North American Society for the Psychology of Sport and Physical Activity

Annual Conference
June 5–8, 2024

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Keynote Speakers

Opening Keynote Lecture
Reshaping academia: The imperative to adapt in the age of AI
Marcio A. Oliveira, University of Maryland
In today’s dynamic educational landscape, universities grapple with the imperative to adapt. Artificial Intelligence (AI) technologies have recently taken center stage, carrying the promise of transforming teaching, learning, and research, unveiling new dimensions of innovation previously considered unattainable. In this keynote, I will delve into AI’s current state in academia, spotlighting achievements, challenges, and trends shaping our future. Envision courses where AI tailors learning experiences, seamlessly adapting to diverse needs, fostering an inclusive educational environment. Visualize a research landscape empowered by AI methodologies, accelerating discovery. However, aware of the hype and amidst the enthusiasm, we must navigate the swiftly emerging applications, addressing critical issues such as the responsible and ethical utilization of AI, mitigating biases, and upholding academic integrity. Universities that embrace AI as an innovation catalyst are not only positioning themselves as leaders, but also taking on the responsibility of conscientiously preparing the next generation of learners. As we peer into the future, the synergy between academia and AI holds the promise of shaping a new era marked by discovery, learning, and academic excellence.

Keynote Speaker: Motor Development
Are we born to move on the earth or on the moon?
Marianne Barba-Roth, Integrative Neuroscience & Cognitive Center of the CNRS and the University Paris Cité, France
Understanding how infants and children develop their motor competencies is a major goal of motor development research. Most studies in this field focus on the emergence and development of a given skill in the child’s natural terrestrial environment, as is the case for reaching, sitting, crawling or walking, all skills that appear several months after birth. However, such skills could exist in a primitive form from birth and even in the fetus, a long time before their full expression several months later. These very early expressions of motor skills are often “hidden” because infants are not tested in an optimal context for expressing them. Moreover, when infants do express them, these neonatal motor primitives are often regarded as spinal reflexes that disappear rapidly after birth and have no connection with later forms of functional and mature behaviors. In my presentation I will explain why it is crucial to identify the optimal window for studying each motor behavior and how researchers can create the optimal conditions for studying them from birth. Then, I will discuss the research of my group and my colleagues on the ontogeny of locomotion to illustrate how the choice of a suitable context, using a mini skateboard adapted to the newborn’s morphology, has enabled us to study primitive crawling from birth, showing that newborns are able to use quadrupedal neuro circuitry to propel themselves and that this neonatal crawling is already controlled at supra spinal level by visual, olfactory and auditory stimuli. Finally, I will conclude by presenting the recent results we have obtained with very premature infants, showing that stimulating their neonatal crawling on a mini skateboard is beneficial for the development of their later crawling, among other positive motor and psychological outcomes, suggesting the existence of a link between neonatal and mature crawling.

Keynote Speaker: Motor Learning and Control
Microgravity effects on the human brain and behavior: Co-occurring dysfunction and adaptive plasticity
Rachael D. Seidler, University of Florida
Studying adaptation to the microgravity environment provides insight into how the central nervous system responds to an environment for which it has not evolved. For example, microgravity alters vestibular signaling, due to the otoliths’ functional dependence on gravity. In this presentation, I will present my work showing that space flight results in adaptive changes to the brain and behavior. I will also highlight brain changes that stem from the physical environment of microgravity, including an upward position shift and fluid shifts. Emerging plans for travel to Mars make it critical to understand how spaceflight affects the human brain and behavior and what countermeasures may be effective at mitigating changes.

Keynote Speaker: Sport and Exercise Psychology
From recognition to action: Racial microaggressions in college sports
Laura Reid Marks, Florida State University
Racial microaggressions are subtle forms of racial discrimination that are psychologically and physically detrimental to people of color, including athletes of color. Racial microaggressions can be verbal or behavioral and are manifestations of implicit bias. Often, these acts originate from well-meaning individuals unintentionally and can even be intended as a compliment. Despite being well-intentioned, racial microaggressions perpetuate stereotypes and cause harm. In this presentation, I will present research on racial microaggressions and their mental and physical impacts. Further, I will highlight how racial microaggressions may manifest in sports with athletes on college campuses. I will conclude this talk with a discussion of the importance of research addressing racial microaggressions in sports, with particular attention to developing interventions tailored for athletes, coaches, and other training staff.

Senior Lecturers
Motor Learning and Control
Perceptual-cognitive expertise in sport: Current perspectives and future directions
A. M. Williams, Florida Institute for Human and Machine Cognition
A significant body of research now exists focusing on the superior ability of experts to anticipate and make decisions under pressure in high-performance domains when compared to less expert, and novice performers. This work has spanned a variety of different domains including sport, law enforcement, warfighting, aviation, and medicine. In this presentation, a succinct summary of the key findings that have emerged over the last five decades is provided and the implications of this work for testing and training in high-performance environments are discussed.
Several questions that have yet to be adequately addressed in the field of expert performance are highlighted and the potential benefits of new approaches to studying this topic are considered. The impact of new and emerging approaches to the study of perceptual-cognitive expertise are reviewed including computational modelling, Artificial Intelligence/Machine Learning, and neuroscience, as well as the potential role that can be played by technological advances in virtual and augmented reality. Finally, I highlight the benefits of embracing a more multi-disciplinary perspective to the study of perceptual-cognitive expertise across domains.

**Sport and Exercise Psychology**

The social side of motivation in youth sport (and an academic career) – A most excellent adventure

*Alan L. Smith, Utah State University*

Dudes – for many of us, the lasting memories of our sport involvement are linked to our experiences with our families, teammates, coaches and mentors, and others who support (or thwart) our goals and development. Through these social relationships, we form views about our capabilities, experience a range of emotions, embrace various reasons for our involvement in sport, and have potential to develop and express character, social skills, cognitive skills, and other human qualities. Whoa! Conducting research in this arena is challenging. Young athletes simultaneously navigate a broad range of relationships, and these relationships are inextricably connected with their individual qualities as well as broader organizational, cultural, and societal features of sport. Academic careers are similarly complex, particularly at a time when strange things are afoot in higher education. In this senior (ahem) lecture, I will share a bit about my academic journey and what I might have learned about the social side of motivation in youth sport. This work started on the topic of youth sport friendships and has expanded to address areas such as sport parenting, sibling relationships, social exclusion, teammate communication, and how multiple social perceptions are reconciled by young athletes. With a Gen Xer’s deep appreciation for lack of adult supervision, I have encouraged centering young people in this work and have drawn from myriad theoretical perspectives and literatures in pursuing my research and broader academic career. I also possess a long list of things we do not know and might want to. Because we cannot travel through time like our good friends Bill and Ted, we will have to invest plenty of sweat equity in knowing what we want to know and do it in such a way that future generations can benefit from our efforts. Let us be excellent to each other in the process! For it is through spectacular failure, the kind guidance of mentors and colleagues, and the bodacious efforts of our students that we come to have fulfilled careers. I look forward to sharing my most excellent adventure with you.

**Early Career Distinguished Scholar Award**

Movement within movement: Developing an early career research program around the within-person dynamics of physical activity and sedentary behavior

*Jaclyn P. Maher, University of North Carolina, Greensboro*

My research path began with an important realization that within-person processes (i.e., how individuals change within themselves over time) are just as important as, if not more important than, between person processes (i.e., how individuals differ from one another) in explaining and predicting movement-related behavior. Movement-related behaviors like physical activity and sedentary behavior are repeat-occurrence behaviors in that they occur within and across days, in part due to the changing environmental contexts within daily life. In other words, there is movement within movement. Therefore, a fundamental aspect of my research is the integration of ambulatory assessment methods (e.g., intensively capture behavior as well as its antecedents and consequences as they ebb and flow in real-time and in real-world environments. Further, my research utilizes dual process framework which emphasizes the role of reflective (i.e., characterized by deliberative, conscious, and effortful processing of information) and reflexive (i.e., characterized by rapid, effortless, and associative processing of information) processes. Employing this framework departs from the status quo that focuses solely on reflective processes that predict and explain movement-related behaviors. In this talk, I will share lessons learned and stories from pivotal moments in my career as well as describe how mentors, colleagues, trainees, and family influenced my early career journey. I will highlight examples of how my research related to the within-person reflective and reflexive processes regulating movement behaviors has progressed over the past decade: from examining day-level processes, to momentary-level processes, to patterns of within-person variability as determinants of movement behaviors. In short, I hope to show how studying within-person variation and change can improve our understanding of movement-related behaviors and enhance health and wellness across the lifespan.

**The NASPSPA Outstanding Student Paper Award Recipients**

**Motor Development**

The effects of a 4-week SKIP program on young children’s fundamental movement skills

*Conner Meldrim, Minot State University; Hayden Tinker, Minot State University; Yung-Ju Chen, Minot State University*

Fundamental movement skills (FMS) are critical in children’s health and motor development. While extensive literature demonstrates the effectiveness of long-term (multi-month to yearlong) FMS interventions, it is unknown whether short-term interventions could effectively promote children’s FMS development. The present study aimed to examine the efficacy of a 4-week SKIP (Successful Kinesthetic Instruction for Preschoolers) program and sex differences in its efficacy in young children. Nineteen preschool-aged children aged 3 to 5 (11 boys, 8 girls; M_{age}=4.2 \pm 0.67 years) participated in the study. A 4-week (2 sessions x 30 minutes x 4 weeks = 240 minutes) SKIP intervention with a ball-skill emphasis was conducted by the researchers. The Test of Gross Motor Development (3rd Edition; TGMD-3) was used to measure children’s locomotor and ball skill competence at pre- and post-tests. Raw and scaled scores of the subtests (locomotor and ball skills) and gross motor quotients were used for data analyses. The Wilcoxon Signed-Rank tests demonstrated that all TGMD-3 posttest scores were significantly higher than the pretest (p < .05), with large effect sizes (r > .5). A Kruskal-Wallis Test showed that there is a significant difference between boys’ and girls’ posttest locomotor scaled scores (H[1]=5.23, p = .022, = .25), posttest sum scaled scores (H[1]=5.63, p = .018, = .27), and posttest GMQ scores (H[1]=5.63, p = .018, = .27). These results indicated that girls outperformed boys in locomotor skills and overall FMS at the posttest. No sex differences were found in any other TGMD-3 scores, nor the changes in the scores between pre- and posttests (p > .05). The results suggest that the 4-week SKIP intervention was effective in improving children’s FMS competence, with girls demonstrating better FMS competence than boys at the posttest. More work is needed to explore the effectiveness of short-term FMS interventions with different designs, dosages, and delivery approaches.
Motor Learning and Control

Functional and free-water imaging in rapid eye movement behavior disorder and Parkinson’s disease

Emily R. Tobin, University of Florida; David J. Arpin, University of Florida; Marissa B. Schauder, University of Florida; Mara L. Higgonbotham, University of Florida; Robin Chen, University of Florida; Xiang Yang Lou, University of Florida; Richard B. Berry, University of Florida; Evangelos A. Christou, University of Florida; Michael S. Jaffee, University of Florida; David E. Vaillancourt, University of Florida

It is established that one of the best predictors of a future diagnosis of Parkinson’s disease (PD) is a current diagnosis of rapid eye movement behavior disorder (RBD). In such patients, this provides a unique opportunity to study brain physiology and behavioral motor features of RBD that are also impaired in early-stage PD. Our goal is to determine whether functional imaging or free-water (FW) imaging approaches are sensitive to the physiological changes occurring in RBD. We also measured performance on the Purdue Pegboard Test (PPT), which has been shown to be affected in patients with RBD and PD. Participants included 25 controls, 24 individuals with RBD, and 39 individuals with PD. All participants were scanned in a 3T MRI scanner. Individuals performed a unimanual grip force task during functional imaging. Repeated measures (3x3) ANCOVA was used to examine functional imaging (striatum, thalamus, motor cortex, and cerebellum) and MANCOVA was used to examine FW imaging [striatum and posterior substantia nigra (pSN)] and PPT score covarying for age and sex. We found decreased functional activity in both RBD and PD within the motor cortex, striatum, and thalamus compared with controls (p’s < .05). There was elevated FW-corrected fractional anisotropy (FAT) in the putamen in RBD and PD and elevated FW in the putamen and pSN in PD (p’s < .05) compared with controls. RBD and PD performed significantly worse on all tasks of the PPT compared with controls (p’s < .05). We observed that the both hands task of the PPT was most sensitive in distinguishing between groups. A subgroup analysis of early-stage RBD (<2 years diagnosis) confirmed the findings in the larger RBD group. These findings provide evidence that the putamen is affected in RBD and PD for both functional and FW imaging. The pSN shows elevated FW, we did not observe this effect in RBD. We also found evidence that the caudate, thalamus, and motor cortex have reduced functional activity in RBD and PD. These findings point to the cortico-striatal and thalamo-cortical circuits being impaired in RBD patients.

Sport and Exercise Psychology

Testing a model of self-compassion as a motivational strategy for women’s physical activity

Katarina Huellemann, Western University; Rachel Calogero, Western University; Eva Pila, Western University

Despite the documented benefits of regular physical activity, women continue to report lower levels of physical activity engagement across the lifespan compared to men. Past research suggests that body-related (e.g., body comparisons) and exercise-related (e.g., motivation) psychosocial factors may be sources of distress for women leading to lower physical activity engagement. Self-compassion, a kind and supportive way of responding to oneself in the face of distress, is positively associated with physical activity behavior. Limited research has examined motivational perspectives of self-compassion, in favour of emotion regulation perspectives, which precludes understandings of whether self-compassionate motivation and action are related to women’s physical activity behavior. As such, the present study investigated how various psychosocial experiences were associated with women’s physical activity behavior over time and whether greater motivational drives for self-compassion indirectly explained these associations. A sample of women (N = 387, M_age = 33.57) completed self-report measures of psychosocial experiences including self-objectification, internalized weight stigma, interoceptive awareness, body compassion, body/eating/exercise social comparisons, intrinsic and introjected exercise motivation, and affective exercise experiences, as well as a novel measure of self-compassion in physical activity and physical activity behavior one-month later. The path model showed good fit, with lower body comparisons (b = -.041, SE = .21, p = .044), and higher body compassion (b = 1.96, SE = .86, p < .001) and interoceptive awareness (b = 3.51, SE = .86, p < .001) indirectly related to physical activity behavior through higher self-compassion in physical activity one-month later. The findings provide novel insight into motivational perspectives of self-compassion in physical activity and underscore the importance of reducing body comparisons and cultivating interoceptive awareness and general body compassion to promote women’s sustained physical activity engagement.

Exploring athletic and exercise identities in the South Korean context: A confirmatory factor analysis approach

Yeongjun Seo, University of North Carolina at Greensboro; Erin Reifsteck, University of North Carolina at Greensboro

The identities of “athlete” and “exerciser” share commonalities in their conceptualizations, yet these constructs can be distinguished by the ways in which their corresponding objectives, motivations, and intentions significantly diverge. Notably, there is a gap in the literature addressing the ambiguity and inconsistent use of these terms in the context of South Korea. In the Korean language, the term “exercise athlete” is commonly used to denote any individual engaging in competitive sports (i.e., “athlete”), and no equivalent term exists for the term “exerciser” in line with the way it is defined in the literature. This linguistic discrepancy is particularly relevant to the study of athletes’ health and well-being because how these terms are conceptualized and operationalized provides a nuanced perspective on their identity, health outcomes, and physical activity behavior during and after transitioning out of competitive sport. Therefore, we refined the existing Athletic Identity Measurement Scale and Exercise Identity Scale that were previously translated into Korean (Park & K. Kim, 2012; C. Kim, 2014) and examined whether the refined versions appropriately represent similar but distinct concepts. We conducted a two-factor confirmatory factor analysis of the scales within a sample of active South Korean male athletes (N = 232, M_age = 19.93 ± 1.22 years). The global fit indices of our final model demonstrated acceptable fit $\chi^2$(101) = 208.512, $p < .01$, CFI = .95, RMSEA = .07 (90% Confidence Interval: .06 – .08), SRMR = .05 and the local fit indices (i.e., factor loadings and intercorrelations) further supported convergent and discriminant validity within the current sample, suggesting participants discerned differences in the questionnaires and provided distinct responses. More research examining perceptions of sport and exercise and how “athlete” vs “exerciser” is defined in different populations is necessary to extend and validate these findings and ensure these constructs are accurately assessed across cultures within sport and exercise psychology research.
Motor Development and Sport and Exercise Psychology Symposium

Community-based physical activity programs for youth: Using implementation science to guide program development

Anne Cox, Washington State University; Leah Ketcheson, Washington State University; Franziska Loetzner, Wayne State University; Corlyn Estelle, Washington State University; Amanda McMahon, Washington State University;

This symposium will include four presentations that describe the development and implementation of community-based physical activity programs. The first program was developed through the lens of sport and exercise psychology, whereas the second was developed from a motor development perspective. Throughout the presentations, the audience will observe both the shared and unique characteristics of these programs developed and implemented from two different perspectives. In addition to describing the background and development of each program, we will illustrate how implementation science frameworks can be applied to program development and implementation to support the efficacy and sustainability of such programs within our communities. The symposium will conclude with a panel of presenters who will answer questions and engage in discussion with the audience regarding program development and implementation.

Development of a youth embodiment-based program designed for female and gender diverse youth

Anne Cox, Washington State University; Sarah Ullrich-French, Washington State University; Amanda McMahon, Washington State University; Corlyn Estelle, Washington State University

Around the time of puberty, during late childhood and early adolescence, girls are at increasing risk of body image disturbance, eating disorders, and low levels of physical activity. Gender diverse or non-conforming youth are also at increased risk for these negative outcomes and more often do not have safe spaces where they feel that they truly belong. These negative outcomes can stem from youth disconnecting from their bodies in ways that reduce their attunement to internal needs and desires, referred to as negative embodiment. Thus, effective, community-based strategies, grounded in the most effective approaches to support positive embodiment are needed to meet the unique needs of this population. Unfortunately, physical activity-based programming, physical education, and recess opportunities tend to decrease just as the need for embodied movement experiences may be increasing for these youth. The Find What Moves You program was developed by a team at Washington State University to help girls and gender diverse youth experience more positive embodiment through movement, social connection, and self-reflection. The developmental theory of embodiment was used to understand and apply the three pathways back to positive embodiment including the physical freedom, mental freedom, and social empowerment pathways. In addition, self-determination theory and monitor and acceptance theory provided theoretical guidance to further develop specific program outcomes, activities, and instructor training for the program. Core program outcomes include 1) enjoyment of and intrinsic motivation for physical activity, 2) mindfulness of mental and physical experiences, 3) a sense of belonging, and 4) body appreciation. The process we used for program and curriculum development will be presented including the needs assessment, theoretical orientation, creation of a logic model and curriculum, and the implementation strategies that have been used in two different settings.

Application of the quality implementation framework to an embodiment-based wellness program

Corlyn Estelle, Washington State University; Anne Cox, Washington State University; Sarah Ullrich-French, Washington State University; Amanda McMahon, Washington State University

Find What Moves You (FWMY) is a movement-based wellness program that was created to address disembodiment and associated negative risk factors experienced by adolescent girls and gender diverse youth. To address the need for high quality theory-driven interventions, FWMY was designed using the developmental theory of embodiment, self-determination theory, and monitor and acceptance theory. Applying an implementation framework to the development and implementation of community-based programs is valuable for matching programs to the needs of communities, optimizing program implementation, and ensuring program sustainability. Despite these advantages, community wellness programs often do not systematically apply implementation frameworks. This presentation illustrates how we applied the Quality Implementation Framework (QIF) retrospectively to the FWMY program. The four phases of the QIF were used to formally assess program implementation and inform further development of FWMY. The four phases include initial considerations regarding the host setting, creating implementation structure, support during implementation, and improving future applications. These four phases were applied to three cycles of FWMY development and implementation efforts. These cycles included the initial needs assessment, specific implementation strategies and evaluation, and application of program evaluation data to curriculum revisions. Two pilot studies were conducted to obtain acceptability, feasibility, and fidelity data. In the first pilot, FWMY was delivered in an online format (N = 6) and in the second, it was delivered using a hybrid delivery model at two middle school after school programs (N = 10; N = 15). In this presentation, the QIF will be used to show how the data from different phases of the QIF inform each other and how one cycle of applying the QIF feeds into the next cycle. Overall, applying the QIF illuminated critical next steps for the continued development of FWMY such as capacity building strategies and comprehensive staff training.

Development and outcomes of longitudinal community-based physical activity and nutrition programs for families with an autistic child

Franziska Loetzner, Wayne State University; Samantha Miller, Wayne State University; Andrew Pitchford, Oregon State University; Jordan Tsorvas, Wayne State University; Leah Ketcheson, Wayne State University

Children on the autism spectrum and their primary caregivers experience disproportionate rates of health disparities compared to the general population. Concerningly, both children with ASD and their parents are at increased risk for preventable health disparities. By early childhood, children with ASD are 40% more likely than their neurotypical peers to be overweight or obese. While engagement in 60 minutes/day of physical activity (PA) can reduce chronic health disorders, children on the autism spectrum engage in lower rates of PA and experience significant age-related decline in PA levels. Because of the pervasiveness of issues experienced by children on the autism spectrum, primary caregivers are an often overlooked and underserved population when considering health
What do we understand about expertise in sports?

Markus Raab, German Sport University Cologne

The road to excellence in sports is multifaceted and this symposium will bring together multiple perspectives to best understand expertise. This symposium is timely as all presenters are involved as the Editor (Williams) or chapter authors (the others) of a new edition of the Cambridge Handbook of Expertise. In the introduction by Markus Raab a recent review of the past, presence and future of expertise research (Zentgraf & Raab, 2023) will be used to provide benefits and risks of a multidisciplinary endeavor of understanding expertise both on a theoretical and methodological level. Next, the three main presenters will focus on specific frameworks and components of expertise. Rouwen Cañal-Bruland will focus on theory development and paradigmatic advancements in expert anticipation. Nikki Hodges will focus on perceptual training based on motor simulation for developing expertise in sport. David Mann will focus on theoretical development in understanding the conditions necessary for developing expertise in decision-making and tactical skill. Finally, Mark Williams will comment on the integration of those factors to understand expertise in sports and provide an outlook beyond sports.

Expert anticipation research: Past, present and future

Rouwen Cañal-Bruland, Friedrich Schiller University Jena, Germany

The aim of my talk is threefold: first, I critically review the main paradigmatic approach taken in the past that led us to the most prominent conclusion regarding anticipation research in sports, namely, that experts are better able to pick-up and use advanced kinematic information than novices (Loffing & Cañal-Bruland, 2017; Williams & Jackson, 2019). I will refer to this approach as the “observer paradigm” as it focuses on the passive observer, for instance, a goalkeeper standing in front of a life-size screen trying to predict where an opposing penalty-taker in soccer is likely to shoot the ball (e.g., Savelsbergh et al., 2002). Second, I discuss the presently dominant paradigmatic approach to which I refer as the “observer-and-actor paradigm”. This paradigm has been adopted to account for findings showing that anticipation is grounded in sensorimotor coupling and hence mutual influences of sensory information processing and motor actions, thereby advocating action-based paradigms (Engel et al., 2013). Consequently, the inclusion of ecologically valid motor responses has become the rule rather than the exception, resulting in a paradigmatic approach in which the participant is free to move and respond as in the real situation. Third, I will suggest that despite the considerable theoretical and empirical progress in expert anticipation research made possible by these two paradigmatic approaches, we are in dire need of a new conceptual framework and a corresponding paradigmatic turn. Specifically, we need to truly embrace the social dynamics and real-time interactions between actors to fundamentally improve our understanding of anticipatory behavior in real-life in general, and of expert athletes in particular. I will propose and briefly sketch out such a novel conceptual framework that I call “interactive anticipation” and shortly present the paradigmatic turn needed to change and improve the way we study expert anticipation in the future.

Considerations for perceptual training of prediction skills based on evidence for motor simulation

Nicola J. Hodges, University of British Columbia, Vancouver, Canada

The study of action anticipation in sport has a long history and as will be evident from other talks in this symposium, conclusions about processes governing anticipatory decisions is both influenced by the methods used to collect and analyze action predictions, as well as by thinking concerning the presumed embodiment of these processes. In this talk, I will focus my
Decision making is a skill that is vital in invasive team sports, but it remains challenging to test and train. Existing approaches rely largely on video-based tests whereby athletes watch patterns of play and decide what action they would have made if they were a particular player seen within the video footage at a set moment in time. Skilled athletes do typically outperform others on this task, though the approach misses important aspects of decision-making expertise, in particular the ability to create decision-making opportunities by virtue of the actor’s own movements and interactions with others. This not only limits the degree to which skill in decision making can presently be tested, but it particularly restricts the usefulness of the paradigm to train skills that will transfer to the performance environment on-field. The aim of this presentation is to outline the future opportunities for improving the way that we test and train skill in decision making. I will start by reconceptualizing decision making as a process whereby skilled decision makers interact with teammates and opponents to continuously create new and more advantageous opportunities. Accordingly, I will discuss the opportunities offered by advances in virtual and augmented reality for athletes to adopt a first-person perspective within simulated match situations so that they can move, and ultimately to interact with teammates and opponents to create their own decision-making opportunities. Moreover, data-driven game models trained on large volumes of previous match data offer promise as a means of evaluating the likely success of decisions and for providing feedback to players about the appropriateness of the decisions they make in games and in simulated situations. The advances offer great promise for advancing skill acquisition in decision making in invasive team-sports.

Advancing the identification and development of skill in decision-making
David Mann, Vrije Universiteit Amsterdam, Netherlands

Decision making is a skill that is vital in invasive team sports, but it remains challenging to test and train. Existing approaches rely largely on video-based tests whereby athletes watch patterns of play and decide what action they would have made if they were a particular player seen within the video footage at a set moment in time. Skilled athletes do typically outperform others on this task, though the approach misses important aspects of decision-making expertise, in particular the ability to create decision-making opportunities by virtue of the actor’s own movements and interactions with others. This not only limits the degree to which skill in decision making can presently be tested, but it particularly restricts the usefulness of the paradigm to train skills that will transfer to the performance environment on-field. The aim of this presentation is to outline the future opportunities for improving the way that we test and train skill in decision making. I will start by reconceptualizing decision making as a process whereby skilled decision makers interact with teammates and opponents to continuously create new and more advantageous opportunities. Accordingly, I will discuss the opportunities offered by advances in virtual and augmented reality for athletes to adopt a first-person perspective within simulated match situations so that they can move, and ultimately to interact with teammates and opponents to create their own decision-making opportunities. Moreover, data-driven game models trained on large volumes of previous match data offer promise as a means of evaluating the likely success of decisions and for providing feedback to players about the appropriateness of the decisions they make in games and in simulated situations. The advances offer great promise for advancing skill acquisition in decision making in invasive team-sports.

Sport and Exercise Psychology Symposia

SEP Symposium 1: Abuse in Sport: Assessment of Definitions, Methods, and Participants Across North America

Symposium discussant: Kat V. Adams, Utah State University
Introduction to definitions, methods, and participants across North America
Katherine N. Alexander, Utah State University; Kat V. Adams, Utah State University

Sport is not an inherently positive experience for participants and cases of athlete abuse have garnered significant attention and interest from the public in recent years (Kavanagh et al., 2020). Although more scholars have become invested in studying athlete abuse, researchers continue to utilize a wide range of definitions and methodologies when examining these adverse experiences (Alexander et al., 2023). The aim of this symposium is to discuss prevailing paradigms used by athlete abuse scholars across North America and to better understand the field’s collective knowledge of athlete abuse, its antecedents, and consequences. A symposium introduction will highlight common definitions, methodologies, and participants. Subsequently, four empirical studies will be presented. The first study will examine prefrontal cortex activation in current athletes utilizing novel neuroimaging procedures. The second study will explore the relationship between interpersonal violence in sport, athlete perceptions of coach behaviors, and athlete outcomes in a sample of National Collegiate Athletic Association (NCAA) student-athletes. The third study will examine SafeSport policies within Canadian universities by analyzing policies in conjunction with the Universal Code of Conduct to Prevent and Address Malpractice in Sport (UCCMS). The fourth study will investigate parent perceptions of youth sport coaches in the United States as it relates to salient personal and athletic outcomes. Concluding remarks and discussion will be provided, highlighting implications for researchers, policymakers, and practitioners. This discussion will be followed by an open-audience Q&A.

Utilizing neuroimaging to examine prefrontal cortex activation: A pilot study on mental health in athletes
Katherine N. Alexander, Utah State University; Matthew Cook, Utah State University; Travis E. Dorsch, Utah State University; Leslie A. Page, Utah State University; Kolby Leonard, Utah State University; Spencer Bradshaw, Utah State University

Sport participation is often assumed to be an inherently positive experience; however, there is a growing body of evidence to suggest that athletes’ experiences of abuse in sport can have negative long-term impacts, including mental health impairments and post-traumatic stress disorder (PTSD) symptomology (Alexander et al., 2023). One novel window into neural health is the use of brain imaging. The purpose of the present pilot study was to compare neural activity in the prefrontal cortex of athletes with high and low rates of self-reported mental health symptomology, including symptoms of anxiety, depression, dissociation, and PTSD. Participants were recruited from a larger study sample examining mental health symptomatology in current and former high-level athletes. In the present study, current athletes underwent functional near-infrared spectroscopy imaging of the prefrontal cortex during a battery of emotion regulation and executive functioning tasks that tested inhibitory control, working memory, and cognitive flexibility. Participants were grouped into high (n = 6) and low (n = 4) mental health symptomology groups. Groups were compared via t-tests and based on location of prefrontal cortex activation and the behavioral results of the task battery. Preliminary results suggest that differences exist across these groups, highlighting potential altered cortical hemodynamics and changes in executive functions in participants associated with elevated mental health symptoms.

Experiences of interpersonal violence in sport and perceived coaching among college athletes
Cheryl K. Zogg, Yale School of Medicine; Edward B. Runquist III, Yale School of Medicine; Michael Amick, Yale School of Medicine; Gabrielle Gilmer, Yale School of Medicine; Jeffery J. Milroy, Yale School of Medicine; David L. Wyrick, Yale School of Medicine; Katharina Grimm, Yale School of Medicine; Yetsa A. Tsuklì-Wosornu, Yale School of Medicine

Concern about interpersonal violence (IV) in sport is increasing, yet its implications remain poorly understood, particularly among currently
competing college student-athletes (SAs). The objectives of this study were to document the prevalence of IV in college sports; examine potential consequences with SAs’ psychosocial well-being, emotional connection to their sport, and willingness to seek help; and explore associations between IV reporting and perceived variations in supportive versus abusive coaching styles. This study utilized data from the 2021–2022 National Collegiate Athletic Association (NCAA) myPlaybook survey, which was administered to SAs from 123 colleges and universities across the United States. A total of 4,119 SAs completed the survey (response rate: 21.2%; mean[SD] age 19.3[1.5] years; 43.7% female). One in 10 (9.8%) reported experiencing at least one type of IV during their college sports career. Multivariable analyses revealed that female gender (OR[95%CI]: 2.14 [1.46–3.13]), non-heterosexual sexual orientation (1.56 [1.01–2.42]), increasing age (each year: 1.13 [1.01–1.30]), and increasing year of NCAA eligibility (each year: 1.19 [1.02–1.39]) were independently associated with IV. When exposed to IV, SAs reported experiencing worse psychosocial outcomes, including increased burnout and an expressed desire to quit sports. In risk-adjusted linear regression models, having a more supportive coach reduced reports of IV by up to 7.4 (95% CI: 6.4–8.4) absolute percentage-points. In contrast, having a more abusive coach was associated with a total of 15.4 (95% CI: 13.8–17.1) absolute percentage point increase in participants’ probability of reporting experiencing IV. Results of this survey suggest that IV is associated with marked changes in the psychosocial health and emotional well-being of SAs, particularly those who identify as female and non-heterosexual. Ultimately, ongoing efforts are needed to leverage the unique position that coaches hold to help prevent IV and create safe places where all college student-athletes can thrive.

**Safe guarding in university sport: An analysis of Canadian safe sport policies**

Gretchen Kerr, University of Toronto; Joseph Gurgis, Ontario Tech University

Growing awareness of the occurrence of athlete maltreatment in sport has prompted governing sport bodies worldwide to implement protective measures focused on education, policies, and reporting mechanisms for the purpose of safeguarding athletes from harms. In 2019, Canada introduced the Universal Code of Conduct to Prevent and Address Maltreatment in Sport (UCCMS), a crucial step in fostering an environment free of abuse and neglect for participants in federally funded sport organizations. Although national sport organizations are mandated to adopt the UCCMS, other organized sport sectors, such as universities, are not required to adopt this Code. Without mandatory implementation of the UCCMS in universities, safeguarding of student-athletes and the provision of safe, confidential, and independent reporting mechanisms may not be assured. Thus, the purpose of this study was to examine the policies of intercollegiate athletic departments across Canadian universities to assess whether the UCCMS has been adopted and/or whether their existing polices align with the UCCMS. An in-depth policy document analysis was employed to examine the intercollegiate sport policies of 48 universities across Canada. Most existing intercollegiate athletics policies were not in compliance with the UCCMS and did not include information about prohibited conduct or about reporting, investigation, and adjudication processes. The information was difficult to access and, in most cases, did not include identification of an independent, third-party reporting process, thus leaving concerned athletes without options apart from reporting to the athletic department itself. The findings highlight concerns about sufficient protective measures for safeguarding athletes within these academic institutions. Further, there is a pressing need for a comprehensive and standardized approach to embed principles of the Universal Code of Conduct to Prevent and Address Maltreatment in Sport, and Safe Sport more broadly, within intercollegiate sport policies.

