostly at a low level ($Mdn = 2/4$). Self-regulatory processes showed highly variable patterns and ranged widely across processes (coeff var = 0.65 to 1.34) and individuals (0.35 to 1.64). Repeated measures correlations generally indicated greater use of recovery self-regulation coincided with higher perceived stress (i.e., fatigue; $r = .124$ to $.318$; $ps < .023$) and with lower perceived recovery ($r = -.211$ to $-.109$; $ps < .046$), with inter-individual variation in the valence of correlation coefficients. Results indicate that elite cyclists actively self-regulate recovery in individualized patterns. Future work should consider how individuality intersects with common recovery characteristics to support the development of effective recovery self-regulation in athletes at varying performance levels. Funding source: Social Sciences and Humanities Research Council of Canada.

United in joy and misery? A scenario-based exploration of the effects of emotional valence and sharedness on perceived team integration and teamwork

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Everyone wants to be a part of a winning team (Cialdini et al., 1976; Taijfel, 1978) but what happens to team commitment when members experience negative emotions within a team? Research suggests that negative experiences such as team losses lead members to reduce their commitment and negatively impact future teamwork (Benson et al., 2016; Snyder et al., 1986). Other research suggests, however, that it is not the emotional valence of an experience (i.e., pleasant vs. unpleasant) that matters for team integration, but rather the extent to which the experience is shared within the team (Knight & Eisenkraft, 2015). Our aim in this study was to test how emotional valence and emotional sharedness compared in influencing team-members' perceptions of team integration and teamwork. We conducted a 2 (valence – happiness vs. dejection) x 2 (sharedness – individual vs. collective) between-subjects online experiment in which 187 current or former competitive team-sport athletes ($M = 24.50$ years old, 64% male, 35% female, 1% diverse) read one of four scenarios and responded to questionnaire measures of perceived social cohesion, team identification, team commitment, and anticipated executive teamwork. Our results showed that happiness caused higher team identification and anticipations of teamwork than dejection ($f = .29$). Sharedness had no effect due to a failed manipulation. When including perceived emotional sharedness, however, emotional valence no longer had an effect and participants who perceived high sharedness reported higher perceptions of team integration and anticipated teamwork than those who perceived low sharedness ($f = .43$). Thus, whereas it may matter how pleasant or unpleasant members feel on a team, it may be more important to what extent their feelings are shared with their teammates. That is, even if teams feel dejected after a loss, as long as they share their dejection, this may benefit team integration and future teamwork (e.g., by instigating communal coping; Tamminen et al., 2016).

An exploration of factors predicting change in the frequency of athlete burnout symptoms over time

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Athlete burnout is an enduring, multidimensional syndrome characterised by feelings of physical/emotional exhaustion (PEE), reduced sense of accomplishment (RSA) and sport devaluation (SD). Existing research provides support for distinct stress-, commitment-, and motivation-based theories of burnout, but empirical efforts to integrate these approaches are lacking. This study employed a longitudinal, integrated approach with the aim of identifying the factors that predict change in burnout symptoms when these prevailing perspectives are considered alongside each other. Gaelic games athletes completed measures of burnout, stress, commitment, motivation and demographics at 6 timepoints over a 20-month period. All stress, commitment, motivation and demographic factors were integrated as predictors of change in PEE, RSA and SD using latent growth modelling. A backwards elimination approach was

employed to achieve parsimonious models for each burnout dimension. Change in PEE was positively predicted by greater training demands ($b = .37, p < .01$) and amotivated regulation ($b = .27, p < .05$), and negatively predicted by greater external regulation ($b = -.27, p < .05$), greater personal investment ($b = -.26, p < .05$) and elite participation ($b = -.29, p < .05$). Change in RSA was negatively predicted by elite participation ($b = -.32, p < .05$) and constrained commitment ($b = -.57, p < .01$). Change in SD was positively predicted by the number of teams represented ($b = .25, p < .05$). Initial symptom frequency negatively predicted change over time for PEE ($b = -.54, p < .01$) and SD ($b = -.54, p < .01$), but not RSA ($b = -.39, p < .01$). Findings point to key risk and protective factors for burnout, and highlight that these emerge from across theoretical perspectives and vary for PEE, RSA and SD. This study provides novel empirical support for an integrated approach to the study of burnout, suggesting that existing theories can be viewed as complementary and such an approach can provide more comprehensive insight into the development of this complex, multidimensional syndrome. Funding source: Dublin City University.