**Parent’s expectations of youth sport coaches in USA and Canada**

Kat V. Adams, Utah State University; Travis E. Dorsch, Utah State University; Jordan A. Blazo, Louisiana Tech University; Tom Farrey, The Aspen Institute Project Play; Jennifer Brown Lerner, The Aspen Institute Project Play; Jon Solomon, The Aspen Institute Project Play

Coaches, like parents, are a critical relationship for youth athletes, and the expectations of both can influence athletes’ participation and competition experiences (Blom et al., 2013, Dorsch et al., 2022). Recent heightened concern over youth athlete welfare and safety has led to higher expectations of professional responsibility among youth sport coaches. Unfortunately, this responsibility has not been met with an equal emphasis on providing education and resources for the many hundreds of thousands of (largely volunteer) youth sport coaches in North America. Given this environment, the current project was designed to understand the expectations youth sport parents have for their children’s primary youth sport coaches. Participant data were derived from a bi-national, representative sample of youth sport parents from the United States and Canada (N=2055, Mage = 37.97, SDage = 10.34) in Fall 2022. Parents reported significantly higher trust in coaches (when compared to teachers, peers, schools, sport organizations, and community, state, and national governments) to create a safe and inclusive environment, to help their children develop life skills, develop a sense of belonging, develop and pursue goals, identify and cope with off-field stressors, learn from mistakes, work together toward a common goal, have fun, and earn a college scholarship. Furthermore, parents were highly confident in coaches’ abilities to teach and demonstrate the physical, social, mental, and emotional skills that are understood to be developed in sport. These findings highlight both the high expectations parents place on youth sport coaches as well as the high levels of trust they have in their children’s coaches. Because parents view coaches as uniquely positioned to support the development of their children, coaches should be provided the education and resources to meet these high expectations, and children should be protected from coach malfeasance with policies analogous to other critical and developmentally salient relationships (e.g., caretakers, teachers, etc.).

**SEP Symposium 2: Emotions, Emotion Regulation, and Mental Health in Sport and Performance Settings: Directions for Researchers and Practitioners**

Emotions, emotion regulation, and mental health in sport and performance settings: Directions for researchers and practitioners

Morgan J Milne, University of Birmingham; Katherine A Tamminen, University of Toronto

In performance settings such as sport and dance, emotional experiences can contribute to outcomes such as performance satisfaction, as well as mental health and wellbeing. Research demonstrates a relationship between emotions, emotion regulation, and mental health (Aldao., 2013; Webb et al., 2012); as such, it is important that athletes and dancers are able to adaptively regulate the emotions they experience including when and how they experience and express their emotions (Gross, 2015). This symposium will present current perspectives and empirical research on the relationships between these processes and provide future direction and implications for researchers and applied practitioners working in the fields of sport and dance. The first presentation (Sabiston & Lucibello, 2024) will present findings from a four-year study examining body self-conscious emotions, mental health, and sport dropout among women athletes. The second presentation (Bird et al., 2024) will then discuss how emotion regulation strategies predict stability or change in student-athletes’ mental health over an academic year. The third presenter (Tamminen et al., 2024) will expand on the importance of emotion regulation and mental health by...
presenting findings on the associations between emotion dysregulation, performance satisfaction, and mental health among competitive athletes. Finally, the fourth presentation (Milne et al., 2024) of a qualitative study among dance students considers the use of different emotion regulation strategies and the factors that influence use of these strategies. Taken together, this symposium will provide meaningful directions for future research and practice that will contribute to the advancement of emotion regulation and mental health in performance settings of sport and dance.

Body-related self-conscious emotions and mental health among women athletes who continue or drop out of sport: A longitudinal study

Catherine M Sabiston, University of Toronto; Kristen M Lucibello, Brock University

Theoretical links between self-conscious emotions (shame, guilt, envy, embarrassment, authentic and hubristic pride) and mental health are known. Furthermore, self-conscious emotions contextualized to the body are stronger correlates of mental health outcomes compared to general emotions. Body-related self-conscious emotions (BSCE) get worse among youth women athletes, yet the longer-term mental health impacts of BSCE are unknown. This study explored the association between BCSE and mental health outcomes (depressive symptoms, life satisfaction, self-esteem) among young women athletes who have continued or dropped out of sport. Women athletes (N = 123) completed self-report surveys capturing BSCE annually for 4 years (M_age = 14–18 years) and a follow-up survey including BCSE and mental health 4 years later (M_age = 22 years). Preliminary analyses explored sport dropout status on study variables. Controlling for sport drop out status, main regression models tested BSCE as predictors of mental health outcomes. Most (72%) had dropped out of sport at follow up. Sport dropouts reported significantly higher shame and depression symptom scores and lower authentic pride, life satisfaction, and self-esteem. Regardless of drop out status, shame, guilt, and hubristic pride emotions got significantly worse over time. Authentic pride decreased among sport dropouts. Overall, current BSCE were stronger predictors for depression symptoms (guilt, shame, embarrassment, and authentic pride; R² = .11–.26) whereas adolescent-level emotions of guilt, shame, and embarrassment were significant predictors of life satisfaction (R² = .08–.12) and self-esteem (R² = .17–.19). Overall, these findings highlight the potential long-term effects of negative BSCE and provide further evidence that sport-specific intervention programs addressing these emotions during adolescence are needed.

Do emotion regulation strategies explain stability in student-athletes’ mental health profiles over an academic year?

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

Athletes use emotion regulation strategies to regulate sport emotions (Lane et al., 2011) and emotion regulation is related to their mental health outcomes (Bird et al., 2021). Little is known, however, about how emotion regulation strategies relate to UK student-athletes mental health as understood by Keyes’ (2002) dual-continua model of mental health. Adopting a person-centred approach, the present study explored the longitudinal stability of student-athletes complete mental health and explored whether emotion regulation strategies were a mechanism for change or stability in profile membership. 382 student-athletes completed questionnaires (M_age = 19.7, SD = 1.23). Cognitive reappraisal and expressive suppression were explored using the Emotion Regulation Questionnaire, validated for use with athletes (Gross & John, 2003; Uphill et al., 2012). Preliminary evidence suggests student-athletes experience changes in mental health profile membership and that emotion regulation strategies explain these changes. Reappraisal was used more (M = 4.64, SD = .89) than suppression (M = 3.90, SD = 1.17). Further, reappraisal was related to decreased depression (r = –.21, p < .001) and increased well-being (r = .22, p < .001), whilst suppression was significantly related to increased depression (r = .21, p < .001) but not well-being (r = –.006, p = .907). These findings have important implications for intervention by highlighting that emotion regulation strategies are involved in student-athletes mental health across the academic year and that strategies that relate to mental illness do not necessarily relate to well-being, highlighting the importance of considering complete mental health in emotion regulation research. It would be beneficial for athletes to improve their overall mental health and emotion regulation strategies may be a mechanism for doing so.

Emotion dysregulation and performance concerns are associated with symptoms of depression and anxiety among competitive athletes

Katherine A Tamminen, University of Toronto; Devin Bonk, University of Toronto; Jeanne Watson, University of Toronto

Emotion dysregulation is defined as “a state of decreased emotional awareness that leads to difficulties in emotional expression, rigidity, and inadequate responses” (D’Agostino et al., 2016). Mood and anxiety disorders such as depression and anxiety are thought to be related to difficulties regulating emotions, and these disorders may be maintained or perpetuated when individuals cannot effectively manage their emotional responses to stressors and challenges (Aldao et al., 2010; Cisler et al., 2010). There is some initial evidence that difficulties in emotion regulation are positively associated with depression, anxiety, and stress among university student-athletes (Drach, 2021); however, research on emotion dysregulation in sport contexts is limited. Therefore, the purpose of the current study was to examine the associations between emotion dysregulation, sport performance concerns, and symptoms of depression and anxiety among competitive athletes. We hypothesized that: H1) emotion dysregulation and H2) sport performance concerns would be positively associated with symptoms of depression and anxiety; and H3) performance concerns would moderate the association between emotion dysregulation and symptoms of depression and anxiety. Competitive athletes (N = 272) completed online measures of emotion dysregulation, sport performance satisfaction, and symptoms of depression and anxiety. Emotion dysregulation was directly positively associated with symptoms of depression and anxiety, supporting H1. Sport performance concerns were also positively directly associated with symptoms of depression and anxiety, supporting H2. The strength or magnitude of the association between emotion dysregulation and mental health symptoms was not reliably moderated by sport performance concerns; thus, H3 was not supported. The results suggest that emotion dysregulation is linked to mental health symptoms and may be a useful target for intervention among competitive athletes.

Investigating the influences around using emotion regulation in vocational dance students

Morgan J Milne, University of Birmingham; Sarah E Williams, University of Birmingham; Mary Quinton, University of Birmingham

Students in specialised vocational dance training often experience intense emotions due to the demands they face. These emotions can impair performance and lead to mental ill-health if not regulated through implementing adaptive emotion regulation strategies (Robazza & Ruiz, 2018). However, choosing what strategy to use to regulate emotions can be influenced by many factors (Matthews et al., 2021). Little is known about emotion regulation in vocational dance. Using an interpretive description (Thorne, 2016) qualitative approach, this study aimed to understand the experiences of vocational dance students’ use of emotion regulation.
A research world café with student services administrators in high school sport

Jedediah E. Blanton, University of Tennessee; Scott Pierce, Illinois State University; Rachel E. Williams, University of Tennessee; Kylee J. Ault-Baker, The Ohio State University; Kayleigh Hart, University of Tennessee

A research world café is described as an (un)method to strategically but creatively foster innovation and depth around phenomena with researchers and community partners (Monforte et al., 2023). This study used a world café approach to gather administrators’ motivations, opportunities, and challenges for supporting youth leadership and psychosocial development through education-based athletics. By design, this approach to co-production and collaboration does not follow a strict protocol but adheres to a set of consistent elements including small groups and key questions to inspire discussions during rounds of the café. Of the 18 participants, 15 were staff members who represented “student services” operations at national or state high school sport association offices, and three were research collaborators. This world café was conducted during a professional development meeting, involving 75-minutes of discussions where participants rotated in small clusters to share, build, and cross-pollinate ideas. In the café, participants revealed the “why” behind their work, identifying personal reasons and passions for supporting youth leadership and life skills development. Administrators also reflected on their sense of responsibility toward aspirations of education-based athletics (i.e., to develop life skills and productive citizens), and explored the need to find innovative ways to allocate time in their professional worlds to directly, and indirectly, support high school athletes. Collectively, participants wrestled with the difficulty of, and established ideas for, effectively measuring outcomes of leadership and life skills development through education-based athletics. This presentation will discuss the central tenets of the research world café and share insights around advancing efforts toward developmental high school sport experiences. As well, researchers will share reflections on the strengths and limitations of the research world café (un)method to engage in co-production and participatory research practices in high school sport and developmental experiences.

Assessing coach and athletic director responsibility for the social mission of education-based athletics

Kylee J. Ault-Baker, The Ohio State University

Key stakeholders, including coaches and athletic directors, have often been charged with promoting psychosocial development of student-athletes in education-based sport programs (Camiré et al., 2009). Despite a focus on promotion of psychosocial development in the very definition of education-based athletics (Blanton et al., 2021), coach and athletic director perceptions of their responsibility for fulfilling this ‘social mission’ of high school sport has not been explored. Therefore, the purpose of this study was to assess coach and athletic director perceptions of their responsibility to promote psychosocial development through education-based athletics. This study used a sequential explanatory mixed-methods design with stratified sampling of 191 coaches and 112 athletic directors in collaboration with a high school state association. Responsibility was measured using the Job Diagnostic Survey (Hackman & Oldham, 1975) and follow-up focus group interviews were conducted (Creswell & Plano-Clark, 2018). MANOVA results indicate a significant difference between responsibility levels of coaches and athletic directors (F[2, 300] = 38.42, p < .001; Wilk’s Lambda = .796, ηp2 = .20). Univariate comparisons revealed coaches had significantly higher responsibility for the social mission than athletic directors (Mdiff = .264, p = .002). Additionally, no difference was found in the level of responsibility for the social mission (M = 5.02) and the athletic success of student-athletes (M = 5.02) for coaches (Mdiff = .003, p = .96). Coaches indicated feelings of perceived

SEP Symposium 3: How Can We Support Psychosocial Development Through Education-Based Athletics? Process and Products From Co-production and Collaborative Research

Symposium discussant: Daniel Gould, Michigan State University

An overview of co-production and collaborative research focused on psychosocial development through education-based athletics

Scott Pierce, Illinois State University; Jedediah E. Blanton, University of Tennessee

The mission of education-based athletics in United States is to offer youth experiential learning of life skills with the aim of developing constructive members of society (Blanton et al., 2021). The purpose of this symposium is to explore processes and products generated through co-production and collaborative research partnerships that support youth leadership and life skills development in education-based athletics. Co-production encourages scholars to integrate citizen’s contributions, focus on knowledge translations efforts, and conduct experientially informed research (Smith et al., 2022). In this symposium, the first presentation will describe a study that used a world café approach to explore sport administrators’ motivations, opportunities, and challenges for supporting youth leadership and psychosocial development. The second presentation will share a mixed-methods study that assessed athletic directors’ and coaches’ perceptions of their responsibility to promote psychosocial development. The third presentation will review a co-production process between athletic directors, coaches, and scholars to create a gamified coach development curriculum for high school sport coaches along with evaluation data. The fourth presentation will describe a youth-adult partnership that created online leadership development programming for student-athletes across the United States, and present evaluation outcomes from the partnership. These experiences emanate from close productive relationships with state and national high school athletic associations, highlighting partnerships and collaborations focused on the developmental potential in education-based athletics. From these presentations, attendees will glean novel and creative activities to advance research and community-engaged, co-production efforts. Following the presentations of these unique projects and partnerships, two discussants with decades of experience as scholar-practitioners will facilitate a reaction and generate conversation around applying and extending efforts to advance sport partnerships.
Coaching Beyond: Co-creating gamified coach education programming with high school athletic administrators

Samantha Bates, The Ohio State University; Kylee J. Ault-Baker, The Ohio State University

Coach Beyond is a program developed by the LiFEsports Initiative at The Ohio State University in partnership with the Ohio High School Athletic Association. The program equips coaches with knowledge, skills, and tools centered around psychosocial aspects of sport to coach “beyond the X’s and O’s.” To provide quality programming, a team of athletic directors and coaches (n = 31) was selected to co-create program content with expert scholars (n = 9) to support community-engaged instruction activities (Doberneck et al., 2010). This ‘State Team’ of ADs and coaches represent 17 school districts throughout the state of Ohio. Specifically, the State Team collaborates with the Coach Beyond faculty and staff to ensure all content is accessible and meaningful for sport coaches in their district and across the state, aligning with Paquette and Trudel’s (2018) recommendations. Literature suggests that coaches often have positive perceptions of coach education that centers around interaction and reflection (Ciampolini et al., 2019), thus a gamified approach is used in all Coach Beyond curriculum. During the establishment of Coach Beyond, the State Team served three primary roles: 1) co-creating a needs assessment to determine content interests in the state, 2) piloting session activities and providing feedback, and 3) ensuring session content is meaningful for coaches and less academic. Currently, six unique Coach Beyond sessions have been co-created with the team of ADs and coaches and has reached over 13,500 coaches. In addition to supporting curriculum design, the State Team supports the facilitation of Coach Beyond programming in their districts, share Coach Beyond resources with their peers and administrator networks, and participate in evaluation of the program. This presentation will further highlight the establishment of the Coach Beyond State Team and co-creation process of the gamified curriculum, as well as share relevant evaluation data. Presenters will also highlight possible opportunities and challenges for those pursuing community-engaged scholarship practices.

A youth-adult partnership to develop and deliver educational programming for student-athlete leadership

Scott Pierce, Illinois State University; Kylee J. Ault-Baker, The Ohio State University; Jedediah E. Blanton, University of Tennessee

Youth-adult partnerships (Y-AP) involve citizens across generations working together to address common concerns (Zeldin et al., 2012), and a goal-oriented focus on shared leading and learning (Camino, 2000). For scholars and practitioners seeking to support the mission of educational athletics, Y-APs provide unique opportunities to empower young people to share their voice and become actively involved in shaping their youth sport experience. The purpose of this presentation is to describe a Y-AP that created online leadership development courses for student-athletes across the United States, and present evaluation outcomes from the partnership. A Y-AP was developed between student-athlete advisory committees from three high school state associations (n = 35 students) and three scholar-practitioners working with the National Federation of High School State Associations (NFHS). The scholar-practitioners identified evidence-based frameworks for youth leadership development through sport. Student-athletes transformed the scientific content into personal leadership examples and testimonials and translated terms and concepts to be used in the course to best support youth understanding and action. The NFHS provided technical expertise and a platform to build and share the educational program. This process resulted in the co-creation of two online courses, “Becoming a Leader” and “Leading Others” that are openly accessible nationwide via the NFHS. Following the Y-AP, student partners reflected on their contributions and experiences as creating a sense of empowerment, pride, and enhanced confidence as leaders. Evidence from over 4000 participants who have completed both student programs has found initial ratings of excellence (P1 = 3.93/5; P2 = 4.30/5). Furthermore, the Leadership Life Skills Development Survey (LLSDS; Seevers et al., 1995) has revealed that participants believe the programs have contributed to gaining leadership life skills, including communication skills (2.49/3), management skills (2.48/3), and skills for working in groups (2.48/3).
Motor Development Abstracts

Predicting future physical military readiness using youth motor competence and fitness growth curve trajectories

Ozgur Alintas, University of South Carolina; Giovanna E. Leone, University of South Carolina; Michael Ertel, University of South Carolina; Ali Brian, University of South Carolina; Bryan Terlizzi, Limestone University; T. Cade Abrams, Booz Allen Hamilton; Ryan S. Sacko, The Citadel; Nestor Hiknet, University of South Carolina; Jason A. Porter, Joint Special Operations Command; David F. Stodden, University of South Carolina

Concurrent secular declines in motor competence (MC) and physical fitness (PF) among U.S. youth have contributed to a national security crisis due to the alarming number of young adults unable to demonstrate adequate PF levels to qualify for Army service. Previous research reveals strong associations among MC levels, PF, and Army fitness test performance/failure rates in adults. As MC levels track across youth, a continued decline in youth MC levels may further exacerbate recruitment issues and physical military readiness. This study aimed to apply growth curve modeling coefficients of youth longitudinal MC data to predict future recruitment age PF and potential Army fitness test performance. An initial sample of children (N = 262, female = 135, M_age = 8.8 years) completed MC (standing long jump distance, throw speed, & kick speed) and PF (grip strength & push-ups) assessments across 3 years. Using linear regression, tracking coefficients were calculated for MC and PF measures to predict MC and PF levels at age 14 (β = .44 to 1.01) via growth curve modeling. We further extrapolated MC and PF levels to military recruitment age (17 years) by applying longitudinal tracking coefficients for the same MC and PF variables from a different longitudinal data set (ages 15 to 18 years – β = .34 to .68). Predicted MC and PF levels (to 17 years) were compared to MC and PF levels from a current sample of young adults in a pre-military setting (N = 306, M_age = 19.55) to calculate the initial sample’s predicted percentiles. The extrapolated growth curves revealed that 80% of females and 63% of males are predicted to be in the lowest 25th percentile of MC and PF at age 17 years. Previous research demonstrates that approximately 75% of individuals at or below the 25th percentile of MC are predicted to fail the current Army fitness test at age 17 (Terlizzi et al., 2022). Consequently, this innovative predictive growth curve modeling application highlights the potential significance of developing MC as a critical antecedent for future physical military readiness.

Supine-to-stand and go: Examining the feasibility of combining supine-to-stand and 10-m shuttle run as a functional motor competence assessment

Ozgur Alintas, University of South Carolina; Giovanna Leone, University of South Carolina; Michael Ertel, University of South Carolina; Bryan Terlizzi, Limestone University; Cade Abrams, Booz Allen Hamilton; Ryan Sacko, The Citadel; David F. Stodden, University of South Carolina

There is a need for Motor Competence (MC) assessments that are feasible, ecologically valid, and sensitive to change across the lifespan. The supine-to-stand (STS) task was combined with a 10-m shuttle run to create a composite measure of gross motor coordination, locomotor speed, and agility (STS-GO), which are essential functional capabilities used across the lifespan. This study examined associations between various performance aspects of the STS-GO (STS time, 10-m shuttle time, and maximum gait speed) to determine its practical utility as a complex, yet feasible assessment of MC. A secondary purpose was to examine associations of the STS-GO task to other established MC assessments. A sample of young adults (N = 110, females = 28, M_age = 22.4 years) completed the STS-GO (2 trials), maximum standing long jump distance (5 trials), and hopping speed (maximum of left & right – 2 trials). STS-GO was digitally recorded and individual components including STS time (sec), 10-m shuttle time (sec), and maximum gait speed (m/s) during the test were analyzed using Dartfish software. Pearson correlations demonstrated moderate associations between STS and 10-m shuttle time components of the STS-GO (males r = .57, females r = .52, p < .001). Results also demonstrated strong correlations between overall STS-GO time with STS time (males r = .66, females r = .76, p < .001), 10-m shuttle time (males r = .83, females r = .87, p < .001), and maximum gait speed (males r = .69, females r = .84, p < .001). Lastly, STS-GO time showed moderate correlations with maximum standing long jump distance and hopping speed in males (r = .53 to .56, p < .001) and females (r = .59 to .62, p < .001). Individual STS-GO performance aspects significantly correlate with overall STS-GO time and demonstrate the capability of STS-GO to assess multiple aspects of MC in one assessment, increasing the feasibility for large-scale MC assessment. Assessing STS-GO in children, adolescents, and older adults is warranted to establish developmental validity across the lifespan.

Otteroo usage has mixed effects on infant motor, cognitive, and social development

David I. Anderson, San Francisco State University; Kate Hamel, San Francisco State University; Minxuan He, Mount St. Mary’s University; Adam Pemnell, Pepperdine University; Marianne Barbu-Roth, Université Paris, Cité

In a previous retrospective study, we found that infants who had accumulated a greater duration of aquatic experience with a neck flotation device (an Otteroo) acquired a range of motor and communication milestones at earlier ages (r values ranged from −.18 to −.32). In the current study, we tracked the Otteroo usage of 98 infants from two to six months of age and assessed their developmental status using the Ages & Stages Questionnaire-3 (ASQ-3) at two (n = 82), four (n = 77), six (n = 63), eight (n = 55), and 12 (n = 53) months of age. Caregivers tracked their infant’s Otteroo usage bi-weekly via an online questionnaire and completed the ASQ-3 online. The majority of the sample identified as white (75%), not of Hispanic, Latino, or Spanish origin (88%), and middle to upper class (95%). The total number of times infants used the Otteroo ranged from zero to 86 (M = 20.9) and the total duration of time in the Otteroo ranged from zero to 2,115 (M = 327.3) minutes. Most infants used the Otteroo in a standard bathtub. Preliminary analyses of the relation between the total duration of Otteroo use and the subscale and summed scores of the ASQ-3 at four, six, eight, and 12 months of age revealed small and insignificant correlations. However, we did observe significant correlations between the total duration of time in the Otteroo and the change in gross motor, personal-social, and total scores on the ASQ-3 between four and six months of age. Follow up simple linear regression models found that total duration of Otteroo use significantly predicted an improvement in gross motor (R² = .09, F[1,52] = 5.3, p = .03), personal-social (R² = .10,


\[ F[1,52] = 6.0, p = .02, \text{ and total } (R^2 = .11, F[1,52] = 6.4, p = .01) \] ASQ-3 scores during this period. We discuss these findings relative to the limitations of the ASQ-3 for detecting accelerated infant development and the need to assess whether Otteroo usage might facilitate motor and psychological development in infants with disabilities or at risk for developmental delay.

Are sport-based positive youth development programs fundamental to fundamental motor skills?

Samantha Bates, The Ohio State University; Dawn Anderon-Butcher, The Ohio State University; Sydney Mack, The Ohio State University; Dimetri Brandon, University of Tennessee Knoxville; Obidiah Akinson, SUNY-Corland; Kethan Mokadam, The Ohio State University; Jacqueline D. Goodway, The Ohio State University; Kylee Ault-Baker, The Ohio State University; Emily Nothnagle, The Ohio State University

Fundamental motor skills (FMS) competency has been positively associated with increased physical activity levels, sport skill development, and improved social and psychological well-being for youth (Barnett et al., 2016; Goodway & Robinson, 2015). Despite past research suggesting that sport-based positive youth development programs (SBPYD) can act as a potential setting for the promotion of FMS in youth (Logan et al., 2011; Weiss, 2020), there is a dearth of knowledge on FMS development in this context. Thus, this study examined the influence of the LiFEsports program on the development of FMS competency among youth participants. LiFEsports is a nationally recognized SBPYD program, which teaches over 900 youth from socially vulnerable circumstances, life and leadership skills through a variety of sport-based opportunities across the year. During the 4-week summer camp, LiFEsports coaches intentionally taught social and sport skills in nine different sports. To examine FMS competency among participants (N = 90; 62% Male, 8–12 years of age), the Test of Gross Motor Development-3rd edition (TGMD-3) object control subscale was used pre and post camp. The object control subscale consists of 3–5 performance criteria for seven different skills (dribble, catch, kick, overhand throw, underhand throw, two-handed strike, and one-handed strike). Baseline data showed camp participants were significantly developmentally delayed (M = 1.7 years delayed). Pilot data and initial analyses indicated improvements in object control skills from pre to post camp, providing additional data to support the value of LiFEsports for improving sport competencies. This study extended previous literature that reinforces the critical role that SBPYD programs can have on the development of FMS competency among youth. Connections between the LiFEsports curriculum and results are provided with recommendations for future research and practical implications.

Evaluation of joint kinematics during reaching in infants with Down syndrome: A comparison of video analysis and computer vision

Matthew Beeser, University of Dayton; Robert Zeid, Georgia State University; Amy Talboy, Emory University School of Medicine; Seyda Ozcaliskan, Georgia State University; Jianhua Wu, Georgia State University

Computer vision technology, such as OpenPose, holds promising potential for the assessment of typical and atypical movement by facilitating the analysis of video data. However, the incorporation of such software has been limited in motor development research and there is an absence of comparing its outcomes with traditional video analysis. Therefore, the purpose of this study was to compare the shoulder and elbow joint angles during reaching in infants with Down syndrome (DS) between traditional video analysis and computer-vision pose estimation. Ten infants with DS were videoed at the mean age of 8 months at visit 1 and 10 months at visit 2 while reaching for a toy held in front of them. Reflective markers were placed on the shoulder, elbow, and wrist of the right arm. Noraxon MyoVideo was used to record from the right side for three minutes. A mean of eight (range: 2–16) reaching attempts were identified per video. The same videos were processed separately. Noraxon MyoVideo video analysis registered the shoulder, elbow, and wrist from the reflective markers. OpenPose, a markerless computer vision software, identified 24 body landmarks, including the shoulder, elbow, and wrist, which were used to register the shoulder and elbow joint angles. Peak and mean angular velocity for both joints were determined for each reach. Cross-correlation at zero lag compared the joint angular trajectories between the two software and a two-way mixed effects absolute agreement intraclass correlation coefficient (ICC) compared the velocity variables. Moderate correlation was found for the elbow angle (.649) and strong correlation for the shoulder angle (.801) trajectories. Peak velocity showed poor agreement (elbow = .015; shoulder = .117), while mean velocity showed moderate agreement (elbow = .558; shoulder = .545). These results suggest that tracking and analyzing infant upper-limb joint kinematics is feasible and relatively reliable with the use of computer vision software. However, some caution should be taken when interpreting or comparing peak joint angular velocities.

How do motor impairments help explain the behavioral variability of children with ASD?

Anjana Bhat, University of Delaware; David Tulsky, University of Delaware; Aaron Boulton, University of Delaware

There is a growing body of literature supporting the presence of motor impairments in children with ASD (Bhat et al., 2022:2023). Yet, motor issues are missing from the current ASD definition. It could be argued that motor issues should be included as an ASD specifier to better recognize, assess, and treat autism-related, motor problems from early on in life. The SPARK study dataset (N = ASD = 9,721) was analyzed using Latent Profile Analyses (LPA) to examine the different profiles that emerge by adding the Developmental Coordination Disorder-Questionnaire (DCD-Q, a motor delay measure) data to the diagnostic questionnaires (linked to current diagnostic criteria) such as the Social Communication Questionnaire (SCQ) and the repetitive behavior severity screener called the Repetitive Behaviors Scale – Revised (RBS-R). The robustness of these profiles were further assessed for varying demographics based on sex, age, and parent-reported current levels of cognitive, functional, and language impairments (i.e., current ASD specifiers). Four unique profiles were found of overall performance that were not observed prior to including the DCD-Q (high motor & core skills impaired, low motor & core skills impaired, moderate motor + high core skills impaired, moderate motor + low core skills impaired). These findings will be discussed further during the presentation. These results highlight the unique role played by motor measures in better explaining the sub-phenotypic variability in school-age children with ASD. These findings support the need for tailored motor assessments and interventions to meet the varying motor needs of the autistic population.

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Physical health of children with neurodevelopmental disabilities: Analysis of the national survey of children’s health dataset

Anjana Bhat, University of Delaware; Jungmi Tsai, University of Delaware; Swetha Kathiravan, University of Delaware; Ashwin Mhadeshwar, University of Delaware; Lauren Kroft, University of Delaware; Shannon Mayberry, University of Delaware; Zaguil Zhang, University of Delaware; Benjamin Brewer, University of Delaware; Shannon Robson, University of Delaware; Carissa Baker-Smith, Nemours Children’s Hospital; Freda Patterson, University of Delaware

Children with neurodevelopmental disabilities (NDD) have a variety of challenges affecting their multisystem development. Together, these...
challenges affect children’s functioning/performance at home, in their school and community and contribute to their poor physical health. Negative physical health consequences include low-levels of physical activity, excessive sedentary/screen time, poor sleep patterns, and poor sport/outdoor/community participation (Srinivasan et al., 2014). Poor physical health will eventually lead to greater risk for chronic conditions later in life including cardiovascular disease, diabetes, as well as social isolation/depression (Weir et al., 2021). Hence, it is important to compare the trajectories of physical health in children with and without NDD to provide recommendations for improving children’s overall physical health and well-being. Data from the 2020–2021 National Survey of Children’s Health (NSCH) were used to compare physical health variables between children with ASD (N = 2,500), other developmental disabilities (ADHD, Learning Disorders, Intellectual Disabilities, N = 17,000), and typically developing (TD) children (N = 45,000) between 6 to 17 years of age. Variables analyzed included Likert scale ratings for amount of physical activity, screen time, consistency of bedtime, sleep hour categories, sports participation, as well as outdoor time. Proportion data for various negative and positive health behaviors were compared using odds ratios and chi-square analyses. Children with ASD and other DD showed reduced physical activity/sports participation, had greater screen time, inconsistent bedtimes, and obtained less sleep (p < .001) compared to TD controls. These results convey how altered sleep, activity, sports participation and screen time during the height of the pandemic may have negatively impacted health of NDD children and call for improved policies and greater access to school/community activity programs. Funding source: P20GM103446-23S4.

Who can, should, and usually does: The effects of a motor skill intervention on the object control skill stereotypes of preschoolers

Ali Brian, University of South Carolina; Sally Miedema, University of South Carolina; Alex Stribing, Kean University; Emily Gilbert, SUNY-Cortland; Adam Pennell, Pepperdine University; Jenna Fisher, West Chester University; Matthew Patey, Bridgewater State University; Kelly Lynn Mulvey, North Carolina State University

Despite no anthropometric differences until postpubescence, preschool-aged girls tend to show greater difficulty performing manipulative object control skills than boys of the same age. Preliminary data suggest that holding gender stereotypes relates to object control skill competence in preschoolers. However, it is unclear if motor skill interventions, which historically remediate object control gaps among preschoolers can also reduce stereotyping. Given that childhood object control skills are predictive of health-enhancing physical activity behaviors later in life, it is important to reduce this stark health disparity. The purpose of this study was to examine the influence of a gross motor skill intervention on the held stereotypes of preschoolers regarding object control skills. Boys (n = 46) and girls (n = 47) completed the Test of Gross Motor Development – 2 and a modified Children’s Occupation, Activities, and Traits Measure. All children (N = 93, M_age = 46.30 ± 6.19 months) participated in either the Successful Kinesthetic Instruction for Preschoolers (SKIP) intervention (n = 56) or a comparison condition of free play/recess (n = 37). Four repeated measures ANOVAs examined object control skills or children’s awareness, flexibility, or endorsement of object control skills by sex. At baseline, there were no significant differences by sex or condition (p > .05). Setting alpha a priori at .10, there were significant main effects for time and a time x condition interaction for object control skills, flexibility, and endorsement (p = .001 – .07; h² = .04 – .49) but not awareness (p > .10), demonstrating that children in the SKIP condition were more inclusive in their thinking about who can and should engage in object control skills at posttest. There were no differences among sex (p > .10). Further research is needed to better understand the interaction and influence of object control skills on held stereotypes in pre-school children (e.g., longitudinal motor interventions aimed at reducing stereotypes).

Early childhood teachers’ use of time during a motor skill intervention explains variance in changes with perceived and actual motor skill competence

Ali Brian, University of South Carolina; Emily Mann, University of South Carolina; Jacqueline D. Goodway, The Ohio State University

Most early childhood education policies mandate 30–90 minutes of daily recess/unstructured movement time. Regardless, many children demonstrate gross motor developmental delays warranting the need for structured movement/motor skill interventions. Little is known regarding how classroom teachers utilize their allocated time when trained to implement gross motor intervention. The purpose of this study was to examine the use of teacher’s time while implementing a motor skill intervention to explain the variance in changes in children’s object control (OC), locomotor (LOC), and perceived motor skill competence (PMSC). Five classroom teachers with 5–10 years of experience (4 female, 1 male) were trained to implement the Successful Kinesthetic Instruction for Preschoolers program to their students (N = 63, 41 girls, 22 boys; M = 4.66, SD = .67 years) for nine-weeks at Urban Head Start centers. Research staff calculated fidelity, teachers’ time on task, and instructional time from the allocated 60 minutes per week. Children completed the TGMD-2 and the Pictorial Scale for Perceived Movement Skill Competence at baseline and post-intervention. Three hierarchical linear models explained the variance with level 1 changes in LOC, OC, TGMD, or PMSC when nested into class (level 2). Only 4.7% of the variance in OC change is explained by the teacher, with fidelity being significant (p = .03; η² = .07). Although 7% of the variance in LOC change was explained by the teacher, the null was the best-fit model. For the TGMD, fidelity was significant (p < .01; η² = .17) with 15% of variance explained by the teacher. For PMSC, both time on task (p = .04, η² = .06) and fidelity (p = .03, η² = .05) were significant, and 25% of the variance was attributed to the teacher. Policy can continue to dictate allocated minutes for recess, physical education, and structured movement. However, these data support accountability measures to be put into place as how the teacher uses their mandated minutes influences children’s perceived and actual motor competence.

Movement differences between healthy and anterior cruciate ligament reconstruction individuals using a bilateral coordination task

Andrew Brizzell, Texas Christian University; Channing Burney, Texas Christian University; Caleb Voskuil, Texas Christian University; Morteza Farivar, Texas Christian University; Kuaning Chen, Texas Christian University; Joshua C. Carr, Texas Christian University; Adam C. King, Texas Christian University

Given the high rate of anterior cruciate ligament reconstruction (ACLR) surgeries, it is important to understand how movement kinematics may be affected post-operatively and post-rehabilitation. Individuals who have undergone ACLR have previously exhibited altered kinematics whilst performing movement tasks; however, any relationship amongst limb movement velocity during coordination tasks and history of ACLR has yet to be explored thoroughly. This study aimed to explore how limb velocity differed between healthy controls and ACLR individuals using a novel bilateral lower extremity coordination task. Twelve participants with no history of ACLR comprised the control group, and 12 participants with ACLR history comprised the experimental group. Participants performed alternating knee flexion/extension movements continuously for 30 seconds.
under four conditions that included: internally paced slow, internally paced fast, slow (60 bpm) metronome paced, and fast (90 bpm) metronome paced. Kinematic data of ankle endpoints were recorded and used to compute resultant velocity trajectories within each trial and condition for both lower extremities. Mean and standard deviation of the resultant velocity for injured/dominant and non-injured/non-dominant limbs were computed and analyzed between groups, pacing, and tempo factors. Bilaterally, self-paced compared to metronome-paced movements, and fast-paced compared to slow-paced movements, showed significantly higher mean resultant velocities across both groups ($p<.001$). ACLR participants exhibited significantly higher mean velocities on their injured limb compared to the healthy group’s dominant limb ($p<.001$). ACLR individuals also exhibited greater standard deviation of the resultant velocity, across both limbs, than healthy controls ($p<.001$ injured/dominant; $p=.007$ non-injured/non-dominant). These results suggest individuals who have undergone ACLR may exhibit decreased motor control in both their injured and non-injured limbs, however the mechanism behind this phenomenon requires further investigation.

**Motor skills in children with developmental disabilities following a physical activity program**

Pamela Bryden, Wilfrid Laurier University; Nicole Laymes, Wilfrid Laurier University; Lauren Moorcroft, Wilfrid Laurier University

Individuals with developmental disabilities can fall behind their peers in fundamental motor skill development (Columbo-Dougovito, 2019), academic work, activities of daily living (Champers, 2016), aerobic capacity, musculoskeletal functioning (Collins & Staples, 2017) and social functioning (Pan et al., 2009). A focus on improving fundamental motor skills helps physical development and improves the quality of life by strengthening communication skills, socialization levels, and the ability to perform daily living tasks (MacDonald & McIntyre, 2019). For several years, we have offered a physical activity program for individuals between the ages of 7–12 years with a developmental disability, which is aimed at developing fundamental motor skills (FMS). Participants ($N=5$ children, $80\%$ male; $M_{age}=10.5$ years) were recruited from the physical activity (PA) program. Children completed two rounds of motor testing using the TGMD-3 (Ulrich, 2019). The first round of motor testing was completed following an 8-week session of the PA program, while the second round was completed after a 5-week washout period during which point the participants did not engage in PA. Overall, it was found that participants who were observed to experience anxiety during the first testing session scored higher on the second testing session. The participants who were not observed to experience anxiety had a decrease in scores in the second testing session, which was as expected. Based on parent and participant anecdotes, it was clear that the program had a significant positive impact on children’s lives, in terms of FMS development, practicing social skills, independence, and increased self-confidence. External factors had an impact on testing performance, which is particularly important to recognize for children with developmental disabilities. Future research will aim to consider external factors including pre-test anxiety and parental presence. Funding source: NSERC.

**Motor and language development are highly related in infants with Down Syndrome**

Madelyn Burton, Georgia State University; Noa Levy, Georgia State University; Mayra Ramirez Rubio, Georgia State University; Robert Zeid, Georgia State University; Amy Talbey, Emory University; Jianhua Wu, Georgia State University; Gena Priest, Georgia State University

Down syndrome (DS) is the most common genetic condition causing significant developmental delays in the motor, cognitive, and language domains. Motor development is closely associated with cognitive and language development in typically developing (TD) infants and advances in motor development have developmental “cascading” effects on other domains. Thus, our objective was to determine the interrelations of early motor intervention on language development in infants with DS. Ten infants with DS ($7M/3F$, mean age $9 \mathrm{mo.}$; $11\mathrm{days}$ at Time 1 and $13 \mathrm{mo.}$; $44\mathrm{days}$ at Time 2) were visited in their homes at 2 separate time points. At each visit, a multi-domain developmental assessment using the Bayley Scales of Motor Development (4th Edition) was conducted. Participants were placed into one of three test groups: control, gross motor training, or gross motor and fine motor training. Preliminary Bayley results from this ongoing study sought to describe the interrelations between gross and fine motor development and language development in infants with DS. A significant strong positive correlation was seen between changes in Language standard scores and changes in Fine Motor scaled scores ($r=.873$, $p=.001$) between the two time points. Additionally, changes in Fine Motor and Gross Motor scaled scores had significant positive correlations with changes in Expressive Communication scaled scores ($r=.790$, $p=.007$ and $r=.723$, $p=.018$ respectively). This demonstrates that improvements in motor skills are strongly associated with improvements in language development. Specifically, advances in both fine and gross motor development are associated with advances in the expressive communication aspect of language. This data demonstrates a clear relationship between the development of motor and language skills in infants with DS. Continuing data collection will allow for exploration of the differing effects of two motor intervention protocols on the acceleration of language development. Funding source: NIH R21 HD105879 (Role of early motor experience in infants with Down Syndrome).

**Nintendo switch exergaming to promote gross motor development and physical activity in children with autism**

Jacob Corey, University of Delaware; Jung-Mei Tsai, University of Delaware; Swetha Kathiravan, University of Delaware; Anjana Bhat, University of Delaware

Autism Spectrum Disorder (ASD) is a multisystem disorder affecting 1 in 36 children that impacts social communication, behavioral, cognitive, and motor abilities. It has been reported that 80% of children with ASD have motor difficulties and engage in less physical activity than peers. Without intervention, these motor difficulties amplify with age, increasing rates of physical inactivity. Recent advancements in low-cost exergaming tools, along with clinicians’ openness to using technology presents an opportunity to leverage children’s interests in technology to deliver gross motor interventions. We aim to evaluate the efficacy of a more readily accessible, newer, low-cost video gaming system, the Nintendo Switch. By targeting endurance/muscular fitness to enhance motor performance in children with ASD. Thirty children with ASD between 8 and 19 years were matched on demographic variables and randomly assigned to the Nintendo Exercise (NE) or Waitlist Control (WL) group. A pediatric physical therapist has administered standardized measures including the Bruininks-Oseretsky Test of Motor Proficiency (BOT), 6-minute walk tests, and game specific measures (i.e., scores, reps, time) during pre/post-testing. The NE group participated twice weekly playing the Nintendo Switch RingFit Adventure game for 1 hour per session for 8 weeks. Preliminary results based on coding of 20 participants suggests high engagement with a mean score of $4.34$ out of $5 \pm 0.23$ on a 5-point likert scale. Game-based data also supported improvements in the NE group for body coordination/strength and aerobic fitness based on improvements of $3559.42 \pm 1471.10$ points in the core crushing game, and time reduction by $31.5 \pm 15.5$ s to complete Transient Temple. This ongoing RCT will add to the evidence on efficacy of digital technology interventions for individuals with ASD. Our study will provide skilled and unskilled clinicians with a training protocol using
Nintendo Switch, a low-cost and highly engaging digital technology. Funding source: T32HD007490 Predoctoral Training in Physical Therapy and Rehabilitation Research (PI:Reisman) and Maggie Neuman Grant (PI: Bhat).

Stakeholder input on feasibility and acceptability of a novel exergaming intervention for individuals with Autism Spectrum Disorder

Jacob Corey, University of Delaware; Swetha Kathiravan, University of Delaware; Hannah Starner, University of Delaware; Jungmei Tsai, University of Delaware; Anjana Bhat, University of Delaware

ASD is a highly prevalent developmental disorder associated with social, cognitive, and motor difficulties that impact an autistic child’s ability to participate in their home, school, and community. It is well documented that children with ASD engage in significantly less physical activity (PA) than their typically developing peers (Srinivasan et al., 2014). Recent advances in videogaming technologies offer the option to use such technologies to promote PA (Corey et al., 2023). We recently examined the effects of a novel exergaming intervention using Nintendo Switch technology to promote PA in individuals with ASD between 8 and 19 years of age (N = 15). This abstract will report the feasibility and acceptability data on the 8-week Nintendo Exergaming (NE) intervention offered to autistic individuals, through surveys obtained from various stakeholders including parent, child, and trainers. Preliminary findings indicated that 46–61% of children perceived the NE intervention as challenging/hard and 92% found it highly enjoyable. 100% of parents found the NE intervention to be extremely beneficial, innovative, and satisfactory and 90% would continue using the intervention, would recommend to others, and seek it in the community, if available. Parents considered the 8-week intervention a value deal at $250-$500. 100% of parents said the intervention benefited their child’s cognitive and motor skills such as executive functioning, coordination, strength, and endurance. Overall, families found the intervention to be a beneficial and low-cost option to promote PA in their child. Our findings offer preliminary evidence for the highly engaging and accessible nature of Nintendo Switch technology to promote PA in children with ASD. Funding source: NIH, Maggie Newmann Health Sciences Fund.

Specialized chair use accelerates standing and stepping motor skills in children with Down syndrome

Jennifer Didier, Sam Houston State University; Jennifer Aguillard, Magic Moments Therapy

A child with Down syndrome (DS) experiences delays in locomotion and is not afforded access to the same experiences walking allows children who walk sooner. This 9-mo. longitudinal study researched if using a specialized chair, with 6 to 9 mos. of physical therapy and home chair practice, would accelerate standing and stepping behavior in children with DS across the USA. The chair promoted proper posture and allowed for thigh contact, feet flat on the floor, and equal, unlocked weight-bearing of lower extremities. The children (N = 13, 9 M, 4 F), started the protocol once they could sit independently (Mage = 20+5.1 mo., range 10.4–26.4 mo.), practicing 5 days a week with their parent, performing < 15 reps each day. Each progressed through the phases including pulling up to stand, reaching and grasping while standing, standing holding the T-bar, and independent standing. The physical therapist assessed the child every 3-mos. using the Gross Motor Functional Measurement (GMFM-88). Repeated measures ANOVA showed significant increases in scores (F[3,10] = 62.08, p < .001, n2 = .949) across time with the total scores increasing from 43.8±10.2 to 73.7±8.7% across the intervention time. Participants progressed from independently sitting, to standing and stepping, to standing independently.

Four participants walked by the 6-mo. test and the other 9 walked near the 9-mo. assessment. The average score from the pre-test fell in the range for mild/moderate impairment; however, after 3 mos. of chair use, participants scored in the mild impairment range (M = 57.9±12.3%) and, after 6 mos. scored closer to their peers without DS (M = 68.9±10.8%). Raw scores showed large, clinically significant gains, compared to MCID values, in the crawling (10pts) and standing (9pts) categories after 3 mos. and crawling (8pts) and walking (9pts) categories from 3 to 6 mos. The final assessment showed the largest gains in the standing (4.2pts) and walking (3.3pts) categories. These values, compared to existing norms, were accelerated for DS and more closely matched their typical peers, after the intervention. Funding source: Sam Houston State University, College of Health Sciences.

Investigating parental perceptions and actual motor skills in children: Exploring the potential interaction of sex

Leesi George-Komi, University of Michigan; Kara K. Palmer, University of Michigan; Stephanie A. Palmer, University of Michigan; Aaron Wood, University of Michigan; Leah E. Robinson, University of Michigan

While some evidence suggests that parental perceptions of a child’s motor skills (MS) are associated with their child’s actual MS, the extent to which this relationship holds across sexes remains less explored. This study aimed to examine associations between parental perceptions of child MS and actual MS, with a focus on the potential interaction effect of the child’s sex. The participants were 48 preschoolers (24 girls; Mage = 52.79 months ± 4.35) from Midwestern Head Start Centers. Parental perceptions were gathered via questionnaires, and children’s MS were assessed using the Test of Gross Motor Development-3. The study utilized linear regression models to examine the association of parental perceptions and children’s sex on different MS domains: locomotor skills, ball skills, and their combined subscale score (total). Results showed that child sex was significantly associated with ball skills (β = 9.00, p < .05) but not total or locomotor skills. However, there were no significant associations between parental perceptions and children’s total, locomotor, or ball skill performance. Furthermore, the interaction effect between a child’s sex and parental perceptions of their MS was not significantly associated with any actual MS. Findings suggest a distinct sex-specific influence on ball skills, yet parental perceptions did not reflect this difference. The absence of a significant association between parental perceptions and specific MS outcomes, despite the notable association between sex and ball skills, suggests a potential gap in how parents recognize or understand sex-specific differences in MS. Future research should aim to better understand this gap in order to develop targeted interventions and educational strategies that enhance parental awareness and involvement, particularly in recognizing and supporting sex-specific motor skill development in children. Funding source: National Institutes of Health Grant NHLBI-1R01HL132979.

Developmental associations of perceived motivational climate in physical education and motor competence in Finnish school children

Timo Jaakkola, University of Jyväskylä; Mikko Huhtinen, University of Jyväskylä; Vassilis Barkoukis, Aristotle University of Thessaloniki; Iiris Kolunsarka, University of Jyväskylä; Arto Grästen, United Arab Emirates University

The study was designed to investigate the developmental associations of perceptions of task (TC) – and ego-involving (EC) motivational climates and motor competence (MC) in Finnish students. The sample consisted of 1130 (girls 575, boys 555) Finnish schoolchildren aged between 10.6 to 12.6 years at baseline (M = 11.26 ± .32 years). Participants completed
Developmental trajectories of motor skill, physical activity, fitness and perceived motor competence predictors of standing long jump in children aged 4–11 years old

Lin-Hsiang Kang, The Ohio State University; Jacqueline D. Goodway, The Ohio State University; David F. Stodden, University of South Carolina; Ali Brian, University of South Carolina; Dimetri Brandon, University of Tennessee Knoxville; Blatze Shiebler, University of Maryland; Chloe Kin, The Ohio State University; Larissa True, New Mexico State University; Rick Ferkel, Central Michigan University; Elianah Cohen, The Ohio State University; Ruri Famelia, The Ohio State University

Standing long jump (SLJ) is a complex skill that is influenced by individual constraints such as explosive power, multi-limb coordination, dynamic balance, leg & abdominal strength. This skill is one of the last fundamental motor skills (FMS) to emerge across childhood. Little is known about the developmental trajectory of the predictors of SLJ. This cross-sectional study examined the extent to which a variety of process & product FMSs, fitness variables, BMI, perceived motor competence (PMC) & MVPA predicted SLJ scaled by a child’s height (%HtLJ) in Early Childhood (EC, 4–5 yrs, n = 115), Middle Childhood (MC, 7–8 yrs, n = 124) & Later Childhood (LC, 10–11 yrs, n = 126) for White, Hispanic, & Black boys & girls. Nine FMS predictors (kick mph, throw mph, run velocity[runV], hop stride length scaled to ht [hop%/h], locomotor standard score [LOCSS], object control SS [from TGMD2], & the developmental sequences [SQ] for jump, throw, & hop), 5 fitness predictors (PACER laps, BMI, BMI%, push up, curl up), PMC [measured via physical/athletic competence subscale] & scaled minutes in MVPA[5 day accelerometry] were entered into 4 regression equations to predict %HtLJ in: a combined age group, and separately for EC, MC & LC to examine the developmental trajectory of predictors. The combined age regression significantly (p < .001) predicted 45.7% of the variance in %HtLJ with significant predictors being ethnicity*, kick mph**, hop%/h*, & push up**. In LC the regression significantly (p < .001) predicted 63.5% of the variance in %HtLJ with significant predictors being ethnicity**, kick mph**, runV**, BMI**, BMI%* & PMC**. These findings suggest there is a developmental trajectory to predictors with implications to FMS interventions for children.

Gait variability in children and adults during treadmill walking with rhythmic auditory stimulation

Haneol Kim, University of Wisconsin-La Crosse; Matt Beerre, University of Dayton; Jianhua Wu, Georgia State University

Healthy children and adults exhibit motor adaptability in response to changing task constraints, ensuring movement consistency and stability. Gait variability (GV) is an objective measurement of motor response and has been employed to study the intrinsic features of gait regulation. Over the past decades, rhythmic auditory stimulation (RAS) has been used as a nonpharmacologic treatment for patients with gait impairments and has shown improvements in gait velocity and stride length resulting in a smoother gait trajectory. Despite growing interest in RAS, implementation in preadolescents is scarce due to limited knowledge on how children regulate GV compared to adults at various RAS frequencies. Therefore, this study aimed to investigate the effect of RAS frequencies on the variability of gait parameters in children and adults while walking on a treadmill at their preferred speed. Twenty young adults (10M/10F; 22.5 ± 3.79) and 20 typically developing children (8M/12F; 8.9 ± 1.61) participated. A 9-camera VICON motion capture system and a ZEBRIS FDM-T instrumented treadmill were used for data collection. Three 5-minute RAS trials were collected at the participant’s preferred treadmill speed: 75%, 100%, and 125% of the cadence at the preferred treadmill speed. The 100% RAS condition was collected first and then the 75% RAS and 125% RAS conditions were presented randomly. The coefficient of variation of normalized stride length and stride time were calculated. Two-way (2 group x 3 frequency) mixed ANOVA was conducted on each variable. Children had greater variability of normalized stride length and time than adults across RAS conditions (p < .001). Both groups showed the least GV for stride length and stride time at 100% RAS and increased the variability with either increasing or decreasing RAS frequencies (p < .001). A greater GV in children indicated that gait development, particularly GV control, continues to mature beyond preadolescence. Increasing or decreasing RAS frequency from the preferred one may increase attentional demand and thus affect gait regulation. Funding source: Provost’s Dissertation Fellowship.

Developmental trajectories in perceived and actual motor competence: Differences by gender and ethnicity/race

Chloe Kin, The Ohio State University; Jacqueline D. Goodway, The Ohio State University; David F. Stodden, University of South Carolina; Ali Brian, University of South Carolina; Dimetri Brandon, University of Tennessee Knoxville; Blatze Shiebler, University of Maryland; Lin-Hsiang Kang, The Ohio State University; Larissa True, New Mexico State University; Rick Ferkel, Central Michigan University; Elianah Cohen, The Ohio State University; Ruri Famelia, The Ohio State University; Sarah Wall, Eastern New Mexico University

Development of fundamental motor skills (FMS) and perceptions of motor competence (PMC) in early childhood are critical for lifelong physical activity (PA). FMS includes locomotor skills and object control skills (OC). PMC reflects the child’s perceptions of his/her FMS. Research has found gender differences in OCs but little research has been performed...
with children from vulnerable communities. This study investigated gender, race/ethnicity, and age differences in the FMS and PMC of children from vulnerable communities (N=408, 209 girls, 199 boys). There were 138 White, 138 Black, and 132 Hispanic children aged 4–5 years (n = 139), 7–8 years (n = 131) and 10–11 years (n = 138). The children’s FMS was evaluated using the Test of Gross Motor Development 2, producing locomotor (LocSS) and object control (OCSS) standard scores. Children’s PMC was evaluated using the physical/athletic competence subscale (Harter & Pike, 1984, or Harter 1982). Three, 3 Age X 2 Gender X 3 Ethnicity/Race ANOVAs were run for LocSS, OCSS, and PMC. LocSS had a significant main effect for Age (p<.001) and a significant interaction effect for Age X Ethnicity X Gender (p<.05). Post hoc analyses showed LocSS significantly dropped in 7–8 year olds compared to 4–5 and 10–11 year olds (p<.001). OCSS had a significant main effect for Age (p<.001). Post hoc analyses showed 7–8 year olds scored significantly lower than 4–5 and 10–11 year olds (p<.001) and 4–5 year olds scored significantly lower than 10–11 year olds (p<.011). PMC had a significant main effect for Age (p<.001) and Ethnicity (p<.05). Post hoc analyses showed 10–11 year olds scored significantly worse than 4–5 and 7–8 year olds (p<.001). It can be concluded that FMS scores dropped in 7–8 year olds yet they perceived themselves to be successful in such skills. This suggests that the early childhood years are a prime period for intervention when PMC is high, yet skills need to be improved. Intervention during this developmental window could increase the likelihood of children from vulnerable communities engaging in PA across childhood and adolescence.

Health-related physical fitness status in Special Olympics Unified Sports: Impact of disability, country income status, and gender

Franziska Loetzner, Wayne State University; E. Andrew Pitchford, Oregon State University; Leah Ketcheson, Wayne State University

More than 6 million people with intellectual and developmental disabilities (IDD) participate in Special Olympics (SO) programming. To promote inclusion, SO offers a Unified Sports program where Athletes withIDD (athletes) and without IDD (partners) train and compete together on the same team. While Unified Sports is a growing initiative, little is known regarding the differences in health and fitness between athletes and partners. The primary objective of this study was to explore health-related physical fitness (HRPF) in SO soccer athletes and their partners who participated in Healthy Athlete Screenings at the 2022 World Unified Cup. Components of HRPF were measured through health screenings and functional fitness tests in the domains of body composition (BC), muscular strength (MS), flexibility and range of motion (FRM), muscular endurance (ME), and cardiorespiratory endurance (CRE). To examine group differences, regressions with one-way ANOVAs were computed along with univariate ANOVAs to examine interactions. Three hundred World University; Lisa K. Kenyon, Grand Valley State University; Mia E. Hoffman, University of Washington; Dinah Schultz, Oregon State University; Heather A. Feldner, University of Washington

The ON Time Mobility framework takes a rights-based approach to mobility. This framework outlines five key principles of mobility, including timing, urgency, multimodal, sociability, and frequency in real-world environments. Regarding frequency, the goal is a high daily dosage of self-initiated mobility grounded in socially rich contexts. Power mobility devices are one strategy for young children with disabilities to engage in self-initiated mobility and may include motorized wheelchairs or similar devices. Power mobility device use patterns are important to examine to understand how families and children are (or are not) integrating power mobility into their daily lives. The purpose of this study was to compare device use patterns (frequency, duration, and location) of the Permobil® Explorer Mini and a modified ride-on car. 24 children 12–36 months with a diagnosis of cerebral palsy (CP) or at-risk of CP participated in this multisite, mixed-methods, doubly counterbalanced, randomized, crossover clinical trial. Children used each device for an eight-week intervention period. Device use was recorded through caregiver diaries. Wilcoxon signed rank tests were calculated to compare use patterns between devices. Bonferroni corrections were used as appropriate. Results indicated significantly higher frequency (# of days with at least one driving session [z = −3.2, p < .025], # of total driving sessions [z = −3.4, p < .025]) and longer duration (average time in minutes per session [z = −3.1 p < .025], total time in minutes across sessions [z = −3.5, p < .025]) for the Explorer Mini compared to the modified ride-on car. There were no significant differences for locations of device use (# of total locations [z = 0.3, p > .025], # of rooms in house [z = −0.4, p > .025]). These findings suggest families and children with CP were able to integrate the Explorer Mini into daily life more readily than the modified ride-on car. Future work is needed to understand the dose-response relationship between power mobility device use and developmental outcomes. Funding: AACPDM, NICHD, C-PROGRESS. Funding source: Funding: AACPDM, NICHD, C-PROGRESS.

Should we adopt data papers in the motor control, learning, development community?

Keith Lohse, Washington University School of Medicine in Saint Louis

“Data papers” are peer-reviewed publications whose primary contribution is empirical, not theoretical. The goal of the data paper is to share machine-readable data (stored in an online repository) that is complemented by a human-readable narrative (which is published by the journal). The narrative describes the study design and the dataset for a methodologically valid study, regardless of the statistical-, theoretical-, or practical-significance of the current results (e.g., many studies are soundly designed but lack statistical power, producing uninformative confidence intervals). Although data papers see increasing usage in the natural sciences, biomedicine, and engineering, to date there are no peer-review data paper formats in journals for motor control, learning, or development (MCL/D). The goal of this presentation is to start a community discussion of data papers in MCL/D, gauge authors’ concerns and/or interest in this topic, and give authors the tools to store their data online. In a recent survey from Springer-Nature, 89% of respondents said they wanted to make their data publicly available, but almost three quarters of respondents report no support with planning,
managing, or sharing research data. This presentation will provide accessible information on how to: [1] make research data Findable, Accessible, Interoperable, and Reusable (FAIR); [2] find or create a suitable online repository for research data; [3] obtain a persistent digital object identifier (DOI) to make research data citable, and; [4] create data sharing plans that adhere to federal mandates for data archiving. Information on data sharing will be useful for all authors, while pushing for data papers as a viable format in the field. Funding source: NIH/NICHD-NCMRR R25.

**SKIPping together: A motor competence intervention promotes gender-integrated friendships for young children**

Sally Miedema, University of South Carolina; Kelly Lynn Mulvey, North Carolina State University; Alex Stribing, Kean University; Emily Gilbert, SUNY-Cortland; Ali Brian, University of South Carolina

Gender segregated play is prevalent in early childhood as boys and girls trend with differential play preferences. Emerging evidence supports the benefits of gender-integrated friendships for social emotional development. Yet, little is known regarding the effects of motor skill intervention on gross motor skills and gender-integrated friendships. Participants included children (N = 93; Mage = 70.38, SD = 26.21 mos) randomly assigned to intervention (n = 56) or control (n = 37) conditions. Children completed the TGMD-2 and a gender-integrated survey before and after the 10-week Successful SUNY-Cortland; Ali Brian, University of South Carolina; Kelly Lynn Mulvey, North active, Interoperable, and Reusable (FAIR); [2] accessible information on how to: [1] make research data Findable, Accessible, Interoperable, and Reusable (FAIR); [2] find or create a suitable online repository for research data; [3] obtain a persistent digital object identifier (DOI) to make research data citable, and; [4] create data sharing plans that adhere to federal mandates for data archiving. Information on data sharing will be useful for all authors, while pushing for data papers as a viable format in the field. Funding source: NIH/NICHD-NCMRR R25.

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**Physical activity parenting practices in the family context**

Stephanie Palmer, University of Michigan; Leah Robinson, University of Michigan

Parents’ physical activity parenting practices (PAPP) play an integral role in shaping their children’s physical activity (PA) behaviors. However, the degree to which social and physical environmental factors at home influence parents’ use of PAPP is understudied. This study examined associations among different types of PAPP and parents’ PA attributes (knowledge, competence, skill, behaviors), perceptions of their children’s PA attributes (PA importance for child, child’s PA ability), and the home environment for PA (availability and accessibility of space and equipment). Parents (N = 52; Mage = 39.02 ± 5.54 years; 85% female) from Central and Eastern Michigan completed a questionnaire with validated items from the Determinants of Physical Activity Questionnaire and Godin Leisure Time Physical Activity Questionnaire to assess parents’ PA attributes, Parents’ Perceptions of Physical Activity Importance and their Child’s Ability Questionnaire to assess child PA attributes, the Home Environment Survey to assess parents’ PA attributes, and The Physical Activity Parenting Practices Questionnaire to assess how parents structure, support, and control children’s PA behaviors. Linear regressions examined whether social or physical factors contributed to parents’ use of different PAPP. Parents who reported higher PA importance for their child used autonomy-supportive PAPP significantly more often (p < .05), and those who perceived their child as more competent in PA engaged in controlling PAPP significantly less often (p < .05). PA availability was positively associated with structural (p < .05) and autonomy supportive PAPP (p < .05), while accessibility was negatively related to autonomy-supportive PAPP (p < .05) and negatively trended with structural PAPP (p = .05). No other significant findings emerged. These findings suggest that parent’s structure, support, or control their children’s PA in different ways, depending on their child’s PA attributes and resources for PA at home. Funding: Rackham Graduate School Post-Candidacy Research Award Funding source: Rackham Graduate School Post-Candidacy Research Award.

**Addressing motor competence for autistic children through a health-enhancing community-based program: Outcomes of a longitudinal study**

Samantha Miller, Wayne State University; Franziska Loetzner, Wayne State University; E. Andrew Pitchford, Oregon State University; Leah R. Ketcheson, Wayne State University

There is ample empirical support suggesting that autistic children exhibit significant motor delays. Autistic children also experience greater health disparities, including cardiovascular, metabolic, and mental health conditions, when compared to the general population. Despite this reality, there are relatively few opportunities for autistic children to participate in health-enhancing community-based programming targeting motor competence. One such program, called PLANE (Physical Literacy And Nutrition Education), provides autistic children with the opportunity to acquire and develop fundamental motor skills (FMS: run, gallop, hop, skip, horizontal jump, slide, striking a stationary ball, forward strike, stationary dribble, two hand catch, kick, overhand throw, and underhand toss) while also promoting positive trajectories of health. Twenty-nine autistic children (83% male, Mage = 8.28 ± 3.60) participated in PLANE for one year. Children attended weekly sessions emphasizing the development of FMS, sport sampling, and lifelong physical activity. FMS, health-related physical fitness (HRPF), and health outcomes were collected at four points throughout the yearlong intervention. The Test of Gross Motor Development – 3rd Edition (TGMD-3) was used to measure FMS and the Brockport Physical Fitness Test (BFPT: grip strength, isometric push-up, curl-up, standing long jump, and 20-m PACER) was used in measuring HRPF. Children experienced significant improvements over time in TGMD-3 total scores (p < .001), TGMD-3 ball skills (p < .05), TGMD-3 locomotor skills (p < .001), and grip strength (p < .01). Findings suggest the potential of community-based health promotion programs to improve FMS and some components of HRPF for autistic children. Further research is needed to better understand how to scale up and out such programs to create more accessible opportunities for longitudinal participation. Funding source: Michigan Health Department of Health and Human Services (#R-2004-146232).

**FREE COMMUNICATIONS: VERBAL AND POSTERS**

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Self-regulation (SR) and fundamental motor skills (FMS) develop rapidly during early childhood and share common fundamental processes, including planning sequenced actions, controlling body movements, and engaging in goal-directed activity. Still, limited research has examined the relationship between developing SR and FMS. This study explored prospective associations among three SR variables and FMS in preschoolers with and without exposure to the Children’s Health Activity Motor Program (CHAMP). Preschoolers (N = 118) from three Midwestern Head Start centers completed 16-week CHAMP (n = 71; Mage = 52.86 +/- 3.26 months; 41 girls) or a control condition (n = 47; Mage = 53.74 +/- 3.25 months; 27 girls). Preschoolers’ behavioral, emotional, and cognitive SR were measured at baseline using the Head-Toes-Knees-Shoulders Task (HTKS), two subscales of the Emotional Regulation Checklist (emotion regulation, negative lability), and “Mr. Ant” (visuo-spatial working memory) and “Boats and Rabbits” (cognitive flexibility) from the Early Years Toolkit, respectively. FMS were assessed pre- and post-CHAMP using the Test of Gross Motor Development-3rd edition (TMGD-3). Fifteen linear regressions were built to examine associations among preschoolers’ baseline SR (each construct, separately) and post-CHAMP FMS. Controlling relevant individual factors, SR was not associated with any FMS outcome in either group. However, trends were observed. For children in CHAMP, “Mr. Ant” performance was positively trending with post-CHAMP ball skills (p = .07). For children in the control group, behavioral regulation was positively trending with locomotor skills (p = .07) and cognitive regulation with ball skills (p = .09), while negative lability was negatively trending with locomotor skills (p = .07). Although we observed no statistical significance, the repeated trends coupled with the theoretical and neurological overlap between SR and FMS warrants future investigation on the relationship between these two constructs, particularly in intervention settings. Funding: NHLBI-1R01HL132979. Funding source: National Heart Lung and Blood Institute – 1R01HL132979.