Youth sport participation during COVID-19: Exploring the role of parents' perceived barriers and investment

Justin T. Worley, Utah State University; Liam O'Neil, Utah State University; Matthew Cook, Utah State University; Kat V. Adams, Utah State University; Travis E. Dorsch, Utah State University; Jordan A. Blazo, Louisiana Tech University

Parent engagement is a predominant driver of youth sport participation. Considering the COVID-19 pandemic caused abrupt changes to youth sport participation trends, it is important to explore how parent engagement relates to the participation of youth athletes in organized sport following the COVID-19 lockdown period. The present study was designed to (a) characterize distinct parent profiles based on their perceived barriers to, and change of investment in, their children's sport participation, and (b) examine profile differences by children's time spent in organized sport practice and competition. Participant data were derived from a nationally representative sample of youth sport parents from across the United States ($N = 1214$, $M_{\text{age}} = 39.2$ years, $SD_{\text{age}} = 8.7$ years) in September 2021. Parents completed measures assessing perceived barriers to their children's sport participation, change in investment (i.e., time and money) in sport participation from pre-pandemic levels, and weekly hours their oldest child spent in organized sport practice and competition. Cluster analysis was used to classify profiles of youth sport parents' responses to perceived barriers and change in investment. A four-cluster solution was retained which included profiles characterized by (a) moderate barriers and low investment, (b) high barriers and high investment, (c) low barriers and moderate investment, and (d) low barriers and high investment. Post-hoc comparisons showed that clusters differed significantly on the amount of time parents reported that their children spent engaging in organized sport ($\eta^2 = .07, p < .001$). The lowest sport participation ($M = 4.19$ hours) was reported for the parent cluster characterized by relatively moderate barriers and low investment. The highest sport participation ($M = 8.28$ hours) was found for the parent cluster characterized by relatively low barriers and moderate investment. This study has implications for researchers and practitioners who are interested in understanding patterns of

engagement in organized sport during the COVID-19 pandemic. Funding source: Aspen Institute Sports & Society Program.

Perceptions of peer relationships, social identity, and motivational experiences in high school athletes

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Athlete perceptions of peer relationships in youth sport are positively associated with motivational experiences, such as sport commitment and enjoyment (e.g., Ullrich-French & Smith, 2006; Weiss & Smith, 2002). Moreover, organized sport is a context in which young athletes may derive a part of their identity through membership on their team. Because social identities are theorized to form within the context of interpersonal relationships (Postmes et al., 2005), it is possible that athlete perceptions of peer relationships are associated with sport commitment and enjoyment by way of social identity. The purpose of this study was to test the plausibility of this conceptual model. Participants from interdependent high school sport teams ($N = 147$, female $n = 80$, $M_{\text{age}} = 16.0$ years, $SD_{\text{age}} = 1.4$ years) completed established measures of friendship quality and peer acceptance, social identity (cognitive centrality, ingroup affect), and sport commitment and enjoyment. Observed variable path analysis was used to test the conceptual model and bootstrapped confidence intervals were used to assess indirect effects. Neither friendship quality nor peer acceptance was directly associated with sport commitment or enjoyment. However, friendship quality was positively associated with cognitive centrality ($\beta = .29$, $p = .001$) and peer acceptance was positively associated with ingroup affect ($\beta = .22$, $p = .011$). In turn, cognitive centrality was positively associated with sport commitment ($\beta = .21$, $p = .006$) and ingroup affect was positively associated with sport commitment ($\beta = .49$, $p < .001$) and enjoyment ($\beta = .62$, $p < .001$). Indirect effects showed that friendship quality was related to sport commitment through cognitive centrality ($\beta = .06$), and peer acceptance was related to sport commitment ($\beta = .11$) and enjoyment ($\beta = .14$) through ingroup affect. The results offer partial support for the proposed conceptual model and suggest that distinct aspects of peer relationships in sport may be motivationally salient by uniquely shaping social identity with sport teams.