Profiles and correlates of supine-to-stand performance in younger individuals with visual impairment

Adam Pennell, Pepperdine University; Danielle Nesbitt, Fayetteville State University; Alexandra Stribing, Kean University; Ali Brian, University of South Carolina

The supine-to-stand (STS) is an important lifespan mobility skill as it relates to functional and health-related outcomes (e.g., capacity, fitness, independence) in various populations. However, there is limited knowledge of the STS in young individuals with visual impairment (YVI), a population that is known to present with motor-related disparities when compared to sighted peers. This study investigated product- and process-oriented STS metrics as well as potential correlates of such outcomes in YVI. Seventy-one participants (Mage = 13.1 ± 2.3 years) completed a demographic questionnaire, several anthropometric measurements, the three-component STS (i.e., lower extremity, axial, upper extremity) for five trials, and the timed get up and go test. Likewise, a subset of the sample (n = 57) also completed the locomotor subscale of the Test of Gross Motor Development-3 (TGMD-3). STS performance was quantified in numerous ways (e.g., fastest and average of five trials, percentage occurrence of various STS component profiles). The average fastest and five-trial STS times, timed get up and go test, and TGMD-3 locomotor subscale scores were 2.23 ± .87, 2.57 ± 1.03, 9.26 ± 4.26, and 26.63 ± 9.98, respectively. The fastest STS trial tended to be the first trial (27%). Numerous STS component profiles were utilized by YVI. The most common profile was defined by the symmetrical push, symmetrical axial region, and the symmetrical narrow-based squat with balance step (=15 to 19%). Spearman associations were mixed, but consistent and convincing STS correlates were weight and body mass index (r = .001). STS product-oriented scores correlated with the presence of a multimorbidity (fastest trial: r = .002; average of trials: r = .001) and the locomotor subscale of the TGMD-3 (fastest trial: r = .008; average of trials: r < .001). These results suggest that STS profiles are numerous and that STS product (as opposed to process) scores may be more powerful response variables in YVI. Future research should compare STS performance in YVI to sighted peers.

Cognitive functions improve following Assisted Cycle Therapy in children with Down syndrome

Shannon Ringenbach, Arizona State University; Sajan Parab, Arizona State University; Jordan Santos, University of Arizona; Bryn Ganther, Arizona State University; Jordan Stupka, University of Arizona; Taylor Kreul, University of Arizona; Amanda Vecellio, Arizona State University; Carter Coray, Arizona State University; Nick Asa, Arizona State University; Stockton Ringenbach, Arizona State University; Tony Vi, Arizona State University; Munira Ahmed, Arizona State University; Sundas Ahmed, Arizona State University; Ayaan Ali, Arizona State University; Edward Ofoi, Arizona State University

Children with Down syndrome (DS) have reduced cognitive capabilities that affect decision making and academics, as well as activities of daily living. Our previous research showed improvements in cognitive functions in adolescents and adults with DS following Assisted Cycle Therapy (ACT). Thus, this study aims to fill the gap in research to understand the effects of ACT on cognitive functions in children with DS. This study examined the change in cognitive functioning using tests like Reaction time, Tower of London, and Card Sorting over an eight-week intervention. Seven participants in the study were assigned to complete the ACT intervention, in which they rode a stationary bike with the assistance of a motor to maintain a cadence of at least 35% greater than their voluntary cycling speed. Seven children (M chronological age = 11.6 years, 6 M, 1 F) completed a 30-minute cycling session 2x/week for 8 weeks on the stationary bicycle with a motor that was set to 35% greater than their self-selected warmup rate. All participants completed the ACT intervention but a few were unable to complete some cognitive functioning tests due to their intellectual abilities (M mental age = 3.3 years). Overall, the results of this study showed that information processing as measured by a simple reaction time task t(6) = 2.81, p = .03, task-switching as measured by a modified Wisconsin card sorting test t(6) = –2.07, p = .08, and problem solving as measured by the Tower of London t(4) = –2.8, p = .049 improved following the eight week ACT intervention. The results of our study are discussed with respect to the upregulation of neurotrophic factors, which are involved in increasing the cognitive functioning within the prefrontal cortex following ACT exercise intervention. Furthermore, these results will be used for a product development grant application to create a Pediatric Assisted Cycle Therapy (PACT) bicycle to be used in pediatric neuropsychology populations that have movement deficits. Funding source: Jumpstart Grant Program, College of Health Solutions, Arizona State University.
Differences in process and product measures of standing long jump by gender, age category, and ethnicity in 4–11 year old children

Blaize Shiebler, University of Maryland; Jacqueline Goodway, The Ohio State University; David F. Stoddent, University of South Carolina; Ali Brian, University of South Carolina; Katrina Makres, National Institute of Health; Kristen Au, University of Maryland; Dimitri Brandon, University of Tennessee Knoxville; Chole Kin, The Ohio State University; Larissa True, New Mexico State University; Rick Ferkel, Central Michigan University; Elianah Cohen, The Ohio State University; Ruri Famelia, The Ohio State University; Sarah Wall, Eastern New Mexico University

There is limited literature on standing long jump (SLJ) yet SLJ is a complex skill that underlies many individual constraints such as multi-limb coordination, explosive power, dynamic balance, leg and abdominal strength, and strength-to-weight ratio. Both total body and component developmental sequences of SLJ (SLJSQ) reveal the initial stages of SLJ emerge in early childhood (EC) but proficiency in the skill does not occur until Middle (MC) to Later childhood (LC). This study examined Gender, Age, and Race/Ethnicity (R/E) differences in SLJ across EC (4–5 years, n = 139), MC (7–8 years, n = 133), and LC (10–11 years, n = 139) with 210 girls and 201 boys, and 138 White, 132 Hispanic, and 141 Black children. The product measure of SLJ scaled total distance jumped as a percentage of standing height (%HTSLJ) and the process measure of SLJ combined the component stages for 4 levels of arm and leg action (total score 2–8). Two, 3 Age (EC, MC, LC) X 2 Gender (boys, girls) X 3 R/E (White, Hispanic, Black) ANOVAs were conducted on: (%HTSLJ) and JumpSQ separately. For %HTSLJ there were significant (p < .001) main effects for Gender, Age Category and R/E. The only significant interaction was R/E X Age Category (p < .001). Boys were better than girls, Black children were better than White/Hispanic children (who were statistically similar), and children in EC were worse than MC/LC (who were statistically similar). For JumpSQ there were significant (p < .001) main effects for Age Category and R/E, but not Gender. Significant interactions included R/E X Age Category (p < .01) and Gender X R/E X Age Category (p < .05). Black children were worse than White/Hispanic children (who were statistically similar), and all age categories were significantly different from each other with a developmental trajectory in scores from EC to MC to LC who had the best SLJSQ performance. Both process and product measures of SLJ revealed similar trends. It is interesting to note Black children had the worst process performance in SLJ but the best product performance. These findings have implications for practitioners.

Comparing caregiver and child perceptions with actual child physical activity and motor skill competence: A collective case study approach

Andrea Taliaferro, University of South Carolina; Jill Lassiter, James Madison University; Amanda Campbell, Bridgewater College; Michael Ertel, University of South Carolina; Ali Brian, University of South Carolina

Parents are critical choice agents in the behavioral opportunities of preschool-aged children. Parents who value physical activity (PA) and motor skill development are more likely to support opportunities for children to engage in health-enhancing activities. The accuracy of parents’ beliefs, expectations for, and valuation of PA behavior and motor skill development of preschool-aged children warrants exploration, and thus was the purpose of this study. Participants included 11 caregivers and their preschool children (ages 3–5 years) who volunteered to participate in the larger SKIPping with PALS study (see Brian et al., 2023) located in a rural, Title 1 school. Data sources included a caregiver semi-structured interview, generated drawings of perceptions of PA, and Welk’s Parental Survey. Child data consisted of the Pictorial Scale of Perceived Movement Skill Competence, average daily step count as measured by Movband 4, BMI, and TGMD-3 score. A collective case study approach was utilized to explore data. Data were synthesized by two researchers into 11 individual case study narratives, one for each caregiver/child dyad. Researchers followed a two-step within and across case data analysis process. Open coding of the case narratives was completed by two researchers, with resulting themes verified by a third researcher. Based upon the analysis of the 11 narratives, six themes were found: (1) caregivers valued PA; (2) sports-oriented vs. physical activity-oriented families; (3) vague conception of what constitutes PA; (4) over estimators of PA behavior/movement; (5) relatively accurate perceptions of locomotor skills, and; (6) inaccurate over estimators of object control skills. If caregivers inaccurately predicted or lacked knowledge about their child’s PA or development, they may inadvertently fail to promote health-enhancing behavior. Future research should explore the influence of caregiver education on accuracy of estimation, and its impact on subsequent child behavior. Funding source: Duke Endowment.

Home observations of unsupported and supported walking by crawling and walking infants

Paige Thompson, Purdue University; Reagan Frame, Purdue University; Maia Lynch, Purdue University; Ashley Hartman, Purdue University; Madeline Douglas, Purdue University; Julia Hack, Purdue University; Laura Claxton, Purdue University

At walking onset, in addition to taking independent steps, infants rely on stationary objects (furniture), moving objects (push-toys), and caregivers. Little is known about the benefits/detrimentsof these walking aids and how the use of walking aids might differ between Walkers (can walk 10-ft unsupported) and Crawlers (cannot walk 10-ft unsupported). This study used video captured during 1-hr naturalistic home observations to document everyday walking. Using Datavyu, a video-coding software, coders documented the frequency and duration of unsupported (independent steps) and supported (crawling, push-toy, caregiver) walking in 25 13-month-old infants (12 Walkers, 5 males; 13 Crawlers, 7 males). Overall, Walkers walked longer (M = 11 min, SE=1) and had more bouts of walking (M = 59, SE = 7) than Crawlers (M = 2 min, SE = 1; M = 20, SE = 4), ps < .05. As expected, Walkers (M = 5 min, SE = 1) walked unsupported more often than Crawlers (M = 1s, SE = .6), p < .001. Surprisingly, infants spent equal time in supported walking (Walkers: M = 3 min, SE = 1; Crawlers: M = 2 min, SE = 1; p = .400), and used crawling (Walkers M = 75 s, SE = 20; Crawlers M = 81s, SE = 29), push-toys (Walkers M = 15s, SE = 8, Crawlers M = 13s, SE = 23), and Caregivers (Walkers M = 48s, SE = 53, Crawlers: M = 17s, SE = 9) equally often; ps > .05. Most infants crawled (92% Crawlers; 100% Walkers), and less than half used push-toys (46% Crawlers; 25% Walkers). However, only 9 infants (6 Crawlers and 3 Walkers) had push-toys available. We expected that unsupported walking bouts would most often end in falls; however, walking bouts most often ended because the infant stopped moving (Unsupported: Walkers-60%, Crawlers-42%; Supported: Walkers-50%, Crawlers-79%). We expected caregivers to stay within arm’s reach of infants more during unsupported walking; however, caregivers were equally as likely to stay within arm’s reach for both types of walking (Supported: M = .5, SE = .1; Unsupported: M = .5, SE = .1, p > .05). Still gaining experience with walking, novice walkers continue to rely on supported walking (especially crawling).
Service receipt during the COVID-19 pandemic and its relationship to various outcomes in children with Autism Spectrum Disorder

Jungmei Tsai, University of Delaware; Anjana Bhat, University of Delaware

Children with autism spectrum disorder (ASD) receive various services such as special education services (SES), speech language therapy (SLT), occupational/physical therapy (OT/PT), behavioral therapies (ABA), medical (MED), and mental health (MH) services to address multisystem impairments. These services were disrupted during the COVID-19 pandemic and transitioned to remote/hybrid formats. This study aimed to examine the effect of services loss on outcomes of social interaction, communication, autism severity and daily functioning of children with ASD, after controlling for demographic and child/parental factors. The nationwide SPARK study conducted by the Simons Foundation used a COVID-19 impact survey to assess its impact on ASD families (N = 6067) between August 2020 – July 2021. We compared the mean outcome improvements scores between groups receiving vs. not receiving each service. Logistic regression analyses were conducted to control for multiple factors. The results suggested ABA and PT/OT predicted improvements in domains of social interaction, everyday activity, and overall autism (Wald = 4.24–16.39, p < .05); ABA and SLT contributed to improved communication (Wald = 4.33–11.05, p < .05). MH and MED services were associated with worsening outcomes in all domains (Wald = 5.51–17.88, p < .05). Younger age, males, higher family income, less baseline ASD severity, less motor/functional/cognitive delay, more severe language delay and the absence of parental mental health issues were associated with more improvements in various outcomes. In addition, we are also studied the relationship between service formats (F2F, hybrid, vs. online) and child outcomes. Together, this study provides insights on the impact of service receipt (type, format) on outcomes of children with ASD during the COVID-19 pandemic. Future studies assessing the relation between service quality and ASD-related outcomes will benefit from our findings. Funding source: HRSA R41MC42492.

Developmental changes in motor competence: The influence of physical activity and weight metrics

Aaron Wood, University of Michigan; Kara Palmer, University of Michigan; Zhonghe Quyang, University of Michigan; Cartissa Wengrovius, University of Vermont; Katherine Scott-Andrews, University of Michigan; Lu Wang, University of Michigan; Leah Robinson, University of Michigan

Research has shown an important dynamic between motor competence (MC), physical activity (PA), and weight status in young children. Nonetheless, there is a need for a better understanding of the high degree of variability from individual to individual in the development of MC across that time. This study’s purpose was twofold, a) examining the development of MC over time controlling for PA and weight in early childhood, and b) examining the developmental relationship between PA/weight on MC (and vice versa). Data from 146 preschool-aged children (3.5–5 years) enrolled in the Promoting Activity and Developmental Trajectories of Health (PATH) study were included in the present analysis. MC was evaluated using process scores (i.e., Test of Gross Motor Development- 3rd Ed.), product scores (throwing speed, kicking speed, jumping distance, running speed, and hopping speed), and a combination score (i.e., all process and product combined and scaled 0–100). Body Mass Index percentile (BMI%) was calculated. PA was measured with GT3X-BT Actigraph accelerometers worn on the non-dominant wrist for 8-days. Dynamic relationships between MC, PA, and BMI% were examined using longitudinal-growth curve models and cross-lag panel models. Longitudinal-growth curve models showed at baseline, older children were more likely to have better MC (p < .05). Further, PA at baseline was associated with higher MC (process scores, product scores, and combination scores (all p < .05)). Interestingly, there was an attenuated change in process MC controlling for baseline PA (beta = -0.02, p < .05). Cross-lag panel models showed that all three constructs (MC, PA, and BMI%) were relatively stable over time, and there were no significant cross-lags among constructs. Exploratory analyses found a trend whereby weekend PA predicted subsequent process MC Scores (p = .07). This research provides novel insights into longitudinal associations among these constructs. Further research is needed to fully understand individual variability in the development of MC from child to child over time. Funding source: 1R01HL132979-01.

Exploring advanced movement skills development in middle childhood: A one-year follow-up study

Sz-Yan Wu, The University of Texas at Austin; Chung Shan Medical University; Jody Jensen, The University of Texas at Austin

The development of fundamental motor skills (FMS) is essential for children’s ability to perform daily activities, such as writing, running, self-feeding, and throwing. However, these assessments may lack scalability for older children or those with a higher level of proficiency. To address this limitation, Advanced Movement Skills (AMS) have been proposed to represent the motor functioning required for physical games and sports that demand greater intensity and variety. Therefore, this study aims to investigate the role and development of AMS in school children, as limited research is currently available on this subject. In this one-year follow-up study, 83 volunteers were divided into two groups: 7–8 years (20 boys and 28 girls) and 9–10 years (21 boys and 14 girls). Their proficiency in AMS was evaluated through six tasks: Single-Leg Hop for Distance (SLHD), Figure-8 Hops for Time (Fig8), Single-Leg Hop and Stick Series (SLHS), Jump and Clap (JC), Jump with a 360° Turn (JT360), and Twist Jumping (TJ). Linear or ordinal mixed-effect models were utilized to examine the effects of time (between the baseline and follow-up), age (between the participants aged 7–8 and 9–10 years), and their interaction, while controlling for gender and body mass index. No significant interactions between time and age were found across all AMS tasks. Age-related performance differences were significant in SLHD (p = .007), SLHS (p = .011), and JC (p = .015), with older children outperforming their younger counterparts. Over the one year, all children demonstrated improvement in Fig8 and JC (p < .001). However, no significant differences were observed between age groups and time points for JT360 and TJ. The results indicate age-related disparities and temporal changes in movement tasks requiring power production and dynamic stability. Interestingly, body management skills in the air seem to be less developed in middle childhood, suggesting the emergence of AMS in late childhood.

Sticky mittens training in infants with Down syndrome: Arm reaching kinematics and coordination

Robert Zeid II, Georgia State University; Jackelyne Perez, Georgia State University; Amy Talbey, Emory University; Seyda Ozceliskan, Georgia State University; Jianhua Wu, Georgia State University

Successful reaching requires visual perception, cognitive processing, and limb coordination. Targeted practice using the “sticky mittens” may advance reaching and grasping skills in infants with Down syndrome (DS). Further, reaching and grasping may provide an ideal setting to investigate the interrelation between motor and language development in infants with DS. Here, we aimed to understand the progress of shoulder and elbow joint kinematics and upper limb coordination during arm reaching in infants with DS with and without receiving the “sticky
Neural activity associated with execution of a visuomotor adaptation task performed in different workspace locations

Reuben N. Addison, Louisiana State University, DePauw University; Fabian Steinberg, Louisiana State University; Arend W. A. Van Gemmert, Louisiana State University

Visuomotor adaptation studies investigate how humans utilize sensory information to interact within their environment. The sensorimotor system updates crucial information during adaptation, particularly in estimating the target’s location within the workspace. While some studies have proposed workspace-specific adaptation, most evidence from studies indicate potential generalization to other workspace locations. Changes in brain activity occur in response to visually rotated targets, yet understanding neural changes during workspace manipulation remains limited. The current study explored how changes in neural activities are affected by workspace manipulation during a visuomotor adaptation task. Twenty-four right-handed young adults made point-to-point movements with a stylus on a digitizer tablet in three different workspace locations (1) central (CEN); 2) ipsilateral (IPS) to the body, and 3) contralateral (CTL) to the body with the feedback of pen-traces rotated 45° clockwise. Electroencephalography (EEG) was recorded with a 32-electrode system. Within-subject ANOVAs were used to analyze behavioral and neural workspace-related differences. Results indicated that participants improved significantly on the visuomotor adaptation task across all three workspace locations; however, improvements in performance were more pronounced in the ipsilateral workspace compared to the contralateral workspace. The observed workspace related performance differences were associated changes in alpha (C4, CP2, and CP6) and beta waves (C4, CP2, P4, and P8). It can be concluded that neural activity changes were consistent with behavioral patterns, supporting the view that these brain areas are pivotal to process spatial information during the adaption process when novel tasks are performed. We believe that our data suggest that right central and parietal-cortical areas (areas involved in spatial processing) are involved in workspace-related inhibition to allow the left hemisphere work efficiently.

Motor Learning and Control Abstracts

Effect of dual tasking on cognitive performance among college students with concussion history? A pilot study

Prasanna Acharya, Illinois College; Madison Webb, Illinois College; Tsilate Mussie, Illinois College; Marc Dalecki, German University of Health & Sports

Often, dual-tasks (DT) involve a motor and cognitive task such as walking and counting backward and studies showed lower cognitive performance in DT scenarios in healthy individuals and more pronounced performance declines in acutely concussed individuals. Here, we aim to examine whether similar effects exist further time post-injury using computerized cognitive tasks. We hypothesized lower performance during DT and that concussion history participants (CH) perform lower during DT conditions than no-history controls (NoH). Our preliminary data set included ten college students (M = 21.1 yrs., with 4 CH [2 females; > 4 yrs. post-concussion] and 6 NoH [3 females] participants), randomly assigned to start in standing (Single task; ST) or walking (DT) condition. In both conditions, participants completed two cognitive tests on a laptop – a Stroop Color word test (48 congruent, 48 incongruent trials) and a D2 sustained attention test (computerized version of the D2 test, with varying sequences of the letters d and p, and participants had to correctly mark d’s surrounded by two commas) – and the laptop was placed on eye level on top of the treadmill. The participant’s comfortable walking speed (CWS) was determined before testing for the DT condition. ANOVAs were used to analyze response time (RT; ms), error rate (ER; %), and sustained attention score (CS; D2 test only) in the CH and NoH groups during ST and DT conditions. In our pilot data set, no significant cognitive performance differences were detected between ST and DT conditions, groups, or group x condition interactions (all p > .05). NoH and CHs’ Stroop and sustained attention performance was similar in ST and DT walking with CWS in college students >4 yrs. post-injury compared to NoH. Surprisingly, Stroop and sustained attention performance was also similar between DT and ST conditions, independent of groups, suggesting walking with CWS did not draw enough strain on resource capacities to lower performance during these two tasks. However, these results are preliminary, and more data collection is needed.

Evaluating the effect of load on visual attention during a live ice hockey practice

Nikki Aitcheson-Huehn, University of North Carolina at Chapel Hill; Ryan MacPherson, University of North Carolina at Chapel Hill; Jason P. Mihalik, University of North Carolina at Chapel Hill; Adam W. Kiefer, University of North Carolina at Chapel Hill

High-performing athletes must maintain performance across a range of cognitive, perceptual, and physical demands. These demands fluctuate in response to evolving competitive pressures, such as changes in physical workload. Further, informational load changes with the number of participants one is engaged with at any given moment, highlighting the complexity of the perceptual challenges encountered. This study aimed to evaluate the effect of physical and informational loading by monitoring in situ visual attention—indexed via quiet eye (QE)—during team practices, with visual attention hypothesized to decrease with increased physical and informational load. Ten (n = 10; 20.6 ± 2y) Division II club male ice hockey players wore a chest-strap heart rate (HR) monitor (Polar H10) and mobile binocular eye tracking glasses (Tobii Pro Glasses 3) during separate 60-min coach-led practices. Four ice-facing video cameras captured each player’s motor behavior. Physical load was indexed via mean heart rate (HR) during each shot (i.e., puck attainment and release). Average HR during practices was 141bpm (SD = 16) with 25% of each practice spent in 60–70% of HR max. Informational load equated to the number of total players participating in the drill when the shot occurred (i.e., 2–6). Preliminary analysis of the shots of 7 forwards focused on QE,
the visual fixation initiated before downswing (i.e., the final movement). The duration of QE was calculated from onset (gaze within 3° of visual angle for at least 3 frames) and offset (gaze moved off location for 3 or more frames) and was relative to shot duration. Predominate QE locations included the goalie’s lower body (30%), the ice in the crease (23%), and the visible portions of the net not occupied by the goalie (16%). During shots with another player and goalie, QE duration was 25.8% (SD = 33.4); whereas, QE duration was 14.6% (SD = 5.8) on shots with 2 other players and goalie. The full analyzed results will be presented to directly test the hypothesized relationship between visual attention and load (i.e., HR and number of players). Funding source: NASPSPA Graduate Student Research Grant.

Adaptation and savings are differentially impacted by the type of virtual partner

Nour Al Afif, McMaster University; Daniel Deletsu, McMaster University; Mikayla Lalli, McMaster University; Ola Schwarzengberg, McMaster University; Lidia Barbera, McMaster University; Abby Girouard, McMaster University; Rakshith Lokesh, Northeastern University; Joshua G. A. Cashaback, University of Delaware; Michael J. Carter, McMaster University

Current literature suggests that physically collaborating with one or more individuals enhances task completion. However, there are inconsistencies in our understanding of how collaborative experiences impact an individual’s subsequent solo task performance. Some studies suggest that individual performance benefits from these interactions (Takagi et al. 2017), while others do not (Beckers et al. 2020). Additionally, these previous works used non-redundant paradigms where each partner had individual control over their own cursor, which does not accurately reflect collaborative interactions in daily life. To address this, participants (N = 100) in our experiment adapted to a 30-deg visuomotor rotation either alone or sharing the cursor with a virtual partner. The virtual partners were based on the fast and slow states of the two-state model (Smith et al. 2006). The fast state learns quickly but forgets easily, while the slow state learns slower but retains learned behaviour longer. Those who completed the task alone, did so at either the full rotation, or a rotation of 15 degrees. Participants completed 2 sessions, each consisting of a baseline block (50 trials), followed by a visuomotor rotation block (200 trials), a counter-adaptation block (20 trials) and an error clamp block (50 trials). We separated the two sessions with a 5-min break to examine savings, where previous adaptation to a perturbation leads to faster re-adaptation. All participants performed session 2 alone. Reach angle was the primary measure used to examine the extent of adaptation and savings across the blocks of trials. Results indicated that participants who interacted with a fast partner exhibited more spontaneous recovery of the learned adaptation during error clamp in the first session. Yet, those who interacted with the slow partner showed faster re-adaptation in the second session, similar to the group that completed the task alone at a 30 degree rotation. These results suggest that the nature of the partner can influence the extent of savings differently following adaptation. Funding source: Natural Sciences and Engineering Research Council of Canada, Canadian Foundation for Innovation, Ontario Research Fund.

Front leg strategy in older adults’ gait during step-to-step transition

Elham Alijanpour, Old Dominion University; Daniel M. Russell, Old Dominion University

Walking requires the coordination of many body components and systems, but aging alters organism constraints, which impacts movement coordination. The step-to-step transition, usually starting before double support and ending afterwards, has been identified as a critical phase where most age-related falls occur. Recently, unbalanced leg forces and a later transition start at double support have been identified in older adults, emphasizing the importance of understanding these dynamics in addressing age-related deficits and fall risk in the elderly. The current study aimed to quantify differences in interlimb coordination and front/back leg force ratio during double support of gait between young and older adults. Two groups of 10 young and 10 older adults walked on an instrumented treadmill at their preferred walking speed while a motion capture system recorded joint kinematics. Based on phase plots of lower extremity joints, interlimb coordination was quantified using continuous relative phase. The results showed older adults (M = 1.4, SE = 0.4) had significantly higher relative force in their front leg during step-to-step transition compared to young adults (M = 1.1, SE = 0.1), t(18) = 1.97, p = .03, with a medium effect size r = .4. Statistic parametric mapping results of knee interlimb coordination revealed larger, faster, and more variable front knee flexion during the step-to-step transition in older adults, p < .05. However, there were no significant differences in hip or ankle interlimb coordination patterns. Older adults appear to use a “front leg strategy”, with increased front knee flexion and quicker knee angular phase transition to propel the body forward, compensating for reduced back leg hip extension reported in previous studies. This strategy may serve both shock absorption and step-to-step transition demands in walking but could impact energy efficiency by increasing load on the knee extensor muscle.

Motor vs brain biomarkers for freezing of gait: The most severe motor impairment in Parkinson’s disease

Quincy J. Almeida, Carespace Health & Wellness Clinics; Fatemeh Karimi, University of Waterloo; Nico Castro-Folker, University of Waterloo; Marek Saastaa, University of Waterloo; Ning Jiang, Sichuan University

Freezing of gait (FOG) in Parkinson’s disease (PD) is the most debilitating motor symptom impeding independence and quality of life, so it is critical to be able to clinically define, identify and predict when and if it is occurring. Previously, we presented that spatial gait variables are likely more important than temporal variables in predicting FOG. In the current abstract, we pooled gait data from several countries that were followed for up to 3 years, and employed machine learning to make predictions about the likelihood that newly diagnosed PD might experience FOG. Results revealed that 50% of the sample that showed no signs of FOG eventually converted to FOG within 4 years. Utilizing Bayesian classification and principal component analyses, we identified key predictors of FOG, with the most relevant features for training an algorithm with an acceptable false-positive: true-positive as measured using a receiver operating characteristic (ROC) curve. The results of these analyses revealed that mean stride length & velocity, cadence, coefficient of variation of the stride length & velocity (between limbs), and disease duration were key to a portable, robust diagnostic algorithm. Given that some patients are unable to complete full walking assessments, we also had the objective of utilizing EEG-based movement-related cortical potentials (MRCP’s) as a potential biomarker of FOG using a simple, seated ankle dorsiflexion task in 3 groups (FOG, PD non-FOG, healthy age-matched controls). The FOG group revealed significantly lower MRCP’s than controls (p = .002), which was affected by severity of FOG. Furthermore, beta frequency band (12–35 Hz) desynchronization was absent in FOG, especially over Cz before movement. Interestingly, FOG showed theta band synchronization over the supplementary motor area suggesting involvement of cognitive processes rather than 1° cortex in controlling cue-based voluntary movement (a potential compensatory mechanism in FOG). The pros and cons of utilizing gait vs brain biomarkers as prodromal indicators of FOG in PD will be discussed. Funding source: Michael J. Fox Foundation, NSERC.
Postural control entropy is greater when barefoot compared to when wearing shoes in children aged 4–6 years old

Bryon C. Applequist, Texas A&M University – Corpus Christi; Megan E. Perkins, Texas A&M University – Corpus Christi

Postural control gradually evolves during early childhood as children learn how to control the constraints of their environment and growing body. As children grow, their neuromuscular system is maturing with the development of their sensory systems that effect balance and postural control. The constraint of shoes could have a dramatic effect on the development of postural control in children. In many cases, shoes are the connection between the ground and our bodies and are necessary for activities such as sports and physical activity. However, shoes could hinder the child’s ability to fully utilize their proprioceptive system, particularly with the habitual use of footwear in modern children. The purpose of this study was to investigate the effect shoes have on postural control of children, measuring both the conventional standard deviation of the center of pressure (COP) and the sample entropy of COP. 10 healthy young children between the ages of 4–6 (Age: 4.9 ± 1.1years) participated in the study. Subjects were asked to stand in quiet posture for 1-minute while barefoot and while wearing a lab supplied shoe. Standard deviation (SD) and sample entropy (SE) of the COP trajectories in the anteroposterior (AP) and the mediolateral (ML) directions were computed. Dependent t-tests were used to compare the barefoot and shod conditions of each variable. There was a significant difference between the barefoot and shod conditions for COP AP SE (Bare 1.64±.45, Shod 1.16±.40, p = .003), and COP ML SE (Bare 2.83 ± .80, Shod 1.90 ± .87, p = .001). There were no differences for SD for either AP or ML (p > .05). These results indicate that shoes are providing a constraint on the children and driving them towards rigidity in their postural control and lower entropy. Lower entropy values have been related to pathology and neurological deficits. It is possible that shoes can limit the development of healthy postural control and reduce children’s adaptability of their environments and perturbations. Future work should be conducted related to the habitual use of specific types of shoes.

Leveraging eye tracking machine learning system for predicting successful targeting skill performance

Ayoub Asadi, Iowa state university/Alzahra University; Afkham Daneshfar, Alzahra University; Mohammad Reza Saeedpour-Parizi, Indiana University Bloomington; Christopher Aiken, New Mexico State University; Ann Smiley, Iowa state University

Eye tracking in sports is an emerging field aimed to uncover the complex interrelationships between visual function and motor performance. While previous studies have identified specific visual behaviors that can differentiate superior sports performance, the application of machine learning systems utilizing eye tracking data in sports remains relatively unexplored. This study aimed to investigate eye movement behaviors to detect successful performance in basketball free throws using machine learning methodologies. Gaze behavior data from 25 student basketball players during successful and unsuccessful free throws were collected and analyzed. The series paired t-tests was used to determine eye movement behaviors differences between hit and miss trials. Furthermore, based on eye movement data, the different machine learning classifiers were developed to detect free-throw performance. Statistical results revealed significant differences in fixation, saccade, and microsaccade durations between hit and miss trials (p ≤ .05), indicating the effectiveness of longer fixation durations and shorter saccade and microsaccade durations for successful performance. Also, the outcomes derived from the machine learning analysis, exhibiting an accuracy rate of 85.9%, highlighted the heightened importance of metrics associated with saccades for successful performance than those related to fixations. The implications of these findings highlight the significance of employing eye tracking coupled with machine learning techniques within the domain of sports. The demonstrated leveraging capability to reliably predict successful performance from athletes’ eye movement data signifies a paradigm shift in understanding the critical elements governing proficient motor skills. Our findings offer valuable initial insights and serve as a source of inspiration for future research concentrating on the advancement of machine learning systems utilizing eye-tracking technology to identify and assess proficiency in motor skills.

Differences in the prefrontal cortex during the Purdue Peg test performance in young adults with and without ADHD

Elham Bakhshipour, University of Delaware; Roxana Burciu, University of Delaware; Roghayeh Barmaki, University of Delaware; Nancy Getchell, University of Delaware

Attention Deficit/Hyperactivity Disorder (ADHD) affects the individual’s quality of life throughout the lifespan. Fine motor function is associated with cognitive function and the quality of life. However, little is known on the impact of ADHD on fine motor function in adulthood. To examine prefrontal cortex (PFC) activation using functional near infrared spectroscopy (fNIRS) during execution of a manual dexterity task in young adults with ADHD aged 20–25 years. Fifteen adults with confirmed ADHD and seventeen without ADHD completed the Purdue Pegboard test (PPT) in a matched sample repeated measures design. Repeated measures two-way ANOVA was performed on average change in deoxygenation (Δ HbR) and change in oxygenation (Δ HbO) in PFC regions (left dorsolateral PFC, left ventro medial PFC, right ventro medial PFC, right dorsolateral PFC). A Bonferroni correction was used to account for multiple comparisons. The results showed that adults with ADHD may demonstrate no significant difference in PPT performance while their PFC activity has an abnormal pattern compared to the control non-ADHD group. This highlights the importance of utilizing neuroimaging devices to study underlying deficits in this population. The underlying fNIRS substrates show lower baseline at rest, higher activation in the PFC and dorso-lateral PFC (dPFC) in ADHD group compared to the control group during the task accomplishment time. This can confirm compromised fine motor ability in ADHD group. PFC, and more specifically dPFC is involved more in confirmed ADHD. This can lead to PFC overuse which in turn can cause more frequent mental fatigue in ADHD. This article demonstrates compromised cortical activation during fine motor task in adults with ADHD.

Differences in the prefrontal cortex activity during the DASH17+ handwriting performance in young adults with and without ADHD

Elham Bakhshipour, University of Delaware; Roxana Burciu, University of Delaware; Curtis Johnson, University of Delaware; Roghayeh Barmaki, University of Delaware; Nancy Getchell, University of Delaware

To examine differences between adults with and without ADHD on the handwriting performance, we utilized a multimodal assessment strategy: The Detailed Assessment of Speed of Handwriting (DASH17+); and concurrent prefrontal cortex oxygenation measurement using functional near-infrared spectroscopy (fNIRS) as well as kinematic measurement using Wacom digitizer. To address our research question, a total of 32 participants with (n = 17) or without ADHD (n = 15) participated in the study. All participants performed the DASH17+ on the Wacom digitizer while concurrently we collected oxygenation data (indirect measurement of neural activity) from the prefrontal cortex. Performance data were analyzed using MoveAlzyer software to calculate handwriting biomechanics and kinematics. Our results indicated that overall performance scores did not differ between groups between or within the different subtests...
(copy best, copy fast, free writing). The ADHD group had less frequent short pauses and lower values of oxyhemoglobin than the non-ADHD group. Our research suggests that, despite scoring similarly to our control group on the performance scores of DASH17+, the ADHD participants have a harder time switching the handwriting biomechanics when the demands of the task changes. Further, underlying mechanisms change between tasks, within tasks, and even from one trial block to another that are not reflected in the DASH17+ assessment alone. Funding source: College of Health Science Equipment Grant, Graduate College Summer Doctoral Fellowship Grant, KAAP Dissertation Grant, and KAAP Teaching Assistantship Award and three Professional Development Awards.

Attentional focus does not impact balance in healthy young adults

John Henry Ballard, University of Tennessee, Knoxville; Joshua Weinhandl, University of Tennessee, Knoxville; Kevin Becker, University of Tennessee, Knoxville

In recent years, several researchers have made attempts to add further nuance to our understanding of how attentional focus impacts motor behavior. One line of research has considered the benefit of a holistic focus (i.e., focus on the general feelings associated with completing a task; Becker et al., 2019) relative to the traditionally studied internal and external focus. To date, a holistic focus benefit has been reported in jumping tasks and object projection tasks, but the one study testing a holistic focus in a balancing task found no benefit (Becker & Hung, 2020). These authors suggested the cue used in that study (feeling calm and stable) may have been incongruent with the actual feelings experienced when balancing on a stabilometer, thus rendering it ineffective. The purpose of the present study was to use a different balancing task to determine how an internal, external, and holistic focus impact balance performance in healthy young adults. Participants (N=18) stood on inflatable balance discs placed on a force plate and attempted to maintain their balance during 10 second trials. They focused on keeping their feet still (internal), keeping the discs still (external), or feeling calm and stable (holistic). Three trials were completed in each condition in a counterbalanced order. Center of pressure data was captured from the force plate at 1000Hz, and a custom MATLAB code was used to calculate root mean square (RMS), median power frequency (MPF), and sample entropy (SEn) in both the medial/lateral (x) and anterior/posterior (y) directions. Repeated measures ANOVAs indicated no effect of focus on RMS or SEn in either direction. MPFx approached a significant difference between conditions (p = .051) with mean values highest in the external condition. The present data do not support the benefit of a holistic or an external focus in the performance of a balancing task by healthy young adults. The latter conclusion is especially surprising but fits a recent trend suggesting the external focus benefit may not be as clear or universal as previously thought.

Perceived workload following a sprinting task using attentional focus instructions

Amanda Barclift, University of North Carolina Greensboro; Aleiza Higgins, University of North Carolina Greensboro; Louisa Raisbeck, University of North Carolina Greensboro

Directing attention to cues in the environment is an effective strategy to optimize motor learning and performance. Attentional focus (AF) can be external focus (EF) (directs attention to the effects of the movement on the environment) or internal focus (IF) (directs attention to the movement itself). An EF has been shown to be beneficial for performance and learning, due to reduced attentional demands from automatic processing. It is unknown how AF influences perceived workload during sprinting. This study investigated the effects of AF instructions on perceived workload following a sprinting task. Healthy young adults were randomly assigned to one of three groups: EF (N=4, 22.75 ± 2.06 yrs), IF (N=4, 21.75 ± 1.71 yrs), or control (N=4, 21.75 ± 0.96 yrs) group. Participants completed 3 x 20m baseline sprints and the NASA Task Load Index (NASA-TLX). The acquisition phase consisted of 3 x 20 sprints with EF (focus on driving forward as forcefully as possible while clawing the floor with your shoe as quickly as possible), IF (focus on driving one leg forward as forcefully as possible while moving your other leg and foot down and back as quickly as possible) or no instructions. A 20-minutes retention phase was administered, followed by 3 x 20 sprints and the NASA-TLX. The NASA-TLX has six subscales (Mental, Physical, Temporal, Performance, Effort, and Frustration) which are averaged to calculate a global perceived workload score. A repeated measures ANOVA was performed to assess group differences from baseline to retention. No significant differences were observed F(1,9) = .122, p = .735) for perceived workload between groups at baseline or retention. These results suggest that AF instructions utilized during sprinting acquisition have no effect on mental workload during the retention period. Thus, NASA-TLX should be completed after every trial to determine the influence AF instructions have on mental workload for earlier trials versus later trials. In addition, more trials are needed during acquisition and a larger sample size will provide more statistical power.

The impact of an internal focus, external focus, and cognitive distraction tasks on the performance of a balancing task

Kevin Becker, University of Tennessee, Knoxville; John Henry Ballard, University of Tennessee, Knoxville; Joshua Weinhandl, University of Tennessee, Knoxville

Several studies have suggested an external focus can be useful for improving balance (Dieküfß et al., 2019; Wulf et al., 1998), yet other studies have found no benefit (Landers et al., 2016). A recent study compared internal (IF) and external focus (EF) conditions with a continuous cognitive task and found that the cognitive task led to better balance than either an IF or EF (Polshaia et al., 2014). It is possible that distraction may promote automaticity in balance, but the attentional demand of the distraction may influence this relationship. The purpose of the present study was to test the impact of an IF, EF, high demand cognitive task (COG-H), and low demand cognitive task (COG-L) on the performance of a balancing task. Participants (N=21) balanced on inflatable discs on a force plate for three 10 s trials in each condition. In the IF and EF conditions they focused on keeping their feet or the discs still respectively. In the COG-L and COG-H, they focused on either a short or long number sequence while balancing, and then repeated the sequence back to confirm accuracy. Center of pressure data was captured from the force plate at 1000Hz, and a custom MATLAB code was used to calculate root mean square (RMS), median power frequency (MPF), and sample entropy (SEn) in both the medial/lateral (x) and anterior/posterior (y) directions. RMANOVAs indicated no effect of focus on RMS or SEn in either direction. A significant focus effect was found for MPFx (p = .019). MPFx in COG-H was higher than COG-L (p = .043), and approached being higher than EF (p = .073). The present data do not demonstrate a clear advantage of any conditions regarding the magnitude (RMS) or structure (SEn) of variability while balancing. However, evidence suggests that a cognitive task higher in demand is effective at eliciting higher frequency postural adjustments which may indicate more automatic processing of balance. Additional work should test the effectiveness of different types of cognitive tasks as an alternative strategy to simply focusing externally at all times to improve balance.
Effect of attentional focus on force curve learning in a dual-task paradigm

Mohammed Bila, Wayne State University; Qin Lai, Wayne State University; Kristoph Lopata, Wayne State University

Prior research has extensively shown that an external focus of attention is associated with increased movement effectiveness compared to an internal focus. However, it remains unknown how attention focus affects the learning process during dual-task. This study aims to investigate the effect of attentional focus on motor learning during dual-task settings involving force production and balance maintenance. Participants (N=17, aged 18–40 years) signed an informed consent, then were randomly assigned to either an internal focus of attention or an external focus of attention group. The dual task involved producing a force curve with a peak of 60% of the maximum grip force and a duration of 1 second. Participants were instructed to direct their focus on the hand dynamometer as external attention and direct their focus on the forearm muscle contraction as internal attention, respectively. During 2-lab visits, participants started with a baseline test, followed by 8 blocks of acquisition with specific focus instructions, each with 6 trials. A retention test was administered 48 hours after the first visit, without a specific attention focus cue or feedback. For the acquisition phase, a 2 (Group) x 8 (Block) ANOVA with repeated measures on Block found a significant group difference in temporal error, (F[1, 15] = 5.01, p = .04). Further, Duncan’s Multiple Range Test (MRT) indicated that external focus produced smaller temporal errors compared to internal focus. For retention and baseline tests, separate 2 (Group) x 2 (Test) ANOVAs with repeated measures on the test demonstrated a significant interaction on force area error (F[1, 15] = 6.28, p = .02), and a tending interaction on temporal error (F[1, 15] = 3.13, p = .09). The study findings suggest that the external focus of attention enhances force curve learning, while the internal focus of attention leads to increased force area and temporal errors under dual-task.

Asymmetrical specificity of learning: Auditory feedback neither helps nor hinders implicit sequence retention and transfer

Elena M. Broeckelmann, University of Manitoba; Calvin D. Reimer, University of Manitoba; Cheryl M. Glazebrook, University of Manitoba

Auditory action-effects may enhance sequence learning and retention in the implicit Serial Reaction Time Task (SRTT). Recently we investigated if sound influences how sequences are encoded and found that visuospatial coding was used regardless of the presence of auditory feedback. However, participants performed faster with visual cues only. Thus, it is unclear if the response-stimulus interval (RSI) in the auditory condition moderated these results. The present study replicated this protocol, while also adding a response delay group to determine if processing time along affects sequence learning. Fifty-four neurotypical righthanded adults (M = 23, SD = 3.6) practiced a 10-item implicit SRTT by reaching with their preferred hand to a square array of four targets presented on a touchscreen. The three groups were all guided by visual cues (i.e., targets filled in); Group 1 received an RSI of 0ms, Group 2 received a 300ms RSI with auditory feedback, and a third group had a silent RSI of 300ms. On Day 1, participants repeated the sequence 10 times across blocks 1–6 and 8, while block 7 presented the stimuli in a pseudorandom order. On Day 2 participants completed a retention test with their preferred hand as well as transfer tests with their non-preferred hand in spatially congruent and mirrored motor congruent transfer conditions, with and without auditory feedback. Total sequence time (TST) was analysed using predetermined mixed model ANOVAs. A significant reduction in TST indicated all three groups acquired equal implicit sequence knowledge on Day 1, but those practicing without an RSI performed faster overall. Similarly, all groups performed the sequence more rapidly in the no sound condition on Day 2, including those who had practiced with auditory feedback. A significant main effect of sequence transfer indicates better performance with spatially congruent stimuli. Thus, the RSI constrains response speed, and the presence of auditory feedback does not affect sequence encoding. Notably, participants did not become reliant on the availability of auditory feedback. Funding source: NSERC.

Prior training experience may influence the expression of hand performance abilities.

Pamela Bryden, Wilfrid Laurier University; Shreyas Alapatt, Wilfrid Laurier University

The relationship between handedness and athletic proficiency has long intrigued researchers and the public. A study by Loffing (2017) found a higher prevalence of left-handed athletes in sports requiring shorter response times, such as baseball and table tennis. Studies have shown that training the non-dominant limb can assist the competitor’s ability to perform effectively with either of his or her limbs (Walker & Henneberg, 2017). This provides a significant advantage over other competitors who exclusively focus on performing with only their dominant limb in a sports setting. Therefore, this study examined whether training the non-dominant limb in sports influences hand performance. University-aged participants (N = 21) first completed the Waterloo Handedness Questionnaire (WHQ; Steenhuis et al., 1990), a self-report measure of hand preference, and a background survey to capture the type of sports and training the participant has engaged in. Following this, participants completed the Tapeley-Bryden dot marking task, which is a speed-accuracy measure assessing the performance of both the dominant and non-dominant limbs. Given the low number of left-handed participants who completed the experiment, only results from the right-handers will be discussed. Results indicated that all participants completed the task faster with their dominant limb as compared to their non-dominant limb (t(17) = 12.0, p < .001). Participants were then divided into those who had explicit training of their non-dominant limb in a sport (e.g., basketball dribbling) and those who received no such training. Here, it was found that the differences between the two hands were smaller and non-significant for those with training (t(12) = 2.2, p = .09) than for those without training (t(12) = 9.85, p < .001). However, no differences were noted between the two groups with respect to hand preference as measured by the Waterloo Handedness Questionnaire. This continues to build on our work indicating that prior training experiences may influence hand preference and performance abilities. Funding source: NSERC.

Handedness in young Canadian baseball players

Pamela Bryden, Wilfrid Laurier University; Adam Robertson, Wilfrid Laurier University

It has been suggested that handedness selection can alter Major League Baseball performance and lead to potential advantages. Brown and colleagues (2019) specified that there was a batting advantage, for left-handed batters who throw right-handed, termed “sinister right-handed players.” These advantages have led to being more likely to have a career batting average of over .299 and more than 7 times more likely to make the major leagues. Cairney et al., (2018) identified that children exposed to hockey early in their development as athletes might be more likely to bat left when they choose to play baseball. The proportion of left-handed batters born in Canada is higher than in other countries leading to higher batting averages. Therefore, the purpose of the current study was to examine young Canadian students and whether playing hockey in their childhood would increase the likelihood of playing at the post-secondary or professional level. Two-hundred and seventy-seven participants (16 to
26 years of age) who had played either baseball or softball were recruited through social media platforms. All participants completed a questionnaire including demographic information, prior sports experiences (specifically hockey and baseball experiences), and questions from the Waterloo Handedness Questionnaire (WHQ). Overall, there was a larger proportion of left-handers than expected in the sample (~15%). The majority of participants (82.7%) had prior experience playing hockey. Looking more closely, there was a greater than expected number of right-handed players who were sinister right-handers (35.2%). Interestingly, 46% of athletes in the sample with hockey experience achieved the collegiate or junior level of baseball, indicating the positive effects of hockey on baseball output. In conclusion, although still in progress, this study appears to have a clear connection between overall handedness and future successes in baseball due to prior experience playing hockey. Funding source: NSERC.

The effects of physical activity on bilateral transfer in young and older adults

Sean Cochran, Roanoke College; Christopher Aiken, New Mexico State University

Bilateral transfer is the change of motor performance in one limb following practice with the other (Parlow & Kinsbourne, 1989). Transfer between limbs in younger adults is typically asymmetrical, meaning a greater amount of change is observed in the nondominant limb (ND) following practice with the dominant limb (D) than vice versa (Pan & van Gemmert, 2013). Asymmetrical transfer is associated with lateralized hemispheric control of movement parameters according to the dynamic dominance model (Sainburg, 2002). Older adults demonstrate more symmetrical transfer caused by additional ipsilateral hemispheric activation as a compensatory mechanism (Cabeza, 2002). Physical activity helps maintain lateralized hemispheric activation in older adults, suggesting asymmetrical transfer could be retained as we age with high levels of physical activity (HPA) (McGregor et al., 2013). Two studies were conducted, one with young adults aged 18–35 (N = 50) and another with older adults aged 65–81 (N = 38). Participants were assessed for hand dominance and reported weekly physical activity levels. Participants were grouped by reported physical activity level and assigned training limb. Individuals performed a 30° visual rotation drawing task. Pre-test of 2 trials established baseline performance of each limb, followed by 40 practice trials on the assigned limb. Post-tests mirrored pre-tests and assessed practice induced changes. For younger adults, HPA resulted in the improved performance of movement time (MT), normalized jerk (NJ), trajectory length (TL), and initial direction error (IDE) in the D limb following ND practice (p < .05). Low levels of physical activity (LPA) showed symmetrical transfer for IDE, meaning either limb improved due to assigned limb training. For older adults, HPA resulted in the improved performance of MT, NJ, TL, and IDE in the D limb following ND limb practice (p < .05). LPA showed no transfer (p > .05). Findings from both studies indicate that HPA elicited asymmetrical transfer, thus suggesting HPA assists in retention of lateralized hemispheric activation.

Analysis and validation of commercially available immersive virtual reality games

Bruna de Souza da Silva, Georgia State University; Eryn Render, Georgia State University; Mansi Patel, Georgia State University; Huy Chien, Georgia State University; Andre Yousif, Georgia State University; Maggie Abercrombie, Georgia State University; Yuping Chen, Georgia State University

Immersive virtual reality (IVR) gaming has witnessed a surge in popularity, offering experiences that engage players physically and cognitively; however, there is a lack of understanding of the potential health implications. The aim of this study was to examine the effects of five IVR games on heart rate (max, average, max change), number of total arm movements (unilateral and bilateral), and the average number of arm movements per minute. Twenty-seven healthy adults (8 males) played five IVR games (Fruit Ninja [FN], Tennis [T], Baseball [BB], Bowling [B], Beat Saber [BS]) on the Meta Quest 2. The Polar Beat monitor and iphone were used to collect heart rate and to record arm movements. A repeated measures ANOVA and paired t-test were used for analyses. A detailed game analysis table was created first. For heart rate data, FN and T demonstrated a significantly higher max and average heart rate compared to BB, B, and BS (p < .001). FN had a statistically higher max heart rate change than other games (p < .002). For the number of total arm movements, FN and BS produced significantly higher numbers than the other 3 games; BS also had higher numbers than T and B; and T had higher numbers than B (all p < .001). T demonstrated a significantly higher % of unilateral arm movements compared to FN and BS (p < .001). FN demonstrated a significantly higher % of bilateral arm movements than both T and B (p < .001). BS also demonstrated a higher % of bilateral arm movements than T (p < .001). FN and BS each demonstrated a significantly higher average number of arm movements per minute than T, B, and BB (p < .001). Our findings suggested that different games might elicit different responses: FN elicits the greatest heart rate change; FN and BS could elicit greater number of total arm movements, % of bilateral arm movements, and average number of arm movements. Meta Quest 2 games could potentially be used to train arm function. When designing a VR intervention program for clinical populations, it is important to consider the game and the goals as factors in influencing their performance. Funding source: National Institute on Disability, Independent Living, and Rehabilitation Research (award number: 90IFST0009).

The influence of different virtual partners when performing a redundant visuomotor rotation task

Daniel Deletu, McMaster University; Nour Al Alif, McMaster University; Mikayla Lalli, McMaster University; Lidia Barbera, McMaster University; Ola Schwarzenberg, McMaster University; Vida Sassman, McMaster University; Rakshith Lokesh, Northeastern University; Joshua G.A. Cashuback, University of Delaware; Michael J. Carter, McMaster University

From a parent guiding their toddler when learning to brush their teeth to a physical therapist assisting a client with their range of motion, physically interacting with other people is ubiquitous in our daily life. While some researchers have shown that haptic human-human interaction benefits performance during training as well as later individual performance (Takagi et al. 2017), others have failed to replicate these benefits (Beckers et al. 2018). Participants in these interaction groups were not aware they were haptically linked to a partner and each participant had independent control over their own virtual cursor when tracking the target. Yet, we are typically aware when we are interacting with others and often do so with tasks where we have shared control over the same control point (e.g., a toothbrush). Here, we tested the effectiveness of training alone versus training with a virtual partner when individuals were made aware of their interaction in a redundant reaching task. Participants (N = 100) completed 50 baseline trials followed by 200 trials with a clockwise cursor rotation in one of four randomly assigned groups. Two of the groups performed the adaptation trials with a virtual partner that represented either the fast (Fast Group) or slow (Slow Group) state of the two-state model (Smith et al. 2006) with 30-deg rotation. The two remaining groups performed the task alone with either the 30-deg rotation (Full Alone Group) or a 15-deg rotation (Half Alone Group). Results showed that participants in the Fast Group contributed less to correcting the rotational error early in the
adaptation block, but were responsible for most of the correction later in this block, with performance most similar to the Full Alone Group. Conversely, participants in the Slow Group corrected for a greater proportion of the initial errors, but their contribution began to drift during adaptation, with performance resembling that of the Half Alone Group. This pattern of results were consistent with our theory-driven simulations. Funding source: Natural Sciences and Engineering Research Council of Canada, Canadian Foundation for Innovation, Ontario Research Fund.

Effects of treadmill training intervention on kinematic patterns of stepping in infants with Down syndrome
Alexandre dos Santos Kotarski, Georgia State University; Robert Zeid, Georgia State University; Patrick Underwood, Georgia State University; Amy Talboy, Emory University; Seyda Ozcaliskan, Georgia State University; Jianhua Wu, Georgia State University

Down syndrome (DS) is a genetic disorder associated with several brain deficits and delayed psychomotor development, including walking skills, compared to typically developing infants. Previous studies have shown that treadmill intervention is effective in advancing walking onset and quality. However, the mechanism of neuromotor changes is unknown for treadmill intervention. This study aimed to examine the kinematic and spatiotemporal characteristics of stepping over a 5-month span. Eight infants with DS (6M/2F, 11.3±3.3 months) entered the study for treadmill intervention. A pediatric treadmill was provided to the infant and the parents conducted the training for 8 min/day, 5 days/week, starting at a belt speed of 0.1 m/s. At our monthly visit, we used a high-speed camera and reflective markers that were placed on the infant’s right hip, knee, ankle and foot to record a 3-minute stepping trial. Here we report the results from three visits: V1, V3 and V5. Kinematic variables included peak hip and knee joint angle and velocity. Spatiotemporal variables were step length and cadence. A series of one-way (visit) repeated measures ANOVA were conducted using the SPSS software. Results showed that from V1 to V3 to V5, peak knee extension increased from 26.2 to 33.3 to 41.1 deg, peak knee extension velocity increased from 38.4 to 91.1 to 145.3 deg/s, peak hip extension increased from 4.6 to 6.7 to 10.1 deg, and peak hip extension velocity increased from 39.5 to 72.5 to 79.4 deg/s. Step length increased from 105.6 mm at V1 to 148.7 mm at V3 to 147.9 mm at V5. Step cadence increased from 3.9 steps/min at V1 to 4.2 steps/min at V3 to 10.7 steps/min at V5. These results demonstrated improvements in kinematic and spatiotemporal variables in the first five months of treadmill intervention which typically lasts for about 10 months. Future studies will continue to register the kinematic and spatiotemporal progress in infants with DS during treadmill intervention and examine step variability which was seen due in part to lower muscle tone and joint laxity.

Relationship between gait fractal dynamics and fall risk in older adults
Scott Ducharme, California State University, Long Beach; Alec Sequeira, California State University, Long Beach; Ayla Donlin, California State University, Long Beach; Jackie Dawson, California State University, Long Beach

While walking, the variability of timing between ipsilateral footsteps (i.e., stride time) correlates with fall risk in older adults. Furthermore, the structure of this variability, i.e., fractal dynamics, may also estimate fall risk because it may represent an individual’s ability to adapt their stepping patterns. That is, greater gait adaptability should logically correlate with lower fall risk. However, to date this relationship has not been established. The purpose of this study was to investigate the association between gait fractal dynamics and fall risk. Eight older adults (3M, 5F; age 69.4±3.2 years) performed the Timed Up and Go (TUG) test, which is commonly used to quantify fall risk. Participants then performed three 5-minute treadmill walking trials at; preferred walking speed (PWS), half of their PWS (Half-PWS), and 0.22 m/s (~0.5 mph; Slow). Heel strike events were obtained via kinematics of heel trajectories, which were then used to obtain stride times. Evenly spaced detrended fluctuation analysis (DFA) was used to quantify stride time fractal dynamics. Results from the TUG tests showed an average of 9.9±2.6 seconds (range [7.79, 16.72]). Fractal dynamic values were 0.72±0.08, 0.78±0.19, and 0.81±0.13 for the PWS, Half-PWS, and Slow conditions, respectively. Fractal dynamics displayed almost no correlations with the TUG scores during PWS ($R^2 = .01$) and Half-PWS ($R^2 = .06$). In contrast, the Slow condition exhibited a moderate negative correlation ($R^2 = .24$), whereby higher fractal dynamic values corresponded with shorter TUG times, indicative of lower fall risk. These findings align with prior studies in which unperturbed walking at typical speeds did not yield differences related to age or physical activity levels, yet when participants were exposed to a challenging task (i.e., slow or asymmetric walking), differences between sub-groups emerged. This study provides preliminary support for the use of fractal dynamics to estimate fall risk. Moreover, extremely slow walking constraints may be a superior setting to adequately test for gait deficiencies.

Tandem balance as a predictor for balance asymmetries in women
Atousa Ebrahimi, University of North Carolina at Greensboro; Louisa Raisbeck, University of North Carolina at Greensboro; Stephen Glass, Radford University at Carilion; Scott Ross, University of North Carolina at Greensboro

Women soccer players sustain more quadriceps, ACL, and ankle ligament injuries than their men counterparts, however, they occur less from contact mechanisms than men. Poor balance and asymmetry between limbs are associated with injury. Assessing balance can identify athletes who may need balance therapy for injury prevention. This study examined tandem stance balance to determine if poor balance or asymmetries exist in women and men soccer players with and without a history of lower extremity injuries. Participants with and without a history of injury included 27 women and 33 men collegiate soccer players. Balance was assessed in tandem stance requiring participants to stand heel to toe on a force plate for 3 10-sec trials on each limb. Participants were instructed to remain as motionless as possible with their eyes closed. Center-of-pressure resultant velocity assessed balance of both limbs and lower values were indicative of better balance. A limb X sex X injury history interaction was assessed with a repeated measures ANOVA ($\alpha = .05$) and LSD post-hoc examination of mean differences. The left-side balance of women with injury ($0.89 \pm 0.51$ cm/s) was better than 5 comparisons (injury: women right-side = 1.22 ± .53, men left-side = 1.28 ± .74; no injury: women left-side = 1.31 ± .47, men right-side = 1.19 ± .24, left side = 1.44 ± .84) but not two others (injury: men right-side = 1.11 ± .49; no injury: women right-side = 0.91 ± .38). Women without injury had better right-side balance than women with injury. However, men with injury had better right-side balance than the left-side for men without injury. Interestingly, women showed asymmetry between sides regardless of injury status and men did not. Our results do not support the notion that poor balance would identify candidates for therapy to prevent injury since better or equivalent balance was found on most comparisons between men and women in both groups. However, women clearly had balance asymmetries regardless of injury history and may need balance therapy to equate sides to reduce injuries associated with women soccer players.
The Impact of aging and Parkinson’s disease on interlimb coordination: An investigation of gait adaptability

Morteza Farivar, Texas Christian University; Adam C. King, Texas Christian University

Interlimb coordination, which refers to synchronizing movements between different limbs, is an essential part of human movement. A lack of coordination can cause gait dysfunction and instability, which are commonly experienced by older adults and individuals with Parkinson’s Disease (PD). Our scoping review aimed to explore the impact of older adults/aging and (PD) on interlimb coordination as it relates to gait adaptability. This study focuses on older adults and individual with PD (>52 years old), with assessment of interlimb coordination during gait, in an open context, according to the Population, Concept, Context framework. A literature search was performed in PubMed, Web of Science, Scopus, SPORTDiscus, and gray literature in Google Scholar, according to the PRISMA-ScR recommendations. Studies written in English language and published between 2006 and 2023 were included. Qualitative studies, conference proceedings, letters, and editorials were excluded. The pivotal research domains identified were “Parkinson’s Disease”, “Inter-limb Coordination”, “Gait Adaptability”, “Older Adults”, “Kinematic”, “Electromyography”. The search identified 710 potentially relevant studies, with a total of 17 fulfilling the established criteria. Interlimb coordination was assessed during walking in treadmill (n = 2), overground (n = 14) and both (n = 1). The comprehensive assessment comprised a clinical evaluation, a detailed gait kinematic analysis focusing on spatio-temporal variables and the range of motion in joint angles, and a thorough analysis of interlimb coordination. Interlimb coordination impairments, particularly in older adults and individuals with PD, can lead to falls and injuries due to their impact on gait adaptability. Identifying fall risk through the assessment of gait coordination allows for targeted interventions that enhance gait adaptability. Therefore, prioritizing gait assessments in these populations is crucial for developing effective fall prevention strategies.

Anticipatory ability scales with spatial exaggeration of an opponent’s action

Kazunobu Fukuhara, Tokyo Metropolitan University; Hiroki Nakamoto, National Institute of Fitness and Sports in Kanoya; Takahiro Higuchi, Tokyo Metropolitan University; David L Mann, Vrije Universiteit Amsterdam

Research in sports anticipation has investigated the mechanisms underpinning skilled anticipation and the usefulness of perceptual training, often utilizing video stimuli depicting the movements of opposing players. However, a common limitation is the absence of opponent models tailored to the individual observer’s anticipatory abilities. This limits the degree to which rigorous experiments can be designed (e.g., in testing at an individual’s performance threshold) and prevents adaptable training paradigms tailored to an individual’s ability. To this end, we created tennis avatars performing forehead groundstrokes using kinematic data and spatially exaggerated the kinematic features specifying the shot direction. While previous studies have demonstrated that kinematic exaggeration enhances the accuracy of identifying movement types such as the tennis serving style, it remains uncertain whether it also enhances accuracy in anticipating the outcome of opponent’s action. The aim of this study was to examine whether increases in kinematic exaggeration result in a commensurate increase in accuracy when anticipating the outcome of those actions. Twelve skilled and 19 novice tennis players were asked to anticipate the direction of forehead shots performed by the avatar within an immersive virtual environment. We established nine exaggeration conditions (5% to 400%), evaluating anticipation accuracy and sensitivity (d') in each condition. The results showed a significant enhancement in anticipatory performance as the degree of exaggeration increased, a relationship observed in both skilled and novice players. In the 150% to 400% exaggeration conditions, skilled players consistently outperformed novices significantly. These findings underscore the influence of participants’ anticipatory abilities on the quantity/quality of information extracted from the opponent’s kinematic cues. The exaggerated avatars have properties to manipulate the difficulty of the anticipation task, suggesting promising prospects for tailored testing/training to the participant’s skill level.

Stretch times of acute opposing ankle muscles: Stretch less to sway less

Taylor Gauss, Louisiana State University; Rhys Lormand, Louisiana State University; Matthew Yeomans, University of South Carolina Upstate; Jan Honzinski, Louisiana State University

Benefits of static stretching include improved flexibility and range of motion; however, the impact of static stretching on postural sway and proprioception remain unclear. We previously showed that acute stretching of opposing ankle muscles in 2–4 30 s bouts decreased sample entropy, thus automated control of sway, and increased center of pressure (COP) variability in the mediolateral (ML) direction compared to no stretch (NS) and/or non-opposing ankle muscle stretches. Interestingly, standing sway remained the same after stretching the non-opposing ankle muscles, despite different stretch times. Here we determined if postural sway would differ for various times of acute opposing ankle muscle stretches. Twelve young adults (4 F/8 M; Age 25 +/- 4.9 years) received NS or passive plantar- and dorsi-flexion stretching to discomfort for 2–4 bouts of 15, 30, or 45 s before performing 3 trials of static stance (barefoot participants stood as still as possible with eyes closed for 45 s on an ATMI force plate) and proprioception tasks (participants actively matched remembered ankle angles, measured by a handheld goniometer). Repeated measures ANOVAs revealed increased M-L standard deviation (SD) and M-L displacement (D) in the 45 s condition compared to NS (p < .05). As with our previous outcomes, results revealed that lower M-L sample entropy after stretching compared to NS (p < .001), stretching did not influence proprioception or anteroposterior sway, and proprioception error negatively correlated with M-L SD and M-L D, especially in more flexible participants. Thus, a better ability to actively reproduce ankle positioning likely encourages an internal focus of attention on movement, known to increase postural sway. Moreover, while less automation of M-L sway occurs after stretching bouts as short as 15 s, it takes only 2–4 bouts of opposing muscle stretching for 45 s to increase postural sway displacement and its variability. We recommend use of less than 45 s bouts of stretching when prioritizing reduced postural sway.