A preliminary investigation into collegiate athlete perceptions of leadership behaviors and organizational culture

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Team culture is paramount to the success of sport teams and it has been well-established that various types of leaders can play unique roles in making team success a reality. Head coaches are commonly tasked with culture creation or transformation, but little is known about how their daily actions, or those of team leaders, influence culture as it is being experienced by athletes. This cross-sectional study examined whether athletes' perceptions of head coach and peer leadership behaviors predicted athlete perceptions of team culture. A purposive sample of

155 current collegiate athletes ($M_{age} = 20.25$, $SD_{age} = 1.43$) representing 17 NCAA teams across three divisions participated in this study. Participants completed Leadership Scale for Sport (LSS, Chelladurai & Saleh, 1980) to assess head coach and peer leadership behaviors and the Organizational Culture Survey (OCS, Glaser et al., 1987) via web-based survey. Results from a path model analysis indicated that athlete responses to the various subscales of the LSS, for both head coaches and peer leaders, significantly predicted scores on the OCS. Specifically, perceptions of head coach leadership behavior positively predicted perceptions of group communication (LSS Training and Practice & OCS Information Sharing: $B = 0.52$, $p = .004$), while perceptions of peer leadership positively predicted the social aspects of team culture (LSS Positive Feedback & OCS Climate and Morale: $B = 0.30$, $p = .014$). An open-ended question was used to gather more information about the athlete experience of team culture. Through a thematic analysis seven themes emerged: social cohesion, caring disposition, achievement focus, development, active leadership, positive experience, and negative experience. Together, these findings provide insight into the unique influence of athletes' perceptions of head coach and peer leadership behaviors on perceptions of team culture. This study aids in understanding how organizational culture operates within the sport context. Future research might work to develop team culture measures specific to sport.

Perceived differences in stress amongst Division I college football coaches

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Coaching stressors and burnout have been examined over the years. The pressures of winning, long nights at work, and sleeping in the office can take a toll on personal life, family life, health, and overall wellness, which have caused many coaches to pursue other options of employment (Bradford et al., 2013; Kelley et al., 1999; Kosa, 1990; Nikolaos, 2012; Raedeke et al., 2000; Ryska, 2009). The researcher examined differences in stress between coaching title (head coach, offensive/defensive/special teams coordinator, and position coach). Additionally, quantitative methods were used to establish perceived stressors both personally and professionally using the Coaching Issues Survey (CIS; Kelley & Baghurst, 2009). The CIS is a tool used to measure perceived stress using four different subscales including, win-loss, time-role, program-success, and athlete-concern. A one-way independent groups multivariate analysis of variance (MANOVA) was conducted to determine the differences in perceived stress and burnout amongst the three different titles of Division I coaches. The title of coaches served as the independent variable and the CIS subscale scores served as the dependent variables. Data screening and basic assumption testing was used for the MANOVA. All statistics were calculated using SPSS with an alpha level of .05. The CIS was administered to 58 Division I football coaches. For the overall MANOVA, no significant mean vector differences were found for title with the four subscales from the CIS (Kelley & Baghurst, 2009) with an alpha level set at .05. Future exploration of specific differences in stress and experience is needed. College football is evolving with the current NIL changes where student athletes are now able to be paid. Future researchers should consider investigating perceived stress during different times of the year, as well as examining stress longitudinally across a career.