Comparing executive function in adults with and without ADHD

Nancy Getchell, University of Delaware; Etham Bakhshipour, University of Delaware; Roxana Burciu, University of Delaware; Roghayeh Barmaki, University of Delaware

Previous research has demonstrated that the N-back test, a visuospatial task that requires storage and continual updating of information in working memory, can reveal significant differences between individuals with attention deficit hyperactivity disorder (ADHD) and without ADHD. The current study utilized functional near infrared spectroscopy (fNIRS) to compare prefrontal cortex (PFC) oxygenation in these populations. To address this, a two-way ANOVA was conducted, assuming group as one factor and task level as another factor. Thirty-two participants (15 with ADHD, 17 without ADHD) completed a N-back test, with three different
levels of the test (N= 1, 2, 3) while fNIRs simultaneously recorded PFC oxygenation change. Overall, fNIRS revealed a greater PFC activity during 2-back vs 1-back in both groups. Funding source: College of Health Science equipment grant, Graduate college summer doctoral fellowship grant, KAAP dissertation grant, professional development awards (University of Delaware).

Exploring the relationship between physical activity levels and implicit learning proficiency in young adults

Richard Guerra, Eastern New Mexico University; Prabha Shrestha, Eastern New Mexico University

Exploring the intricate relationship between physical activity (PA) and implicit learning (IL) in young adults, this study aims to unravel the correlations between various PA levels and IL proficiency. A cross-sectional design was employed, with thirty-five college-aged participants (F = 18, M = 17) completing the International Physical Activity Questionnaire-Form (IPAQ) for PA levels before the Triplets Learning Task (TLT), a computer button-pressing task for IL proficiency. Categorized by IPAQ, PA levels ranged from vigorous to moderate activities or a combination totaling ≥ 600 MET minutes per week. Statistical analyses were employed to identify significant differences and associations, including ANOVA and t-tests for group comparisons and regression and correlation analysis to examine relationships between PA levels and IL proficiency. This study identified four distinct PA choices and assessed IL through reaction time and accuracy. A two-sample t-test revealed a significant gender difference in reaction time (Males: M = 37.5, Females: M = 1.06s; t(31) = -2.81, p = .008), indicating faster responses in males. Our findings show no influence of PA level on IL, contradicting Guerra et al. (2021), which showed enhanced IL capabilities in cardiovascular and resistance training participants. Highlighting the complexity of PA’s impact on IL, this research underscores the need for further nuanced investigation into PA strategies and regimens. Integrating moderate to vigorous PA could play a critical role in cognitive development programs, enhancing IL in diverse educational contexts. Future studies are encouraged to delve deeper into the mechanisms linking PA with IL, potentially guiding more tailored and effective cognitive enhancement strategies. These insights pave the way for innovative educational initiatives incorporating physical fitness and activity as components of learning enhancement methodologies. Such integration could significantly affect pedagogical practices and learner outcomes.

The development of a novel, non-binary measure of motor planning flexibility

Jesse Hansen, Utah State University; Rachel Larson, Utah State University; Breanna E. Studenka, Utah State University

The ability to properly change from one movement to another is important for individuals to adapt to their environment and interact with others (Cox & Smitsman, 2006, Rosenbaum, 1992). Studies have shown (Lebkuecher et al., 2022, Schutz & Schack, 2019, Weigelt et al., 2009, Cohen & Rosenbaum, 2011) that, for binary tasks, individuals show a hysteresis effect, (the reuse of previous motor plans), which decreases end-state comfort when a task is changed. To date there is no agreed-upon method for measuring planning flexibility. This study’s purpose was to develop a non-binary measure of motor planning flexibility. The study used 24 participants (18 to 27 years), who performed the task twice on two different days. Each participant performed the task of grasping the top of the cylinder on the object (8 pointers 45° apart connected to a central cylinder) and rotating it clockwise either 0°, 45° or 90°. After grasping the object, they rotated the colored pointer on one side of the object to the corresponding-colored target located at either −90°, −45°, 0°, 45° or 90° with respect to the center of the object only using their wrist, elbow or shoulder and without using their fingers or adjusting their grasp. Task sequence lengths of 1, 3 and 6 were used before a task switch (e.g.: 0°, 0°, 0°, −90° – sequence length 3). Ninety tasks were performed within a session for each day. All participants performed sequence length 1 first. Odd participants then performed sequence length 3, then 6 and even participants performed sequence length 6 then 3. Results showed no significance sequence length effect on beginning or end-state hand position. There was also, on average, a positive lag autocorrelation from 1 to 3 indicating a declining effect of prior grasps (up to about 3) on the current grasp choice, which helps to explain why sequence lengths longer than 1 had no increasing hysteresis effect. Interestingly, the lag effect varied among participants demonstrating the need to examine individual differences as we further develop this task.

When might an internal focus prove beneficial? An exploration of attentional focus instructions across skill levels

Edward Hebert, Southeastern Louisiana University; Christopher Aiken, New Mexico State University; Kevin Becker, University of Tennessee; Cameron Diez, Southeastern Louisiana University

Recent work has challenged the conclusion that an external focus should be used universally to support motor learning. Some authors have suggested an internal focus could be beneficial in the earliest stage of learning when learners are conceptualizing how their body needs to move, with an external focus being more useful in later stages. The purpose of this study was to examine the effects of internal (INT), external (EXT), or internal-then-external (INT-EXT) attentional focus instructions on learning a bowling task. Participants were 63 college students separated into Beginner (n = 30) and Intermediate (n = 33) groups based on self-described experience and a pretest. They were assigned to 3 conditions using a stratified approach to balance experience and gender. Over 4 days, participants completed a pretest, 50 acquisition trials, and retention/transfer tests of a bowling task. They rolled a rubber bowling ball toward 7 bowling pins arranged horizontally from a distance of 14.63m (48ft) during acquisition and retention, and 16.46m (54ft) during transfer. Pins were separated by 30.48cm (12in), and marked with points for scoring (1–4). The goal of the task was to strike the center pin (worth 4 points). For acquisition, participants were given the following instructions: (1) INT: focus on moving your hand back and forward in a straight line; (2) EXT: focus on the middle pin; roll the ball directly at it; or (3) INT-EXT: INT instructions for the first 25 trials, EXT instructions for the last 25 trials. Points were recorded for each trial and averaged across blocks of 10 trials. Separate 2 (Experience Level) x 3 (Condition) ANOVAs showed significant Experience Level differences across the study, and a significant Experience x Condition interaction for retention and transfer. In Beginners, INT resulted in higher retention and transfer scores than EXT or INT-EXT. No significant group differences were observed for intermediate learners. These results provide evidence that internal focus instructions may be more effective for early-stage, lower skilled learners.

Instructional adherence during a sprinting task using attentional focus cues

Alice Hibbard, University of North Carolina Greensboro; Amanda Barcliff, University of North Carolina Greensboro; Louisa Raisbeck, University of North Carolina Greensboro

Attentional focus (AF) directs attention internally or externally. Using an external focus (EF): directing attention to the effects of the movement on the
Cardiopulmonary resuscitation (CPR) is a crucial clinical psychomotor skill performed by athletic trainers (ATs) under stressful, distracting conditions; thus, it is imperative to practice CPR under conditions simulating real scenarios. A common strategy for improving motor skill performance is attentional focus (AF). Research has demonstrated that an external attentional focus (EF; effect of the movement) is more beneficial than an internal attentional focus (IF: directing attention to the movement itself). Compliance checks in research are used to confirm adherence to instructional cues. Research on AF has not consistently shown how to measure adherence to the focus cues. This study examined adherence between AF groups during a sprinting task. Participants were randomly assigned to one of three groups: EF (n = 4, 22.75 ± 2.06 yrs), IF (n = 4, 21.75 ± 1.71 yrs), or control (n = 4, 21.75 ± 0.96 yrs). Participants completed 3 × 20-m baseline sprints. During acquisition, participants completed 3 × 20-m sprints using AF cues. EF instructions were “focus on driving forward as powerfully as possible while clawing the floor with your shoe as quickly as possible” and the control group received no instructions. Following each sprint trial participants completed a self-reported compliance check asking, “how much were you able to follow the given instruction while performing the task”. A repeated measures ANOVA for adherence revealed no significant differences between the attentional focus conditions F(2,8) = 1.459, p = .288. Overall, those in the EF condition reported greater adherence than the IF condition in later trials: EF (Trial 1 M = 5.25 ± .50, Trial 2 M = 5.25 ± .50, Trial 3 M = 5.50 ± .58) and IF (Trial 1 M = 4.00 ± 1.16, Trial 2 M = 4.25 ± .50, Trial 3 M = 4.50 ± .58). These results suggest that a larger sample size is needed to increase overall statistical power, and during the acquisition phase more sprinting trials are needed as participants may not be able to follow assigned instructions until they reach a certain level.

Exercising attentional focus, anxiety, and mental workload in a CPR augmented reality simulation

Aleiza Higgins, University of North Carolina Greensboro; Scott Ross, University of North Carolina Greensboro; Aaron Terranova, University of North Carolina Greensboro; Louisa Raisbeck, University of North Carolina Greensboro

Effects of neural motivational system, impulsivity, and working memory on performance of a shoot/don’t shoot task with and without high cognitive load

Robert Horn, Montclair State University; Skylar Paletta, Montclair State University; Gustavo Heidner, Montclair State University; Daniel Gwon, Montclair State University; Nicholas Murray, East Carolina University; Luis Torres, Montclair State University; William Lewinski, Force Science Institute

The shoot/don’t shoot (SDS) task requires people to rapidly distinguish between the threat of gunfire and similar non-threatening movements. These situations attract intense media scrutiny and research is urgently needed to establish reasonableness and identify cognitive- and personality-based risk factors. To date, limited effects of impulsivity and working memory have been examined with this task. Here, we tested the effects of impulsivity and working memory (WM) with and without a cognitive secondary task in which participants had to rapidly assess the accuracy of the dispatch message describing the suspect before they appeared. We also examined the effects of behavioral activation (BAS), behavioral inhibition (BIS), and fight/flight/freeze measures (rRST-Q; Reuters et al., 2015). Participants (18 male; 12 female) completed the rRST-Q, Barratt BIS-11 impulsivity test, and a complex span WM test. The SDS task used a training gun in response to the video presentation of six scenarios, for which there was a shoot and don’t shoot version. Each was shown twice with and without the dispatch message (DM; no-DM), in a randomized order. Dependent measures were shoot errors, fail-to-shoot errors, response time, and response accuracy. Using independent t-tests (p < .05), in the DM condition, participants with higher BAS, BIS, and motor impulsivity scores showed more shoot errors than those with lower scores. Also, participants with higher flight scores showed faster response times, and participants with lower WM scores made more fail-to-shoot errors than those with lower scores. In the no-DM condition, higher motor impulsivity and lower WM were associated with higher fail-to-shoot errors. Compared to the no-DM condition, in the DM condition, participants increased their accuracy, maintained their response time, and made fewer fail-to-shoot errors. However, they made more shoot errors. This implies adopting a strategy under high cognitive load that increases the risk of erroneous shootings.

Neuromotor performance is influenced by blast magnitude in military personnel

Charlend Howard, Old Dominion University; Marcia Dovel, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; Justin Toxey, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; Rie Leveret, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; Alexander Hill, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; David Keyser, Uniformed Services University; Walter Carr, Walter Reed Army Institute of Research; Rene Hernandez, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; Sheilah Rowe, Uniformed Services University, Henry M. Jackson Foundation for the Advancement of Military Medicine; Andrea Gonzales, Applied Research Associates; Sathee Wiri, Applied Research Associates; Michael Roy, Uniformed Services University; Christopher Rhea, Old Dominion University

Variability in a neuromotor task can be an indicator of neurological functioning. Our previous work showed recurrent low-level blast (LLB)
exposure from heavy weapons training contributes to a decline in neuromotor variability six hours after LLB exposure. This study examined the relation between blast exposure magnitude—measured via maximum overpressure and impulse—and neuromotor variability six hours after LLB exposure. The coefficient of variation of the maximum flexion angle of the thigh during a stepping in place task was assessed with a custom smartphone app and used as the neuromotor variability metric. We hypothesized that a negative correlation would be observed; higher blast exposure magnitude would be associated with lower neuromotor variability (i.e., more robotic movement). A total of 110 active-duty military personnel (n = 65 Special Operators [SOs], n = 32 Range Safety Officers [RSOs], and n = 13 SOs Trainees [Trainees]) performed the stepping-in-place task before repetitive LLB exposure from heavy weapons training and again six hours after the training. Correlation analysis revealed a significant negative correlation between the Trainee’s maximum blast overpressure and neuromotor variability (r = −.62, p = .02). Additionally, a weaker, yet significant negative correlation was observed for SOs between blast impulse and neuromotor variability (r = −.288, p = .02). No relationship between blast magnitude and neuromotor variability was observed for RSOs. Trainees may have exhibited the strongest dose response to blast magnitude due to their relatively novel exposure to repetitive LLB. SOs have been previously exposed to LLB as part of their duty, which may have decreased their sensitivity to the blasts. RSOs stand further away or have at least 3 feet between them and the blast which may dampen blast magnitude, leading to no relation with neuromotor variability. Future research will examine this dose response effect in a larger sample size across the three groups, as well as its relation to other indicators of neurological functioning (i.e., cognition). Funding source: The INVICTA Study is supported by Award HU00012220065 and a subcontract to Christopher K. Rhea (HJF subcontract 5975). The Uniformed Services University of the Health Sciences (USU), 4301 Jones Bridge Rd., A1040C, Bethesda, MD 20814-4799 is the awarding and administering office.

**Similarities in brain activity during motor imagery and motor execution: A systematic literature review**

**Judith Jiménez-Díaz, Universidad de Costa Rica; María Gabriela Morales-Scholz, Universidad de Costa Rica**

This study aimed to summarize and analyze the scientific evidence on brain activity while performing motor imagery (MI) and execution (ME). A comprehensive search across eight databases identified eighteen relevant studies published up to 2023. Inclusion criteria involved studies with healthy participants of all ages, incorporating neural activity assessments during MI and ME of a motor skill. The aggregated sample size across these studies comprised 313 participants. Predominantly, fMRI and fNIRS were employed to assess brain activity. The mean number of activated brain areas reported across the 18 studies was 6.44 for ME and 5.56 for MI. Notably, five areas exhibited more frequent activation: BA1, BA4, BA6, BA40, and the cerebellum. For BA1, 94.4% of studies reported brain activity during ME, compared to 72.22% during MI. 77.78% and 72.22% of the studies reported brain activity for BA6 during ME and MI, respectively. For BA4, 72.22% reported activity during ME, while 55.56% during MI. Concerning the cerebellum, 55.56% reported activity during ME, whereas 33.33% during MI. Eight of the 18 studies specified which condition was associated with greater intensity of brain activity. Seven of the eight studies indicated more intense activity in BA4 during ME than MI, while one reported the opposite. Four studies noted greater intensity in BA1 and BA6 during ME, with two reporting higher intensity during MI, for BA6. No studies reported a higher intensity of BA1 during MI. Additionally, three studies observed more intense activity in BA40 during ME, while two reported higher intensity during MI for the same area. In conclusion, similarities were observed in terms of the reported number of activated areas, with at least five regions displaying similar frequencies for both conditions. Furthermore, four out of five regions exhibited comparable intensity levels. These results support the proposal that ME and MI rely on similar neural mechanisms; explaining the benefits of using mental practice to improve motor performance.

**The effect of variability practice on baseball hitting**

**Min-Jae Ju, Yonsei University; Soo-Jung Yang, Yonsei University; Seon-Young Ahn, Yonsei University; Ye-Ji Choi, Yonsei University; Jong-Hyun Lee, Yonsei University; Yong-Jin Yoon, Yonsei University; Seong-Kwan Cho, Texas A&M International University**

Baseball is one of those open-skill sports in which performance improves with various practice. As batters have to judge and predict the unpredictable ball thrown by pitchers within a short period of time, they need to perform various practice to improve their hitting accuracy, but there is a lack of prior research on this topic. Taking all the above into account, this study aims to investigate the variability types of hitting practice were divided to confirm how each practice affects hitting accuracy. To accomplish the purpose of the study, four subjects were randomly assigned to each contextual interference (CI) and differential learning (DL) practice (N = 8). In this study, the experiment was limited to the inside and outside of the baseball strike zone. A random hitting operation was performed 15 times for each course (in and out) and each group (DL and CI), and hitting scores were evaluated on a 3-point Likert scale (1. Missed, 2. Bad Hit, 3. Perfect Hit). The pre- and post-training hitting scores were calculated through descriptive statistics analysis using the mean and standard deviation values. In addition, the Cohen’s D formula was used to compare the improvement of the hitting score for each training. The results of the study showed that DL practice significantly improved hitting scores compared to CI practice in the In course, but the effect size was small as .165 (95% CI = .073 – .257). These results indicate that DL practice is effective in improving contact ability for the In course. On the other hand, CI practice does not seem to improve rotation and rotation-related skills in the In-course. In the Out course, CI practice had a significant effect on improving the batting score compared to DL training, but it showed a medium effect size of −.531 (95% CI = −.756–.307). This seems to have been more effective in the Out course because the short and long moment of bat inertia was repeated during CI practice, which increased the subjects’ wrist hinge technique. On the other hand, DL practice seems to be insufficient to improve coordination for the out course.

**Physical activity may not protect against proprioceptive decline in Parkinson’s disease**

**Jason Kang, University of Minnesota; Jacquelyn Sertic, University of Minnesota; Jürgen Konczak, University of Minnesota**

Parkinson’s disease (PD) is a neurodegenerative disease associated with progressive motor and somatosensory decline. A physically active lifestyle can preserve proprioception – the awareness of body position and movement – from age-related decline in healthy aging adults. However, it is unclear whether it also preserves proprioception in PD. We hypothesized that physically active people with PD (n = 11) would also show preserved proprioceptive function. We applied a psychophysical method to measure ankle position sense just-noticeable-difference (JND) threshold. For 35 trials, the ankle was rotated to a 15° reference and a comparison (<15°) position. Participants verbally indicated which position was perceived to move further. Based on the verbal response and perceived movement, a psmarginal algorithm selected the next comparison position. Physical activity
The effect of unilateral ankle loading on spatiotemporal gait parameters in adults and children during treadmill walking

Yeon-Joo Kang, Georgia State University; Haneol Kim, University of Wisconsin-La Crosse; Jiahua Wu, Georgia State University

Healthy populations display a relatively symmetrical gait pattern. However, gait symmetry can be compromised due to pathology or injury. One way to introduce gait asymmetry is by adding weights on one leg only (i.e., unilateral loading). We found that with unilateral ankle loading, young adults increase step length on both sides and increase step time on the loaded side but decrease it on the unloaded side. The purpose of this study was to examine the effect of unilateral ankle loading on spatiotemporal gait parameters between adults and children during treadmill walking. Twenty adults (aged 18–35 years, 10M/10F) and 11 children (aged 6–12 years, 5M/6F) completed 5-minute treadmill walking trials under four load conditions in a random order: no load and ankle loads which increased the moment of inertia of the lower leg by 25%, 50%, and 75%, respectively. The Vicon lower-body model with 16 markers was used to collect the gait data. Spatiotemporal variables included normalized step length and step width, step time, stance percentage, and swing percentage. Three-way (2 group x 2 side x 4 load) mixed ANOVA were conducted on each variable. Results showed that while adults displayed similar step length between the two sides, children produced longer step length on the loaded side than on the unloaded side. In contrast, children displayed similar step width between the two sides, adults produced greater step width on the loaded side than on the unloaded side. Both groups increased step time on the loaded side and decreased it on the unloaded side with increasing ankle load; children had longer step time than adults across the conditions. In addition, children showed higher stance percentage and lower swing percentage than adults across the conditions. These results suggest that children use different motor strategies compared to adults while adapting to the perturbation of unilateral ankle loading during treadmill walking. The development of gait adaptation to external constraints such as mechanical loading may continue beyond preadolescence.

Investigating Lost Move Syndrome in the rolling of recreational white-water kayakers

Philip Kearney, University of Limerick; Aidan Doran, University of Limerick; Edward Christian, University of Chichester

Athletes presenting with Lost Move Syndrome (LMS) find themselves unable to perform a skill that was previously automatic. To date, this phenomenon has been investigated in a limited range of sports. An explanatory sequential design was used to further understand LMS in the context of Irish paddlesport. A cross-sectional online survey explored kayakers’ initial learning and subsequent performance of the kayak roll, including the prevalence of LMS. 108 experienced kayakers completed this survey (M = 14.3 years white water kayaking; minimum level 3 white water kayaking qualification from Canoeing Ireland). Subsequently, interviews were conducted with six respondents who identified as having experience of LMS. Problems with rolling were common: 41.3% of survey respondents indicated they experienced problems shortly after learning, 27.5% indicated that problems occurred a long time after learning and 12.8% indicated they were currently having problems rolling. Of the 85 participants who reported experiencing problems with the kayak roll, 49 reported previously or currently experiencing LMS. There was no association between the likelihood of reporting LMS and either performance characteristics (e.g., self-rated ability to execute the roll prior to problems) or practice history variables (e.g., frequency of practice; initially learning to roll on one or both sides). The interviews supported the presence of some form of performance block, and provided detailed accounts of ‘learning to roll’, ‘losing the roll’, and ‘recovering the roll’. In particular, interview participants’ accounts suggest that their experiences of learning to roll were not conducive to developing a skill that could be performed in a high-pressure dynamic environment. As well as contributing to the understanding of LMS, these findings have practical implications for the white water paddling community as a whole; specifically, for the coaches and instructors who operate in the white water community, and the National Governing Body and its role in the provision of coach/instructor education.

Synchronization in space: Exploring bimanual skills on the von- it comet

Deanna Kennedy, Texas A&M University; Madison Weinrich, Texas A&M University; Renee Abbott, Texas A&M University; Omar Neto, Anhembi Morumbi University; Nathan Keller, Texas A&M University; Traver Wright, University of Texas Medical Branch; Bonnie Dunbar, Texas A&M University; Ana Diaz-Artiles, Texas A&M University

The upcoming Artemis program represents a pivotal milestone in space exploration, with its primary goal of returning humans to the Moon and laying the groundwork for crewed missions to Mars. Therefore, understanding human performance in microgravity and partial gravity environments is of critical importance. The current experiment was designed to determine if the bimanual control of force changes as a function of gravity. Parabolic flight (i.e., the vomit comet) was used to deliver G-levels of 0, 0.25, 0.5, and 0.75G. Right limb-dominant participants (N = 12) were required to synchronize patterns of isometric forces in a 1:2 multi-frequency pattern by exerting force with their right and left triceps brachii muscles. Lissajous plots and force templates were provided to guide performance. Muscle activity from the triceps brachii muscles were recorded. EMG-EMG coherence between the two EMG signals was calculated using wavelet coherence. Results indicated effective synchronization across all gravity levels, but differences in force control and muscle activation were observed. Notably, microgravity (0G) showed higher mean force production for the right limb compared to partial gravity conditions. Additionally, force harmonicity was lower, and EMG-EMG coherence was significantly reduced in microgravity. These findings suggest gravity influences bimanual control, emphasizing the need for further research to fully grasp how exposure to different gravity levels impacts motor control. Funding source: NASA 80NSSC20K1499.
The impact of attentional focus on motor learning and competitive state anxiety

Young-Joon Kim, The University of Tennessee; Jared Marak Porter, The University of Tennessee

Prior studies have revealed the impact of attention on motor learning and anxiety. There is a need to explore whether attentional focus effective in motor learning can be utilized as a strategy to cope with competitive state anxiety. The purpose of this study is to ascertain the impact of attentional focus on motor learning and competitive state anxiety. We predicted that an external and holistic focus of attention would be more effective in motor learning compared to an internal focus of attention, and would also induce more effective motor performance in a competitive situation. Participants (N = 48) were randomly assigned to one of four experimental conditions (i.e., control, external, holistic, internal). Participants in the External, Internal, and Holistic conditions were instructed to focus their attention on the target, arm movement, and swing rhythm, respectively, while performing the task. The participants performed 9 trials for the pre-test, followed by a total of 54 practice trials. During the practice phase of the experiment, participants were asked to repeat the prescribed instructions after every 9 trials. 24 hours later, the participants performed 9 trials each in non-competitive and competitive situations for the post-test and completed the CSAI-2 to measure competitive state anxiety. According to the analysis of results, all groups exhibited higher levels of competitive state anxiety in the competitive situation compared to the non-competitive situation. Furthermore, learning effects were observed in terms of the accuracy in the External and Holistic conditions. Only the External condition maintained this learning effect even in the competitive situation. Regarding consistency, learning effects were found in the External, Internal, and Holistic conditions, with only the Holistic condition maintaining this learning effect in the competitive situation. The results of this experiment provide evidence that specific attentional focuses can serve as effective strategies in competitive situations.

Persistent coordination impairments following anterior-cruciate ligament reconstruction

Adam King, Texas Christian University; Kuanting Chen, Texas Christian University; Morteza Farivar, Texas Christian University; Caleb Voskuil, Texas Christian University; Channing Burnning, Texas Christian University; Joshua Carr, Texas Christian University

Impairments of movement patterns and lower-limb coordination following anterior-cruciate ligament reconstruction (ACLR) appear to persist beyond recovery and rehabilitation. Re-injury risk exists due to these abnormal movements, which have been strongly linked to increased potential of early onset knee osteoarthritis. Range of motion and strength indices typically denoted recovery progression, yet subtle movement impairments restrict functional performance tend to be more readily detectable using coordination analyses. The aim of the current study was to examine whether ACLR individuals (with full return to participation) exhibited different coordination patterns during a bimanual lower limb task as compared to healthy individuals. Twenty-four individuals (n = 12 ACLR, n = 12 Healthy, Age: M = 24, SD = 3.8 years, IKDC score: M = 80.1, SD = 16.5, Time since return: 3 – 120 months) performed an anti-phase coordination pattern with the lower limbs through flexion and extension motion of the knee joints. Self- and metronome-paced conditions were executed at slow and fast tempos. Kinematic markers placed at the hip, knee, and ankle were used to determine knee joint angle trajectories. A phase coordination index (PCI) between the bimanual joint angles was computed. Results revealed higher PCI (poorer coordination) values for ACLR as compared to healthy individuals (p = .01). Self-paced coordination was worse than with the use of a metronome-paced (p = .01). Both self- and metronome-paced conditions exhibited significant differences in PCI between the slow and fast conditions (p < .001). In the fast conditions, self-paced coordination showed higher PCI than the metronome-paced (p < .001) but lower PCI during the slow conditions (p = .01). The findings of persistent coordination impairments for the ACLR individuals have important implications on rehabilitation protocols and established criteria used to determine return-to-play status. Investigating the observed impaired coordination throughout recovery is warranted as well as understanding the association with additional injury risks.

Preference, familiarity, and usefulness of attentional focus instructions on golf putting performance

Haley Kivett, Whittier College; Mehdi Babak, Urmia University; Hassan Mohammadzade, Urmia University; Jalal Dehghanizade, Urmia University; Masahiro Yamada, Whittier College

Although the relationship between external focus (EF) and internal focus (IF) has long been studied, some studies showed that preference (likeliness — Like, perceived usefulness — Use) for or familiarity (Fam) with EF/IF can moderate the attentional focus effect. The central predictions of our preliminary study were that these concepts would be influenced by previous experience (i.e., ball- or body-oriented sports; participation duration) and immediate experience (before and after exposure to EF/IF cues). Specifically, we hypothesized that (A) Fam would be explained by previous experience; (B) Fam, Use, and Like would be different concepts; and (C) the proportion of Like and Use for EF/IF would shift after experiencing EF/IF. After familiarization and baseline trials of golf putting, high-school students (N = 60, M = 15.36 +/- 0.63 yrs) received a list of two IF and four EF (two EF-Near and two EF-Far) cues and responded to questions about Fam (“Which cue is most familiar?”), Like (“Which cue do you like the most?”) and Use (“Which cue is most helpful?”). Then, participants completed 3 trials of golf putting with each cue. After experiencing golf putting with EF/IF cues, the same questions were asked (e.g., “Which cue did you . . . ?”). The responses were categorized into EF-Near, EF-Far, or IF. For Hypothesis A, the results of a multinomial logistic regression (Fam = Sport type + duration + error, reference = IF) showed that individuals who played ball sports tended to feel more familiar with EF-Far (b = -1.421, SE = 0.749, p = .059), which was not evident for Use or Like. For Hypothesis B, the responses between Fam and Like, Fam and Use, and Like and Use showed low agreements: 63.33%, 45%, and 46.67%, respectively. For Hypothesis C, we found an increase in the proportion of IF preference before and after experiencing IF/EF from 6.67% to 20% (Cochran’s Q = 6.4, p = .041), although post hoc tests adjusting for type I errors failed to show significance (p = .184). We found that Fam may stem from previous experience, but Fam, Use, and Like are distinctive concepts.

How motor and proprioceptive learning interacts and transfers across body segments

Juergen Konczak, University of Minnesota; Navene Elangovan, University of Minnesota; I-ling Yeh, Singapore Institute of Technology, Singapore; Huiying Zhu, University of Texas at Austin; Yizhao Wang, Tianjin Huanhu Hospital, Tianjin, China; Leonardo Cappello, Scuola Superiore Sant’Anna, Pisa, Italy; Lorenzo Masia, Universität Heidelberg, Germany

It is known that motor and proprioceptive learning occurs during motor adaptation or skill acquisition. Yet, how these forms of learning actually influence each other and how well they transfer to untrained tasks and other body segments is still incompletely understood. This presentation highlighted the results of a series of experiments in which healthy humans
and stroke survivors used a robotic exoskeleton to train a visuomotor task that required making increasingly small wrist movements challenging proprioceptive function. Wrist position sense just-noticeable-difference thresholds (JND) and spatial movement accuracy error (MAE) in an untrained wrist-pointing task were assessed before, after training and at 24-hr retention. The findings revealed, first, a 45-minute training reduced JND thresholds (~27%) and MAE (~33%) in the trained right wrist in healthy human volunteers. Sensory and motor gains were still observable 24 hours after training. Second, at posttest position sense acuity at the untrained left wrist and right elbow joints improved at approximately the same rate (mean JND left wrist: ~32%; right elbow: ~35%). However, at 24-hr retention proprioceptive learning gains at the contralateral wrist were no longer significant, but still visible at the ipsilateral elbow. Motor errors at the untrained wrist (~20%) and elbow (~27%) were also reduced with practice. Applying the same paradigm to chronic stage stroke survivors revealed that they were able to improve position sense JND thresholds and that such learning was associated with reduced P27-N30 peak-to-peak amplitudes of somatosensory-evoked potentials. These studies demonstrate that visuomotor training induces fast gains in proprioceptive and motor function of the trained joint. Importantly, a nearly complete transfer of proprioceptive as well as motor learning is seen in the contralateral, homologous wrist joint and the adjacent, ipsilateral elbow joint. We discuss the possible neurophysiological mechanism behind such sensorimotor transfer and its implications for neurorehabilitation. Funding source: U.S. National Science Foundation IIP 1919036; University of Minnesota CEHD Jump Start program.

Human adults show a modest preference for individual actions over joint actions

Mikayla Lalli, McMaster University; Jiaqiao Tang, McMaster University; Nour Al Afi, McMaster University; Enuri Dissanayake, McMaster University; Abby Girouard, McMaster University; Joshua Cashaback, University of Delaware; Michael Carter, McMaster University

When deciding to act, either alone or with a partner, we use information about the relative costs of action alternatives to choose an appropriate plan. Recently, Curioni et al. (2022) showed across three experiments that when given the choice to complete a computerized box-clearing task either alone or with a partner, individuals showed a strong preference to cooperate despite it being more costly (i.e., less reward and greater effort). Curioni et al. concluded that this preference for joint action cannot be explained by instrumental utility alone and that other psychological and/or sociological factors must be involved. Across their experiments, participants completed the task standing beside each other on a shared interactive tablet; thus, this close physical proximity may have created a social pressure to cooperate. Similar to Curioni et al., participants performed the task faster alone than together, indicating that cooperation was less effective than individual action. Contrary to Curioni et al., participants demonstrated a slight preference for individual action over joint action, although these preferences were not significantly different from chance. These findings suggest that the close proximity of partners in Curioni et al. may have driven the consistent preference to cooperate even when it is more costly. Funding source: Natural Sciences and Engineering Research Council of Canada, Canadian Foundation for Innovation, Ontario Research Fund.

Successfully controlled brain computer interference through minimal dry electrodes

Joshua Lawton, Old Dominion University; Chris Mizelle, East Carolina University; Ryan Wedge, East Carolina University; Nicholas Murray, East Carolina University

There are approximately 185,000 amputations a year in the United States. Although 84% of lower limb amputates use a prosthetic, only 56% of people with upper limb amputations use one, largely due to less functionality. An increase in functionality will lead to an increase in upper limb prosthetic use and productivity. The purpose of this project was to show proof of concept of a Brain Computer Interface (BCI) EEG-controlled prosthetic, using only 2 dry-electrodes and with imagined movements. Eight participants completed a pre-training Mu task, five completed a 1D cursor training task, three completed a 2D cursor training task, and two completed the main 2D cursor task. After a frequency between 8–13 Hz was established for each participant, they completed 200 trials of the 1D cursor task for three different conditions (left, right, and both hands(s)) or reached a success rate of 80% for 4 trials in a row with random targets. The participants then completed the 2D cursor task with random targets until a success rate of 70% for 4 trials in a row was achieved, followed by a 2D cursor task where the targets were pre-determined. A chi-squared test determined the goodness of fit for the success rate was significant ($p < .001$) for all participants completing the 1D cursor task. The combined success rate for the participants during task 1 for their right hand was 30.16%, 47.11% for their left hand, and 61.47% for both hands. The combined success rate for task 2 was 69.40% and 79.59% for the main task. Overall, this study successfully showed that 2 dry electrodes can be used to detect imagined movements through BCI. Although the accuracy can still be improved by enhancing the equipment and developing better training protocol, participants who completed the main task were able to surpass the expected overall accuracy and surpass 4 out of the 6 individual accuracies. Whether it is to control a mechanical arm, leg, or other body part, the framework of this study grants development opportunities for BCI from a minimal number of dry electrodes.

Evidence-based program to reduce kinesiophobia in chronic low back pain: A meta-analytic approach

Jonghyeon Lee, Yonsei University; Soojung Yang, Yonsei University; SeoYoung Ahn, Yonsei University; Minjae Ju, Yonsei University; Yeji Choi, Yonsei University; Seongkwan Cho, Texas A&M International University; Yongjin Yoon, Yonsei University

Because the causes of back pain are multifactorial, developing an evidence-based physical activity program for back pain is essential; however, kinesiophobia (i.e., the fear related to exercise) seriously increases the disability through daily life due to increasing the sensitivity of pain and even accounts for up to 72% of the causes of chronic pain. Therefore, this review analyzed the studies examining the effect of exercise intervention on chronic non-specific low back pain (CNSLBP) patient’s kinesiophobia. Electronic databases were used for literature screening, including PubMed, CINAHL, SPORTDiscus, and Web of Science. Five authors independently performed data synthesis, and all authors participated in methodological quality assessment. Twenty-one studies were finally reviewed, and twelve studies were identified as level 1 evidence. Subgroup analysis was also performed based on the type of exercise. Pooled data were indicated as standardized mean differences (SMD), and 95% confidence intervals (CI),

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The random effect model showed a significant medium-level overall effect (SMD = −0.69, 95% CI = −0.71, −0.57). Mobile device training (SMD = −1.43, 95% CI = −2.39, −0.46), lumbar motion training (SMD = −0.98, 95% CI = −1.58, −0.37), core muscle training (SMD = −0.52, 95% CI = −0.87, −0.17), pain education (SMD = −0.62, 95% CI = −0.80, −0.44), and multidisciplinary training (SMD = −0.37, 95% CI = −0.60, −0.15) showed significant effect on CNSLBP patient’s kinesiophobia. In contrast, cognitive training, physiotherapy, and Pilates didn’t show a significant effect on CNSLBP patient’s kinesiophobia. The results of this study suggest that, in order to improve CNSLBP patients’ kinesiophobia, future research should prioritize rehabilitative interventions that focus on educating motor control in the lumbar region, incorporating accurate knowledge of pain to facilitate voluntary lumbar excursion. Special attention should be given to addressing these issues when implementing Pilates and cognitive restructuring training. Funding source: Office of Research Affairs UIF Yonsei University.

Insights into self-control of feedback from analysis of motor performance: A conceptual model for trial-to-trial dynamics in motor learning
Keith R. Lohse, Washington University School of Medicine in Saint Louis; Mariane F. B. Bacelar, Boise State University; Matthew W. Miller, Auburn University; Matt Jones, University of Colorado

Giving learners control over feedback has been studied across a range of tasks and populations. Most research, however, has focused on the downstream effects of these choices on long-term retention and transfer. In this study, we investigated the trial-to-trial relationship between prior performance, feedback, and subsequent performance during acquisition. N = 200 participants performed 100 non-dominant hand beanbag throws and received feedback in 50% of the acquisition trials. Half of the participants controlled their feedback schedule (self-control), whereas the other half did not (yoked). Orthogonally, half of the participants also estimated their errors after each throw, before feedback was provided. By investigating when participants requested feedback and how they corrected their errors in response, we hope to gain insights into predicting chronic changes in behavior (i.e., learning) from acute change in behavior (i.e., performance). In a series of regression models, we were able to show that self-controlled participants requested feedback more following small errors, b = −0.02, p < .001, whereas there was no reliable relationship for yoked participants. Further, participants were more likely to request feedback following poor estimates of their errors, b = −.05, p = .003, suggesting that uncertainty in the previous trial contributes to the feedback request. Next, we regressed error on the current trial onto the error from the previous trial and the value of the feedback from the previous trial, controlling for feedback presence. When feedback was not present, neither group of participants showed a strong autocorrelation to the previous error suggesting a “steady state” with stochastic variability around their set point. When feedback was present, yoked participants showed similarly small (near zero) weights for the previous error and feedback. In contrast, when feedback was present, self-controlled participants showed a positive autocorrelation with the previous error, but a negative relationship to the feedback, suggesting adaptive corrections.

Terminal versus concurrent feedback during a dynamic balance surfing task
Kristoph Lopata, Wayne State University; Mohammed Bila, Wayne State University; Qin Lai, Wayne State University

Postural control utilizes multisensory feedforward and feedback mechanisms to anticipate and respond to perturbations in balance (Kandel et al., 2000; Schmidt et al., 2019). This study compared the effects of terminal versus concurrent feedback on a dynamic balance surfing task. Participants (N = 22, aged 18–35) signed an informed consent before completing a baseline test consisting of 12 30-second trials attempting to maintain a parallel balance board. Following baseline testing, participants were randomized into a concurrent or terminal feedback condition, with no group differences detected for baseline performance. Experimental testing occurred on day two and consisted of a stabilometer surfing task matching eight sinusoidal waves (+/- 10 & .65 Hz) during 12 trials. Performance on the surfing balance task was assessed by the Root Mean Square Error (RMSE) between the target curve and each participant’s performance curve. A correlational analysis examined the relationship between each participant’s surfing performance and their vertical and sagittal knee kinematics. A 2 (Group) x 12 (Trial) ANOVA with repeated measures on Trial demonstrated a main effect of Group, F(1, 20) = 17.14, p = .0005, and Trial difference, F(11,220) = 5.78, p < .0001 for RMSE. Duncan’s MRT indicated that participants in both groups improved their surfing performance with practice from Trial 1 to 12; however, the concurrent feedback group (M = 13.225) had significantly smaller RMSE compared to their counterparts with terminal feedback (M = 16.055). The analysis did not detect group differences for any other dependent variables. The results indicate an immediate performance advantage for concurrent versus terminal feedback during a dynamic balance surfing task matching a sinusoidal wave.

Concurrent validity and reliability of the FUS test app for the measurement of fundamental motor skills
Hubert Makaruk, Józef Piłsudski University of Physical Education in Warsaw; Jared M. Porter, University of Tennessee, Knoxville; E. Kipling Webster, University of Tennessee, Knoxville; Beata Makaruk, Józef Piłsudski University of Physical Education in Warsaw; Tomasz Niżnikowski, Józef Piłsudski University of Physical Education in Warsaw; Jerzy Sadowski, Józef Piłsudski University of Physical Education in Warsaw

There is a critical need for systematic teaching, learning, and assessment of fundamental motor skills (FMS) in physical education (PE). Addressing this, the test of Fundamental Motor Skills in Sport (FUS) was developed to evaluate FMS in school-aged students, assessing proficiency in six sports-related tasks: hurdles, jumping rope, forward roll, ball bouncing, throwing and catching, and kicking and stopping a ball. To facilitate the use of the FUS test in the classroom, a mobile application “app” was created to streamline the assessment process, enabling teachers and researchers to easily record, analyze, and track student performances. The present study examined the concurrent validity and intra-rater reliability for scoring FMS with the FUS test app. Twenty-three students (aged 13 years; 61% male) completed the FUS test during PE class. Performances were recorded simultaneously using a video camera and a camera on a mobile device, and were scored by two trained PE teachers. Each teacher scored 3 skills each by viewing on a traditional online video test app. There was a two-day interval between scoring sessions, the order of scoring was randomized. Concurrent validity was assessed by comparing data from both tools using Pearson correlation coefficients (r) and Bland–Altman plots. Intra-rater reliability was determined by reassessing scores after a three-week interval, calculating intra-class correlation coefficients (ICC). The analysis revealed strong positive correlations (r = .92 to .96) between scores from the FUS test app and Kinovea software. Bland–Altman plots showed good agreement across all skills without any significant patterns of disagreement. Intra-rater reliability was excellent for all FUS skills, as indicated by high ICC values (> .91) and narrow 95% confidence intervals. These results support the FUS test app as a valid and reliable tool for scoring FMS in school settings.
suggesting its potential utility in diverse educational contexts and its long-term impact on the development of student FMS.

Absence of visual information hinders coupling of bimanual reaching and grasping movements in virtual reality

Guilherme Martins, University of Wisconsin-Madison; Bryce Speicher, University of Wisconsin-Madison; Caitlin Miller, University of Wisconsin-Madison; Andrea Mason, University of Wisconsin-Madison

When reaching with both hands to simultaneously grasp two objects, it is often necessary to shift fixation from one hand to the other to visually guide performance. The allocation of visual attention towards the dominant or non-dominant limb may thus affect how bimanual movements are coordinated. The current study was conducted to investigate how occlusion of the dominant, non-dominant or both hands influences movement kinematics and coordination during a bimanual reach-to-grasp task. Twenty right-handed healthy young adults (12 female, $M = 23.4 \pm 3.6$ years) participated in this study. Participants wore a fully immersive HTC VivePro VR headset and performed bimanual reach to grasp movements to virtual cubes (3cm) under four different visual feedback conditions: 1) graphic feedback about the position and movement of both hands available (BA) 2) graphic feedback about the right hand removed (RR) 3) graphic feedback about the left hand removed (LR) and 4) graphic feedback about both hands removed (BR). Participants completed 20 trials per condition and hand movements were monitored at 120 Hz using a Leap Motion Controller. Movement times for both hands and the asynchrony between the start and end of movements between the two hands were quantified. A significant Hand X Condition interaction (F3, 37.05 = 4.078, $p = .022$) was found for movement time. Post-hoc analysis indicated that when the left hand was occluded (LR), MT was longer for the left hand ($845.8 \pm 35.3$) than the right hand ($833.3 \pm 35.3$). In contrast, MT was similar for the two hands for all other vision conditions. A main effect of condition was also found for end time asynchrony (F3, 32.1=5.5, $p = .01$), which indicated that the left hand ended the movement after the right hand in the BA and LR conditions, whereas the left hand ended before the right hand in the RR and BR conditions. These results suggest that vision plays a role in the coupling of bimanual movements and that removal of visual information affects the non-dominant limb differently than the dominant limb.

Specificity of test measures in university student balance performance

Ben Meyer, Shippensburg University

The purpose of this project was to compare the performance of university students in balance error scoring system (BESS) and motor control (MC) tests. A recent meta-analysis (Kummel et al., 2016) indicated that balance training may enhance performance in the specific balance tasks that are trained, but may have limited effects on non-trained tasks. This project aimed to add to the body of literature in the specificity of balance domain. It was hypothesized that participants’ composite BESS values would have a weak to moderate relationship with their composite MC scores. Sixteen males and twenty-three females (74 +/- 18 kg, 1.73 +/- .10 m, 21 +/- 1 years) performed the BESS and MC balance tests using a Biodex Balance System SD. The BESS test consisted of single-leg, double-leg, and tandem stances, tested on both firm and foam surfaces. Sway index (SI) data for each of the six conditions was computed, as well as a composite SI measure that provided an overall indication of performance. The MC test required participants to shift their weight (while standing on a static platform) to move a cursor from a center target to blinking targets and back as quickly and with as little deviation as possible. The order of targets was randomized for all participants, and a composite efficiency value (the average of all tested directions) was computed. Results of the Pearson correlation indicated that there is a significant medium positive relationship between the BESS and MC tests ($r = .396$, $p = .013$). Mean composite sway index for the BESS was 1.34 +/- .30. Previous testing in university students found a larger composite score of 2.43 (Dabbs et al., 2017). For the MC test, the composite score of 36 +/- 4 % was similar to a previous sample of young healthy students (Meyer, 2023). The relationship between BESS and MC measures was moderate, indicating some association of balance skills in the participants. With the increasing utilization of balance assessments in clinical, research, and sport settings, it is important that research addresses these populations.

Performance on cognitive assessments is related to fall risk in community-dwelling older adults

Jacquelyn Moxey, Old Dominion University; Kyle Langerhans, Old Dominion University; Paphawee Prupetkaew, Old Dominion University; Brittany Samulski, Old Dominion University

Falls continue to be a major source of injury and mortality for older adults in the United States. More than one out of four people over the age of 65 experience at least one fall each year, and the prevalence doubles in older adults with cognitive impairment. Falling is associated with a multitude of physiological, cognitive, and environmental factors which make identification of those at risk a challenging endeavor. The Physiological Profile Assessment (PPA) measures performance across 5 areas and provides normative information with regard to age and gender to indicate risk of falling. Simple reaction time (SRT), a PPA component, provides a measure of cognitive processing speed. The Montreal Cognitive Assessment (MoCA) is used to identify adults with mild cognitive impairment (MCI) by evaluating 6 domains of cognition. This study examined the relationship between different measures of cognitive function and fall risk in older adults. Cognitive function was assessed using the MoCA, and fall risk was determined using the PPA. 315 men and women (70.52 +/- 7.75 years) completed the assessments. A significant, moderate, negative correlation between MoCA total score and PPA falls risk score was noted, $r = - .404$, $p < .001$. A significant, negative correlation between MoCA total score and SRT was observed, $r = - .350$, $p < .001$. Significant, negative correlations between SRT and each of the MoCA sub-scores were noted (r values ranging from -.286 to - .119, all p < .001), despite timed performance not being a scored aspect on the MoCA. SRT and MoCA measure different aspects of cognition, but seem to provide a valuable method of assessing cognitive decline associated with falls risk. Falls are often screened in adults with MCI or clinical dementia, but earlier screening of all older adults may allow for more timely intervention to mitigate fall risk factors and prolong independence in the community. Future investigation should work to connect specific aspects of cognitive decline, beyond slowed processing speed, which can indicate an increased risk of falling. Funding source: Project supported by Optima Health.

Dyadic motive fit: A meaningful predictor of joint performance in teams?

Florian Müller, Friedrich Schiller University; Norman Hüttner, Friedrich Schiller University; Rouwen Cailat-Bruland, Friedrich Schiller University

In many situations actions need to be coordinated with others to perform successfully (e.g., surgeons working on a patient, a tennis doubles trying to score). Traditionally, joint-action research focused on those context parameters that either facilitate or impede joint performance (e.g., shared visual information, Eils et al., 2017). In contrast, research taking into account actors’ individual differences in psychological constructs is comparatively scarce. A first study by Hüttner et al. (2023) yielded first evidence for the notion that congruence between partners’ preferences for specific types of incentives and situations, that is, their motives, predicts joint performance. In the current study, we sought to replicate and extend these findings to provide a more robust empirical foundation. To this end,
Effects of anxiety on motor sequence learning

Ashley Murray, Washington State University; Victoria M. Rednoske, Washington State University; Andrew Y. Paek, Washington State University; Shikha Prashad, Washington State University

Anxiety can present as a state of worry and fear, which may persist and interfere with daily activities. 12.5% of adults report regular feelings of worry, nervousness, or anxiety. The purpose of this study was to investigate the effect of anxiety on the implicit learning of a motor sequence and working memory. We collected data from 62 individuals (mean age: 21.3 ± 4.46 years, 47 female) on the Serial Reaction Time Task (SRTT) to assess implicit motor sequence learning, the NASA-Task Load Index to assess perceived effort associated with the SRTT, and the Corsi Block Span Task to assess working memory. Participants were grouped into anxiety levels based on the Beck Anxiety Inventory. Participants also completed the State and Trait Anxiety Inventory, the Beck Depression Inventory to assess mood, Perceived Stress Score to assess stress, and the Cognitive Failures Questionnaire to assess self-reported cognitive impairment. All levels of anxiety exhibited improved reaction times (RT); however, within-subject variability in RT performance was different based on anxiety level. Lower anxiety levels showed a decrease in variability as they learned the sequence while higher anxiety levels exhibited no change in variability. Further, higher anxiety levels showed increased online learning (i.e., improvements in RT while performing the task) and increased offline learning (i.e., improvements in RT during breaks between blocks) compared to lower anxiety levels. There were no significant differences in working memory. The increased variability suggests that individuals with higher anxiety levels may spend more of the learning time in exploration. In addition, the higher anxiety level group had decreased online learning and reported greater perceived temporal demands, both of which suggest increased cognitive load during performance of the task. These results suggest that while individuals with higher anxiety levels have intact motor sequence learning, it may require greater cognitive resources for the learning to occur.

Gait variability in autistic young adults during the performance of dual-motor tasks of low and high complexity

Ralph Nelson, University of Wisconsin – Madison; Kristen Pickett, University of Wisconsin – Madison; Brittany Travers, University of Wisconsin – Madison; Andrea Mason, University of Wisconsin – Madison

Several studies provide evidence of decreased motor performance when individuals of all ages and abilities simultaneously perform two motor tasks, such as walking while carrying a tray (Abbruzzese et al. 2014, Cherney et al. 2007). While previous findings suggest that autistic children walk with greater variability than non-autistic children when performing dual-task gait (Kindregan et al., 2015), fewer studies have measured differences in dual-task effects on gait variability in autistic young adults while using a real-world, dual-motor task paradigm. Thirteen autistic (Mage = 23.4 ± 0.8 yrs) and 16 non-autistic (Mage = 24.5 ± 1.2 yrs) young adults walked across a Zeno Walkway™ (4.87m) while performing ten trials in each of four motor tasks: A) simple, overhead walking, and walking while B) carrying an empty tray, C) carrying a tray with unstacked blocks, and D) carrying a tray with stacked blocks. Gait variability was calculated for spatiotemporal gait parameters of step length, stride width, velocity, cadence, and percent time in double support (%DS). We found that autistic adults walked with more variability than non-autistic participants, with significant main effects of task complexity and group by variability in step length (complexity: F = 16.34, p < .001; group: F = 4.90, p < .05). Velocity (complexity: F = 16.78, p < .001; group: F = 17.06, p < .001), %DS (complexity: F = 4.90, p < .05; group: F = 5.10, p < .05), and cadence (F² = 17.15, df = 3, p < .001). No significant main effects were found for task complexity or group on stride width (p > .05), and no interaction effects between task complexity and group were found for gait variability. Our results suggest that increasing dual-task complexity leads to greater variability in spatiotemporal parameters of gait in young adults, with autistic young adults experiencing greater variability in gait than non-autistic adults. Funding source: Kenzi Valentina Research Grant Award – UW Madison.

Gaze dynamics in vision-impaired tennis: Unravelling strategies for serve returns

Ward Nieboer, Vrije Universiteit Amsterdam; Carin Svensen, Katholieke Universiteit Leuven; Debbie Van Biesen, Katholieke Universiteit Leuven; David Mann, Vrije Universiteit Amsterdam

Tennis, a sport that demands quick reflexes, precise timing, and exceptional visual processing, presents unique challenges for individuals with vision impairment. Previous eye-tracking research has explored gaze strategies during ball return in various sports, comparing performance levels. However, in visually impaired tennis, athletes exhibit diverse ocular conditions and impairment severities. This study aims to elucidate how these athletes differ in their ability to track a ball and predict its trajectory during a tennis serve. Eighteen tennis players with vision impairment were recruited, and eye tracking was feasible in eleven players. By analysing and clustering the time series of gaze direction relative to the ball during serve returns, our findings reveal that individuals with peripheral vision loss exhibit superior ball-tracking abilities compared to those with central vision loss. The latter group displays distinct head strategies adapted to their impairment. Moreover, players with the most severe impairment or rare ocular conditions demonstrate unique gaze patterns that could not be clustered. This study adds a new layer to the current knowledge of athletes’ gaze strategies for successfully intercepting an approaching ball by expanding it to players with vision impairment. Our findings have implications for developing targeted training programs, refining classification systems for athletes with vision impairment, and adapting sports practices to foster Para sports development. Funding source: European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 955590.
Effects of attentional focus and autonomy support in motor learning complex movement tasks

Tomasz Niżnikowski, Józef Piłsudski University of Physical Education in Warsaw; Jerzy Sadowski, Józef Piłsudski University of Physical Education in Warsaw; Andrzej Mastalerz, Józef Piłsudski University of Physical Education in Warsaw; Jared Porter, University of Tennessee, Knoxville; Hubert Makaruk, Józef Piłsudski University of Physical Education in Warsaw; Marcin Starzak, Józef Piłsudski University of Physical Education in Warsaw; Paweł Rolański, Józef Piłsudski University of Physical Education in Warsaw; Janusz Zielinski, Józef Piłsudski University of Physical Education in Warsaw; Anna Bodańska, Józef Piłsudski University of Physical Education in Warsaw; Agata Chaliburda, Józef Piłsudski University of Physical Education in Warsaw

The aim of this study was to explore the immediate and cumulative effects of learning in soccer kicking performance, focusing on the role of external or internal attentional focus, practice autonomy, and a combination of attentional focus and autonomy provided to the learner. Participants were 90 physically active male university students (mean age 22.8 ± 1.5 years), selected from 330 students who completed a 60-hour university soccer course. Participants were randomly assigned to one of six groups: external focus with target choice (EF-1), external focus without target choice (EF-0), internal focus with target choice (IF-1), internal focus without target choice (IF-0), autonomy support only (AS), and a control group (C). Results indicated that the EF-1 group exhibited significantly better kicking accuracy compared to the IF-1, IF-0, and C groups, while showing comparable performance to the EF-0 and AS groups. These findings suggest that integrating attentional focus and autonomy in training accuracy of penalty kicks provides an additive effect, highlighting the potential of differential training approaches when teaching penalty kicking in soccer.

Evaluating the effects of history of multiple sports-related concussions on inhibitory control and P3 event-related potential

Megan M. O’Brokta, University of North Carolina at Greensboro; Praween A. Pasupathi, University of North Carolina at Greensboro; Alexa K. Kier, University of North Carolina at Greensboro; Andrew S. Cornwall, University of North Carolina at Greensboro; Eric S. Drollette, University of North Carolina at Greensboro

Sports-related concussions (SRC) affect 1.6 to 3.8 million athletes annually, leading to serious neurological symptoms and potentially fatal brain injuries. Even more alarming is that recent research indicates that accumulation of multiple SRC may lead to more severe brain injury. Thus, the purpose of the present study was to examine the effects of history of multiple SRCs (e.g., two or more instances) when compared to a single instance of SRC and age-matched controls on brain indices of attentional allocation (i.e., P3 event-related potential; ERP). Participants (N = 49, Ntotal corr = 11, Nmultiple corr = 5, Mage = 21 years) completed a laboratory visit consisting of completing the flanker task, during which EEG data were recorded while wearing an EEG cap (64 Ag/AgCl electrodes). Bootstrapped t-tests comparing groups revealed that those with history of multiple SRCs demonstrated reduced P3 mean amplitude (.56 ± 1.90 μV; site CPz) compared to those with history of a single instance of SRC (5.39 ± 3.51 μV and age-matched controls (4.19 ± 2.53 μV; t’s ≥ −3.10, p’s ≤ .01). Participants with history of multiple SRC also demonstrated significantly slower mean reaction times for incongruent trials (507.12 ± 120.8 ms) on the flanker task than those with a single instance of SRC (410.1 ± 30.7 ms; t = −1.91, p = .04). Lastly, those with a single instance of SRC demonstrated significantly faster reaction times on congruent trials (366.1 ± 25.6 ms) and incongruent trials (410.1 ± 30.7 ms) on the flanker task compared to age-matched controls (congruent 412.1 ± 55.3 ms; incongruent 458.1 ± 64.2 ms; t’s ≥ 1.80, ps ≤ .04). Results suggest that history of multiple SRC may negatively affect brain indices of attentional allocation when compared to a single instance of SRC and age-matched controls, suggesting that cumulative brain injury may have worse effects on brain function and cognition than a single instance of SRC.

Adaptation and retention of visual-motor tracking as a function of goal orientations and motivational climate

Cameron S. Olsen, Utah State University; Lian O’Neill, Utah State University; Travis E. Dorsch, Utah State University; Breanna E. Studenka, Utah State University

Individuals with higher task orientation demonstrate greater intrinsic motivation to participate in sport and exhibit greater retention of motor skill. In addition, motivational climates that prioritize mastery over performance outcomes lead to better performance and more adaptive motivation. However, the combined role of goal orientations and motivational climate in motor performance is not well understood. The aim of this study was to document the main and interactive effects of goal orientations (i.e., task and ego) and motivational climate (i.e., mastery vs performance) on adaptation to and retention of a novel motor task. Participants performed a visual-motor tracking task using finger force to match a target line on a computer screen. Participants were rewarded after every three trials (27 trials total) for either bettering the mean of their previous three trials (mastery climate; n = 36) or the mean of all previous participants over the same trials (performance climate; n = 40). The reward schedule was performed across conditions and not contingent on participants’ actual performance. Using residual change scores, we assessed adaptation as change between the start and end of Day 1 and retention as change between the start of Day 1 and start of Day 2 for both linear (mean absolute error; MAE) and non-linear (sample entropy; SampEn) aspects of motor performance. A series of hierarchical regression analyses revealed no main or interactive effects of goal orientations and motivation climate on MAE adaptation (R² = .02); a three-way interactive effect of goal orientations and motivational climate on MAE retention (R² = .16); a main effect of ego orientation, and two-way interactive effect of task orientation and motivational climate, on SampEn adaptation (R² = .11); and two-way interactive effects of ego orientation and motivational climate, and ego and task orientations, on SampEn retention (R² = .16). Findings underscore the independent and combined impact of goal orientations and motivational climate on linear and non-linear aspects of motor performance. Funding source: Utah State University.

Spatiotemporal gait changes when stepping over obstacles in natural and virtual reality environments

Alejandra Padilla, University of Wisconsin-Madison; Bryce Sprecher, University of Wisconsin-Madison; Kevin Ponto, University of Wisconsin-Madison; Kristen A. Pickett, University of Wisconsin-Madison; Andrea Mason, University of Wisconsin-Madison

Virtual reality (VR) based rehabilitation and assessment approaches have the potential to engage individuals across their lifespan in meaningful movement. When walking, we use vision of the environment and our body to adjust both spatial and temporal gait characteristics. However, accurate representation of the body in VR remains a challenge. The aim of this study was to determine how gait is impacted when stepping over obstacles of varying heights in a natural environment with full vision and a virtual environment where visual feedback about the
environment is synthetic and there is no representation of the body. Young adults (n = 12) walked across a 5.2 m Zeno gait mat under two visual conditions: (i) natural environment/normal vision (NE), and (ii) virtual reality/no representation of lower body (VR). In both conditions, participants stepped over an obstacle of varying height (heights = 0, 3, 7, 12, 17 cm) positioned at the midpoint of the mat. Repeated measures ANOVAs were performed to examine the effect of the two visual conditions and five obstacle heights on the variables of cadence, normalized (norm.) velocity, norm. stride length and stride width. Main effects for block height were found on cadence (p = .001) and norm. velocity (p < .002). Main effects of visual condition were found for cadence (p = .001), norm. velocity (p < .005) and stride width (p < .037). Cadence decreased as block height increased (0 cm = 109.12 ± 2.94; 7 cm = 105.12 ± 3.03; 12 cm = 102.59 ± 2.66; 17 cm = 101.85 ± 2.96). Norm. velocity was also highest for the 0 cm block (1.43 ± 0.53) and lowest for the largest blocks (12 cm = 1.34 ± 0.05; 17 cm = 1.34 ± 0.05). Cadence (103.34 ± 3.0) and norm. velocity (1.43 ± 0.05) were significantly larger in NE compared to VR (cadence = 107.1 ± 2.8; norm. velocity = 1.34 ± 0.05) while stride width was greater for VR (12.42 ± 0.98) than NE (11.83 ± 0.04). Results of this study suggest that differences in the NE and VR result in smaller and slower gait characteristics in virtual environments. Interestingly, the gait changes do not appear to be moderated by obstacle height. Funding source: National Science Foundation.

Can observational practice surpass physical practice?
Stephan Panzer, Saarland University; Peter Leinen, Saarland University; Christina Pfiefer, Saarland University; Charles Shea, Texas A&M

It is well accepted that physical practice is not the only way to acquire motor skills. Observational practice facilitates the learning of a wide range of motor tasks. However, observational practice is considered to be less effective than physical practice. An advantage arising from observation protocols is, in part, because the observer is not allocating cognitive and attentional resources to prepare and execute the movement. He/she can utilize these resources to discover important contextual information in the task environment. Even though, examples are obvious in real-life sport settings like in tennis or beach volleyball, limited research attention has been directed to tasks where individuals must respond to changing environmental/perceptual demands. In these kinds of tasks, motor processes have to be matched with perceptual processes for successful response execution. The aim of this experiment was to determine if an observational practice protocol increases individuals’ likelihood to utilize information in a task that specifies contextual information in a changing environment. We used a computerized perceptual-motor task, where individuals were required to intercept balls that dropped from the top of the screen. A colored line at the top of the screen provided information about the direction of the dropping ball. Individuals (N = 26) were randomly assigned to one of two groups: an observational practice (OP) group where the participants only observe another person performing the task, and a physical practice (PP) group where participants physically practice the task. Acquisition consisted of 10 blocks of 20 trials each. At the retention test all individuals physically performed the task. The PP group improved their performance during acquisition. On the retention test, participants in the OP group caught significantly more balls (73%) than individuals of the PP group (63%). Observational practice induced learning advantages and increases individuals’ likelihood to utilize information in a task with specified contextual information in a changing environment. Funding source: German Research Foundation (grant number: PA 774/13-1; 13-2; SPP 1772).

Feedback-related and motor-preparatory brain activity are affected by perceptions of success during motor skill acquisition
Juliana O. Parma, San Francisco State University; Keith R. Lohse, Washington University School of Medicine in St. Louis; Matthew W. Miller, Auburn University

Feedback-related and motor-preparatory brain activity affect motor learning and performance. Both neural processes are affected by objective outcomes, but we examined how manipulating subjective success affected these processes, beyond objective outcomes. Fifty individuals completed 100 trials of a shuffleboard task while we recorded their brain activity with electroencephalography. Twenty-eight participants were randomly assigned to practice with a large target (i.e., the zone defining “success”), while 22 practiced with a small target. Participants were instructed that when the puck stopped within their zone of success, they should consider the trial successful. Trial-by-trial, feedback-related and motor-preparatory brain activity were indexed by the reward positivity (RewP) and motor upper-alpha power, respectively. The RewP is sensitive to the reward associated with feedback, and motor upper-alpha power is inversely related to cortical activation (i.e., greater alpha suggests less cortical involvement in motor preparation). Mixed-effects models quantified the effects of subjective (successful/unsuccessful) and objective (radial error [RE]) outcomes on RewP and motor upper-alpha power. Results revealed that both subjective success and RE affected RewP on the current trial (p < .001). We found increased motor upper-alpha power as a function of trial number (p = .016). Crucially, this effect was stronger following trials subjectively perceived as successful and was also moderated by RE (p < .026). Results suggest that subjective and objective success affect feedback-related and motor-preparatory brain activity. Notably, across practice trials, individuals engage in less motor preparation, but trials subjectively perceived as unsuccessful invite them to re-allocate cortical resources to program the next trial. In conclusion, arbitrary criteria of success established through simple instructions affects feedback-related brain activity as well as moderates the relationship between practice experience and motor-preparatory brain activity.

Biceps brachii EMG signal regularity after different types of fatigue
Michał Pawłowski, The Jerzy Kukuczka Academy of Physical Education; Bogdan Bacik, The Jerzy Kukuczka Academy of Physical Education; Grzegorz Sobota, The Jerzy Kukuczka Academy of Physical Education; Anna Brachman, The Jerzy Kukuczka Academy of Physical Education

It is well known that fatigue has strong impact on movement performance. Nevertheless, despite a wealth of studies, its effects are not fully understood. However, whether fatigue interacts with upper limb dominance and how different types of muscle contractions influences muscles activity still needs to be elucidated. In the last decade the use of nonlinear analyses along with traditional ones has been an effective approach to gain additional insight into the mechanisms related to fatigue in motor control. It has been suggested that sEMG signal regularity seems to have a higher sensitivity in detecting muscle fatigue than the conventional linear measures. In the current study the traditional muscle activity measurement as well as additional insight into the mechanisms related to fatigue in motor control.
with real-time feedback on the force level. EMG signal was derived from biceps brachii of both limbs. Briefly, both fatigue protocols yielded similar significant increase of muscle activity in both limbs (D: F(2,24) = 18.50, p < .001, ND: F(2,24) = 22.20, p < .001). The higher magnitudes of absolute force error and magnitude of force was observed after fatigue, however these changes did not rich significance (p > .05). The level of signal regularity (sample entropy) decreased significantly after both types of fatigue conditions in both limbs (D: F(2,24) = 17.30, p < .01, ND: F(2,24) = 18.10, p < .001). There were no significant changes between limbs before and after different types of fatigue protocols (p > .05). It seems that different types of fatigue protocols (dynamic vs. static) affects muscles in both limbs in similar manner. Funding source: This study was supported by statutory funds from the Jerzy Kukuczka Academy of Physical Education in Katowice, Poland.

The effect of lower limb motor experience on the moving rubber foot illusion

Caleb Perry, Miami University; William Berg, Miami University; Max Teaford, University of Tennessee – Chattanooga

In the moving rubber hand/foot illusions, a person perceives as though a rubber hand/foot is their own limb via synchronized visuo-kinetic stimulation involving the real and rubber limbs. The rubber hand/foot is positioned next to the real hand/foot, however, only the rubber limb is visible to the participant, who watches it for the duration of a trial involving synchronous movement of the real and rubber limbs. Pianists did not experience the moving rubber hand illusion as vividly as non-musicians (Pyasik et al., 2018), suggesting that long-term motor experience increases proprioceptive awareness, thereby decreasing sensitivity to the illusion. Our study sought to determine whether the moving rubber foot illusion (mRFI) differed in individuals with high and low levels specialized motor experience of the lower extremity. A mRFI task (real and rubber feet moved identically for 90s), including control conditions, were conducted with two groups of young adult females, one consisting of 24 formally-trained and exceptionally experienced dancers, and a second group of 25 non-dancers. We posited that dancers would experience the mRFI less vividly than non-dancers. Dependent variables included a) proprioceptive drift (cm), which is the change in perceived location of the real foot as a result of experiencing a mRFI condition, and b) a rubber foot ownership score, which assessed the ownership a participant felt for the rubber foot following a mRFI condition. Both groups recorded significant proprioceptive drift in the direction of the rubber foot as a result of the synchronous mRFI condition (M = 1.95 cm). Also for both groups, rubber foot ownership scores were greater following the synchronous mRFI condition than control conditions. Although participants as a whole experienced the mRFI, the groups did not differ on proprioceptive drift, F(1,47) = 1.195, p = .280, or rubber foot ownership, F(1,47) = .509, p = .479, suggesting that the mRFI is likely not influenced by long-term specialized motor experience of the lower extremity in young adult females.

Oops you did it again: Imitative and compensatory biases after error observation in golf putting

Carrie M. Peters, University of British Columbia; Romeo Chua, University of British Columbia; Sarah N. Kraeutner, University of British Columbia – Okanagan; Nicola J. Hodges, University of British Columbia

Observing other people can elicit unintentional performance biases in the subsequent actions of the observer. One reason for this “motor contagion”, is due to a covert simulation of the observed action, leading to either imitative or compensatory behaviours. There is recent evidence that the type of bias is prediction error (PE) dependent. PEs are the difference between predicted and observed outcomes. When such an error is present, the observer’s own action representation is updated, causing compensatory biases. To replicate and extend this work, we tested experienced golfers watching both “on-target” puts as well as presumed errors. Seventeen golfers (target N = 22), putted a golf ball to the centre square of a 9 x 9 grid after watching videos of an actor putting to the same grid. Vision was blocked at ball-putter contact, preventing outcome feedback. We covaried the location of the actor’s puts (centre, corner) and instructions about the actor’s intended aiming location, to manipulate the presence of a PE across four blocked conditions. Biases were expected after watching corner puts, with the direction modulated by PEs: the absence of a PE would elicit imitation (overshoots and right biases) and PEs would elicit compensation (undershoots and left biases). In each condition five execution and four observation mini blocks were completed in an interleaved order. As predicted, amplitude overshoot errors (imitative biases) were present after watching the actor “correctly” putt to the top corner of the grid compared to when watching puts to the centre (p = .03, d = .36). Compensatory biases were seen in the mediolateral axis and were only present after watching “errorful” trials (p = .04, d = .27). These data provide insight into the processes engaged during observation by showing diverging biases after watching actions perceived to be correct or incorrect. However, the effects were moderated by target location and were axis dependent, showing that there are constraints governing the generalization of such PE-based contagion effects. Funding source: This research was supported by funding from the Natural Sciences & Engineering Research Council of Canada (NSERC) in the form of a Discovery grant awarded to NJH.

Manipulating observational and physical practice to investigate how they independently and sequentially influence visual and kinesthetic motor imagery

AnnaMae K. Pond, University of British Columbia; Carrie M. Peters, University of British Columbia; Matthew W. Scott, University of British Columbia; Sarah N. Kraeutner, University of British Columbia; Nicola J. Hodges, University of British Columbia

Motor imagery involves bringing to mind the kinesthetic and/or visual properties of a physical action. Yet, the content of imagery and its dependence on primarily sensory/sensorimotor representations and experiences is not well understood, particularly as it relates to our capacity to perform visual and kinesthetic imagery. In earlier work, we provided evidence that observational practice led to enhanced ability to perform (quality and timing) kinesthetic and visual imagery, suggesting that these different types of imagery are not dependent on motor experience and that kinesthetic imagery may rely on an initial visual-representation of the action. In the current study, we used a mixed, repeated measures design to test the development of imagery ability, as a function of manipulated experiences (visual observation before physical practice or vice versa). Two groups (n = 11/group, planned n = 26/group) engaged in observation-al and no-vision physical practice of a novel hand gesture sequence, with the order dependent on group. Kinesthetic and visual imagery ability were assessed via subjective quality ratings and were compared after an isolated phase of no-vision physical or observational practice (post1) and after both types of practice (post2). The observation-first group had higher ratings of imagery quality in general compared to the physical-first group (p = .002), partially replicating previous results. However, Group interacted with Time and Imagery-type (p = .01), showing that group differences were most prominent at post1, due to higher ratings of visual imagery from the observation-first group. Although we intend still to additionally consider timing measures and increase the sample size, initial data suggest advantages for observational before no-vision physical practice in facilitating processes required for motor imagery. There was a lack in dependency of kinesthetic imagery on physical practice, suggesting that a visual
representation may be necessary to act as a scaffold for kinesthetic imagery
in the development of motor imagery. Funding source: This research
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Hodges.

The current landscape of virtual reality use in physical rehabilitation:
A systematic review
Gholamreza Pousti, Old Dominion University; Charlen K. Howard, Old
Dominion University; Scott E. Ross, University of North Carolina at
Greensboro; Louisa D. Raisbeck, University of North Carolina at Greens-
boro; Jared T. McGuirt, University of North Carolina at Greensboro;
Christopher K. Rhea, Old Dominion University; Danielle T. Felsberg,
Wingate University

Virtual reality (VR) is an emerging tool in motor outcomes enhancement.
There is a need to review the literature to understand the potential of this
approach. Thus, this systematic review explores VR in physical rehabilita-
tion. Following PRISMA guidelines and the PICOS model, a compre-
prehensive search was conducted to better understand the research-to-
practice landscape. Using PubMed, Scopus, and EBSCO host, 3813
articles were identified through keywords such as “virtual reality”,”
“physical therapy”, “physiotherapy”, “rehabilitation”, “gait”, “ambula-
tion”, “balance”, “mobility”, “function” and “motor performance”. The
team selected 249 articles for screening, and 128 were ultimately
included in the review. Among the studies, the patient population most
commonly studied was stroke survivors (n = 30), balance improvement
was the most commonly stated goal (n = 118), and most studies occurred
in inpatient settings (n = 41). Non-head mounted, less-immersive com-
mercially available devices such as Nintendo Wii and Xbox Kinect were
utilized in the majority of the studies (n = 108). Additionally, 37% of
studies (n = 47) employed off-the-shelf programs, including Wii Fit Plus,
reflecting a trend towards easily accessible VR tools in therapy. Statisti-
cally significant improvements in gait, balance, or upright mobility were
reported in 73.4% of the studies (n = 94). Notably, while only 68 of the
studies included a control group, a consistent observation was that the use
of VR during the movement protocol led to improved motor outcomes.
This suggests a potential transition from theoretical research to practical
application in clinical settings such as hospitals and clinics. The relative
number of field-based to lab-based studies indicates a possible shift
towards broader real-world application. This evolution in VR highlights
its clinical potential and underscores the need for diverse patient research,
long-term studies, comparative analyses, and standardized VR protocols
in rehabilitation.

Repetitive stepping practice improves spatiotemporal components
of comfortable walking gait: The more directions, the better
Kelly Rodriguez, Louisiana State University; Jan Hondzinski, Louisiana
State University

Unidirectional and multidirectional step practice provide rehabilitation
methods to improve various aspects of mobility in geriatric/neurologic
populations including weight shifting, single limb stance, coordination,
strength, and balance used to improve walking gait. Successful strategies
for improvements in walking abilities can involve alterations to stepping
speed as well as increased resistance and/or assistance during stepping.
However, clinicians find themselves attempting various strategies, using
altered levels of movement speed, assistance, and resistance during therapy
sessions, hoping that the selected practice improves walking. Since the
motivation underlying the use of these strategies for gait improvements
often lacks evidence-based clarity, we wanted to systematically examine
their use. We recruited young and middle-aged adults to provide insight
into outcomes associated with the more subtle changes expected with
aging and declines in function of body systems related to ambulation prior
to reaching older adulthood. To examine acute effects of step practice,
we included 2 main stepping conditions (multidirectional—MDS, unidi-
rectional—UDS) and 3 levels of assist (no assist–NA, assistance–A, or
resistance–R). Healthy young (YA, 18–25 years) and middle-aged adults
(MA, 45–55 years) performed 3 comfortably paced walking trials before
(control) and after 3–45 second bouts of practice in each step condition,
allowing for examination of practice effects on spatiotemporal components
of gait. Randomization of 6 step practice conditions (UDS–NA, UDS–A,
UDS–R, MDS–NA, MDS–A, MDS–R) and 5 minutes of rest between
conditions helped negate potential order effects and practice accumulation,
respectively, on primary measures of gait velocity and step length. Results
revealed that after MDS practice participants covered a greater distance
associated with an increased gait velocity and step length compared to
UDS practice. The data support implementation of MDS for desired
increases in temporal and spatial gait metrics of healthy young adults
55 years and younger.

The motor learning effects of combining an external attentional focus
and task-relevant autonomy
Jerzy Sadowski, Jozef Pilsudski University of Physical Education in
Warsaw; Agata Chaliburda, Jozef Pilsudski University of Physical Edu-
cation in Warsaw; Logan Markwell, The University of Tennessee; Paweł
Wołosz, Jozef Pilsudski University of Physical Education in Warsaw;
Igor Cieśliński, Jozef Pilsudski University of Physical Education in
Warsaw; Tomasz Niżniewski, Jozef Pilsudski University of Physical Edu-
cation in Warsaw; Andrzej Mastalerz, Jozef Pilsudski University of Physical
Education in Warsaw; Hubert Makaruk, Jozef Pilsudski University of Physical
Education in Warsaw

Decades of research have been spent investigating methods to facilitate
motor learning effectively. Theoretical explanations would suggest, and
recent empirical evidence has shown, that the combination of autonomy-
supported (i.e., self-controlled) practice conditions and an external focus
of attention may benefit motor learning outcomes. However, not all
investigations have consistently provided evidence for a motor learning
benefit. Providing autonomy over task-irrelevant information has been
proposed as one explanation for the mixed results. Studies have demon-
strated that autonomy-supported conditions utilizing task-relevant infor-
mation, relative to task-irrelevant, can produce greater relative benefits.
Therefore, the purpose of the present experiment was to investigate the
combined effects of an external attentional focus and task-relevant
autonomy on the motor learning of a standing korfball shooting task.
110 PE graduate students (41 females and 69 males, $M_{\text{age}} = 22.53$ years)
participated in the study. Participants were randomly assigned to one of
four practice groups: external focus (EXT), internal focus (INT), auton-
omous (AS) and autonomous-external (AS-EXT). Participants performed
50 trials (5 sets x 10 repetitions) on 3 consecutive days for a total of 150
trials. In the study, a mixed ANOVA was conducted to assess the impact
of different instructional groups on motor learning during the test and
acquisition phases. The results indicated significant effects for test and
acquisition phases, significant interaction between instructional groups
and test phases. The present findings suggest that practicing with an
external focus of attention results in greater motor learning relative to an
internal attentional focus. However, the current study did not reveal
evidence for autonomous conditions providing an additive motor learn-
ing effect when combined with an external focus. The study underscores
the significance of external attentional focus in motor learning but
questions the presumed benefits of combining autonomy support with
specific attentional instructions.
The correlation of a physiological profile assessment, fall-risk index and gait parameters of community dwelling, older adults

Brittany Samulski, Old Dominion University; Kyle Langerhans, Old Dominion University; Jacquelyn Moxey, Old Dominion University

Falls are the leading cause of injury-related death in community-dwelling adults over the age of 65, further supporting ideology of the examination of individual physiological factors as they relate to increased risk of falls. This study examined the relationship between a Physiological Profile Assessment (PPA) risk score and gait parameters in community-dwelling older adults. Participants (N = 301; Age\textsuperscript{a} = 70.9 ± 7.62 years; 64.5% female) were recruited via a community falls risk assessment program. Each participant completed a long form PPA that included testing of reaction time, strength, vision, proprioception, tactile sensation, and postural sway. Overground gait trials on a 40-ft pathway (20-ft pressure sensitive gait mat in the center) consisted of three walking trials at both a self-selected preferred and maximal pace. PPA data was analyzed using Fallscreen software to obtain a fall risk score normalized to the participant’s age and gender (PPA z-score). Gait parameters were averaged across condition and trial, and normalized to account for each participant’s height. A significant, moderate correlation was noted between the PPA z-score and height-normalized gait velocity (r = −.389, p < .001). Significant, weak correlations were noted between the PPA z-score and gait cadence (r = −.243, p < .001), step length (r = −.354, p < .001), percentage of stride in stance phase (r = .287, p < .001), and number of reported falls in the last year (r = .209, p < .001). Gait assessment remains a key component of assessing fall risk in older community-dwelling adults because there appear to be gradual physiologic changes which accompany alterations to gait in persons at risk of falling. Connecting age-related physiologic changes to altered motor behavior (i.e. slowed walking to prevent falling) sets the stage for future investigation of the complex interplay of fall risk factors. An improved understanding of the complex relationship between physiology and motor behavior underlies a future comprehensive approach to fall prevention and risk factor mitigation. Funding source: Project supported by Optima Health.

Horizontal vestibular ocular reflex yields low cue fixation times during the Vestibular Ocular Motor Screening test

Gustavo Sandri Heidner, Montclair State University; Natalie Mileiski, Montclair State University; Julia Duardo, Montclair State University; Luis Torres, Montclair State University; August Price, Bellapianta Orthopedics and Sports Medicine; Robert Horn, Montclair State University

The Vestibular Ocular Motor Screening (VOMS) is a tool that was developed to provide brief clinical screening to assess and monitor vestibular and ocular motor impairments and symptoms derived from sport-related concussions (Mucha et al., 2014). It tests patients in five domains: smooth pursuits, horizontal and vertical saccades, convergence, horizontal (HVOR) and vertical vestibular ocular reflex, and visual motion sensitivity. Despite describing the use of several oculomotor paradigms, the data points collected during the test are limited to scales of symptom severity ranging from 0 (none) to 10 (severe), i.e., no oculomotor data points are collected. In this study we sought to investigate how accurately participants were performing the oculomotor tasks, more specifically the HVOR, as is assumed by the test’s design. This is an ongoing study. Eight collegiate aged adults (N = 8, M\textsubscript{age} = 21.9 ± 3.0 years, 7 females) without a history of concussion completed the VOMS test in the lab. Participants wore a Tobii Pro Glasses 3 eye tracking system during the execution of the VOMS in order to track their eye movements. Videos were analyzed individually to find the corresponding point of the HVOR task and an area of interest (AOI) was placed over the cue on which they were required to maintain fixation during the task. During execution of the task, participants are required to rotate their head 20 degrees, side-to-side, for a total of ten repetitions, at a frequency of 180 beats per minute. Fixation time on cue was very low (M = 3.1 ± .36 %) during the execution of the HVOR. Ocular search strategy varied substantially between participants. The percentage of fixation data points ranged from 27.1–83.9%. These results suggest that the execution of the HVOR task in the VOMS is not uniform across non-concussed participants. More work is needed to investigate variations of head rotation frequency and greater control of head angle of rotation as means of increasing concussion metrics reliability.

Motor performance as a function of compromised motor imagery ability in individuals with Down Syndrome?

Nadja Schott, University of Stuttgart; Carolin Francki, University of Stuttgart; Laura Sophie Scholz, University of Stuttgart

Due to a genetic predisposition, people with Down syndrome (DS) show limitations in mental, linguistic, and motor development. One facet of impaired motor behavior is impaired motor planning ability, which is thought to be related to an impaired ability to use motor imagery (MI), perceptual process through which people plan, initiate, and control their actions; Bach et al., 2022). Numerous studies have investigated motor imagery in typically developed individuals (TD), but this issue has been neglected in people with intellectual disabilities. This study aimed to determine the relationship between motor performance and motor imagery ability in adolescents and young adults with DS compared to typically developing (TD) children. Twenty adolescents and young adults with DS (20.0 ± 4.62 years, 50% female) and 20 TD children (matched for mental age; 9.00 ± 1.75 years, 40% female) completed a modified version of the Test of Controllability of Motor Imagery (Schott, 2013). Motor performance was assessed using the Canadian Agility and Movement Skill Assessment (CAMSA; Longmuir et al., 2017). MANOVA revealed significant differences in CAMSA total score and distribution scores between the two groups (DS vs TD (Wilks’ Lambda = .473, F(3,33) = 12.3, p < .001, η\textsuperscript{2} = .527), with TD children performing better than the DS group. The same applied to the ability to imagine movements (Wilks’ Lambda = .695, F(2,34) = 7.46, p = .002, η\textsuperscript{2} = .305). In the TD group, a significant positive correlation was found between motor imagery ability and motor performance (r = .448, p = .047). In the DS group, however, no significant correlation existed between motor imagery scores and motor performance (r = .131, p = .478). In conclusion, the current study shows that individuals with DS have a weaker facilitation effect of motor imagery ability on motor performance. Thus, our findings have important clinical implications for more targeted interventions to improve movement imagination skills as a prerequisite for motor skill learning in individuals with DS.

Motor imagery of individuals with intellectual disabilities at the Special Olympics 2023 sports competitions in Berlin

Nadja Schott, University of Stuttgart; Lisa Kröper, University of Stuttgart; Inaam El-Rajab, University of Stuttgart

Compared to children with typical development, children with intellectual disabilities (ID) are 65% more likely to have a low level of motor performance (Kavanagh et al., 2023). However, Special Olympics competitions demonstrate that people with intellectual disabilities can improve their motor skills to a high degree, although this group’s determinants of motor learning have been little studied to date. In individuals with ID, it is suspected that the difficulties in motor learning may be related to poor motor representation. Although motor imagery (MI) has been found to aid in developing motor representations in typically developing individuals (Kraeuter et al., 2020), there is limited research on using motor imagery in individuals with intellectual disabilities. During the 2023 Special Olympics, 39 athletes with ID (27.8 ± 6.75 years) and 25 athletes without ID...
(23.6 ± 3.70 years) underwent tests of mental chronometry (active [aTUG] and mental Timed-Up-and-Go Test [mTUG], Beauchet et al., 2014) and generation and manipulation of movement representations (modified Test of Controllability of Motor Imagery with Recognition and Regeneration conditions, [mTCMI] Schott, 2013). The aTUG times (4.78 ± 1.20 s) were significantly higher in subjects with ID than the mTUG time (3.32 ± 1.46 s), but not in athletes without ID (3.63 ± 0.75 s vs 3.28 ± 0.91 s), $F(1,53) = 13.7$, $p < .001$, $b^2 = .205$. In both conditions of the mTCMI, the subjects with ID (recognition: 6.72 ± 3.49; regeneration: 23.2 ± 16.4) performed significantly worse than those without ID (recognition: 12.4 ± 1.85; regeneration: 51.9 ± 10.4), Wilks’ lambda = .38, $F(4,50) = 20.7$, $p < .001$, $b^2 = .623$. Our results for individuals with ID support the motor-cognitive model (Glover & Baran, 2017) that movement imagination depends more on executive resources than actual actions. In addition, the TCMI results show that action language does not automatically and unconsciously evoke a motor representation in individuals with ID to visualize features of the described action (Dupont et al., 2023).

Subliminal priming of whole-body motor responses

Christoph Schütz, Bielefeld University; Iris Güldenpenning, Paderborn University; Dirk Koester, BSP Business & Law School; Thomas Schack, Bielefeld University

Unconscious prime stimuli create a covert activation of the prime-related response and, thus, affect the reaction time (RT) to a target stimulus. Gaze primes, according to previous studies, are only processed unconsciously in the context of conscious gaze stimuli, suggesting top-down processing. In the current study, we sought to investigate the automaticity and controllability of unconscious gaze processing. To this end, participants executed a forced-choice RT task by responding to stimuli of a basketball player (that executed a left/right pass) with a whole-body blocking movement. RT and center of pressure displacement (CoP) were measured as dependent variables. Prior to the target stimulus, an unconscious gaze prime was presented, its direction congruent or incongruent to the target’s pass direction. In three different experiments, gaze cues in the target stimuli were either (1) helpful ($N = 21$, $M_{age} = 27.3 ± 4.8$ years), (2) occluded/removed ($N = 22$, $M_{age} = 24.9 ± 4.1$ years), or (3) detrimental to the task ($N = 22$, $M_{age} = 27.7 ± 9.5$ years). In theory, all gaze cues were irrelevant to the main task. Repeated measures ANOVAs on the CoP data showed significant main effects of the gaze primes in Experiments 1, $F(1,20) = 126.714$, $p < .001$, $w^2 = .750$, and 2, $F(1,21) = 26.160$, $p < .001$, $w^2 = .364$, but not in Experiment 3, $F(1,21) = 1.132$, $p = .299$, $w^2 = .003$. The same pattern of results was found for RT. Effects of gaze priming were more pronounced in Experiment 1 (CoP: 45 mm, RT: 38 ms) than in Experiment 2 (CoP: 12 mm, RT: 11 ms) and absent in Experiment 3. Our findings demonstrate unconscious gaze priming of a complex, whole-body response. Task-irrelevant (but socially relevant) gaze cues were processed without awareness or intentionality, in a purely bottom-up manner (Exp. 2). The gaze priming effect was enhanced in the context of helpful gaze cues (Exp. 1) and attenuated in the context of detrimental gaze cues (Exp. 3), indicating that the automatic processing of unconscious gaze cues can still be controlled by top-down, strategic processes.

The whole (practice) is not greater than the sum of its parts: Part-task practice is as effective as whole-task practice for polyrhythm learning

Matthew Scott, University of British Columbia; April Karlinsky, California State University, San Bernardino; Brennen Chan, University of British Columbia; Ellie Saplwy, University of British Columbia; Timothy Welsh, University of Toronto; Nicola Hodges, University of British Columbia

Part-task methods of practice are not thought to be effective for tasks requiring high temporal coordination between effectors or joints.

However, Kurtz and Lee (2003) showed that a part-task simplification method involving unimanual tapping of a later tested 3:2 bimanual polyrhythm facilitated learning and did not differ to whole-task, bimanual practice. Part-practice was only effective when participants could hear both (hand) rhythms during practice. However, there was no control group which just listened (no tapping). In the current study we sought to replicate and extend this work, also asking whether this part-task simplification strategy could be enhanced by practising with a partner. We had four groups, comprising novices practising the whole task alone ($n = 22$), part-task alone (one hand; $n = 21$), part-task with a partner (one hand each; $n = 26/13$ pairs) or just listening ($n = 16$). Participants performed 20 trials (40 sec/trial). The first half of each trial was performed with pacing tones present and the second half without. Performance was assessed pre- and post-test on Day 1 and in retention, 24 hours later. Based on preliminary analysis of the full-trial ratio data only (i.e., inter-tap intervals), we replicated the Kurtz and Lee result, with no differences between the unimanual/part- and bimanual/whole-practice groups in retention. Moreover, there was no evidence that task sharing with a partner was better for learning than practice alone. All three physical practice groups improved between pre-test and retention testing, compared to the control, listen-only group, which did not. Although we have further analyses to run, especially considering high individual differences and the need to look at other dependent measures, these data give further evidence that novel coordination patterns can be effectively acquired through simplified part-practice.

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The relationship between ankle proprioception and muscle rigidity in Parkinson’s disease

Jacquelyn Sertic, University of Minnesota; Jason Kang, University of Minnesota; Emily Lecy, University of Minnesota; Colum MacKinnon, University of Minnesota; Jacquelyn Sertic, University of Minnesota; Jason Kang, University of Minnesota

Parkinson’s disease (PD) alters the processing of proprioceptive signals. Given that proprioceptive afferents from mechanoreceptors such as muscle spindles are used for the conscious perception of body position and the regulation of muscle tone — both of which are dysfunctional in PD — we hypothesized that ankle proprioception will be impaired in PD and the extent of proprioceptive impairment will be correlated with the magnitude of ankle mechanical stiffness. Applying a psychophysical approach, the just-noticeable-difference (JND) threshold of ankle position was determined as a measure ankle position sense acuity. For a total of 35 trials, the ankle was rotated to a reference of 15° and comparison position (less than 15°). Participants indicated which position they perceived to have moved farther. Based on the verbal response and the experienced stimulus size difference, an adaptive psi-marginal algorithm selected the next stimulus size. To obtain a measure of rigidity, ankle mechanical stiffness was determined using a robotic device that passively moved the ankle through a 30-degree dors/plantarflexion range of motion and while measuring the resistance torque about the ankle. The sample consisted of 10 participants with mild-to-moderate PD and 4 age-matched controls. PD participants were off medication during testing. There were two main results. First, JND thresholds ranged between 1.2–2.2° (median: 1.9°) for controls and 1.2–4.4° (median: 2.4°) for people with PD ($p = .18$, Cohen’s $d = .37$). Second, a significant correlation between ankle position JND threshold and ankle stiffness was found in the PD group ($p = .03$, $r = -.71$; after controlling for 1 outlier). This study provides initial evidence that the magnitude of ankle proprioceptive impairment and rigidity are related in PD. Abnormal processing of muscle spindle afferents may contribute to both proprioceptive impairment and rigidity, both of which impact gait and related motor functions. Funding source: NASPSPA Graduate Student Research Grant.
The effects of traditional practice conditions and augmented reality on motor skill acquisition

Andrew Shaw, University of Tennessee, Knoxville; Jaelyn Smith, University of Tennessee, Knoxville; Andrew Strick, University of Tennessee, Knoxville; Jared Porter, University of Tennessee, Knoxville

Research in the area of practice specificity proposes that greater transfer of learning occurs when practice and testing parameters are closely matched. Unfortunately, not all performance situations lend themselves to realistic replication during practice. In some cases, such as medical, military, or law enforcement, it is either dangerous, prohibitively expensive, or not possible to practice under real-world constraints. The growing capabilities of augmented reality (AR) may provide a solution to this conundrum. Thus, the purpose of this study was to determine if practicing with the aid of AR would produce similar motor learning effects compared to real-world practice. Participants were randomly assigned to one of five groups; control (no practice), solitary practice (no defender), practice with a static practice (dummy) defender, practice with a static live defender, and practice with a AR digital static defender, and practiced a basketball shooting task. An AR basketball defender was deployed on a Micro Soft HoloLens2 headset. All participants performed a 10-shot pre-test and post-test against a live defender. All practice groups performed 150 practice shots over three days of acquisition. The post-test was conducted 24 hours following the final day of practice. Results are based on improvement in shooting performance from the pre-test to the post-test. Results revealed a statistically significant interaction between groups and test F(1,3) = 6.14, p = .006, as both the control (p = .005) and live practice groups (p = .042) had significant differences between pre and post test scores. Post-hoc analysis showed no significant learning interactions across groups. Given these findings, it is hypothesized that AR can be a useful learning aid, while more participants (N = 80) are needed to fully investigate the potential learning benefits that may result from using AR during skill acquisition. Additional research is needed with more diverse tasks as well as to explore the differences between AR and VR with skills requiring object manipulation.

Mediolateral stability training improves gait velocity and reduces falls risk in older adults

Ben Sidaway, Husson University; Evan Andrews, Husson University; Alyssa Driscoll, Husson University; Kayla Matte, Husson University; Ryley Newcomb, Husson University; Mikaylah Payeur, Husson University; Danielle Scott, Husson University; Ryan Wheelock, Husson University

Walking is the leading cause of falls in older adults with examinations showing that the greatest instability in gait occurs in the mediolateral direction. Although lateral instability is a significant risk factor for falls, few falls-reduction programs target dynamic mediolateral stability. This study examines whether walking on planks can improve gait parameters associated with fall risk in older adults by improving mediolateral stability. Community-dwelling older adults (N = 10; mean age = 83 yrs.) walked on 6 m long narrow planks whose width decreased with practice for one month, twice a week for 20 minutes. During pre-, post-, and retention tests participants completed the Activities-specific Balance Confidence (ABC) scale and the Dynamic Gait Index (DGI) and then walked 24 m over a computerized gait mat at their typical walking speed and at a self-determined fast speed. The gait mat was used to record, gait velocity, cadence, stride length and its variability, stride time and its variability, stride width, and stance percentage. By the end of training participants were able to walk on a plank on average 3 plank widths narrower than their narrowest pretest width. During post- and retention tests stride length was greater than at pretest while variability of stride length decreased. Stride width was found to decrease with practice walking on the planks as did percentage stance time. After training participants reported an improved balance confidence and an improvement was found in the DGI. Some participants indicated that they had a reduced fear of falling following training. Training also resulted in significant increases in gait velocity during both normal and fast walking even though the plank walking was performed very slowly. With practice on the planks, participants improved their ability to balance on one foot which in turn led to a greater stride length and hence increased gait velocity. Plank training then resulted in improvements in important gait parameters indicative of improved dynamic mediolateral stability and reduced falls risk in older adults. Funding source: Husson Research Fund.

The impact of balance and mindfulness training on young biathletes’ rifle aiming trajectories

Kajetan J. Slomka, Academy of Physical Education in Katowice; Justyna Michalska, Academy of Physical Education in Katowice; Anna Akbas, Academy of Physical Education in Katowice; Anna Kamieniarz, Academy of Physical Education in Katowice; Grzegorz Juras, Academy of Physical Education in Katowice

This study compared two approaches for enhancing biathletes’ shooting aiming trajectories. The first requires motor skills and balance. Postural balance improves motor performance in many sports and reduces the danger of body imbalance, falls, and injuries. Mindfulness and psychological competency underpin the second strategy. Mindfulness involves focusing on the present and without judging it. Recent research links mindfulness to better competitive shooting. This is because mindfulness and refocusing increase awareness. The 6-week balance training and 6-week Mindfulness Sports Performance Enhancement (MSPE) programs were tested to increase youth biathletes’ aiming performance. 16 teenage biathletes were the experimental group and 10 were the control group in this study. National Sports Championship Schools featured both categories. Balance was tested on a force platform and targeting quality with video tracking and laser feedback. The biathletes were ski ergometer-tested at rest and after acute workouts. After the initial measures, the experimental group was split into Stability (n = 8) and Mindfulness (n = 8) groups and undertook distinct training programs alongside their daily practice. Balance and mindfulness training affected shooting balance. Statistically significant changes (p < .05) were detected in COP path length (lenCOP), velocity (vCOP), and rambling/trembling trajectories at rest and after fatigue. This applied to anterior-posterior and medio-lateral planes. Additionally, shot aiming trajectories like velocity and postural characteristics like lenCOP and vCOP correlated positively (r = .74, p = .035). Exercised training did not enhance aiming trajectories in any group. This research supports the idea that balance and mindfulness are linked and is its most important and potentially useful finding. Future research should use the same approaches with more advanced athletes and a bigger sample size to confirm our findings. The study’s results may have been clearer if the training program had been adopted earlier in the planning process.

Virtual variability: The motor learning effects of practice variability within an immersive environment

Jaelyn Smith, University of Tennessee, Knoxville; Jared Porter, University of Tennessee, Knoxville; Hubert Makaruk, University of Tennessee, Knoxville; Andrew Strick, University of Tennessee, Knoxville; Logan Markwell, Józef Piłsudski University of Physical Education in Warsaw; Agata Chaliburdz, Józef Piłsudski University of Physical Education in Warsaw; Jerzy Sadowski, Józef Piłsudski University of Physical Education in Warsaw; Michal Biegajło, Józef Piłsudski University of Physical Education in Warsaw

Previous studies have demonstrated that virtual reality (VR) practice facilitates positive transfer of learning similar to real-world (RW) practice.
Practice variability is another factor that has received ample investigative attention, and studies testing the practice variability hypothesis have demonstrated that higher levels of variability (i.e., varied practice) can beneficially effect retention and transfer compared to lower levels of variability (i.e., constant practice). The purpose of this study was to examine how differing levels of variability during motor skill practice in VR influence retention and transfer. It was predicted that a) the varied practice groups would result in greater retention and transfer test performance compared to the constant practice groups and, b) that the varied practice group switching between a VR and RW environment would lead to enhanced motor learning compared to the other groups. Participants (N = 120) were randomly assigned to a RW constant practice group (RW constant), a constant practice group that switched between a RW and VR environment (RW + VR constant), a RW varied group, and a varied practice group that switched between RW and VR (RW + VR varied). Participants performed a 10-trial pretest and a 60-trial golf putt practice phase in one of the four practice groups. Then, 10-trial retention and transfer tests were performed 24 hours and 7 days later. Analyses revealed that the two varied practice groups led to greater accuracy improvements during the transfer test. However, RW + VR varied practice did not lead to superior motor learning relative to the other three practice groups. These results partially support the current predictions and are in support of the practice variability hypothesis. Additionally, these findings provide further evidence that practicing a motor skill in VR can elicit a positive transfer of learning effect.

Effect of acute state mental and physical fatigue on subsequent motor performance and perceived workload
Joshua Springer, University of Tennessee, Knoxville; United States Army; Jared Porter, University of Tennessee, Knoxville

Over the last few decades, there has been an emphasis in scholarly work exploring the foundations of fatigue and its impact on human performance. However, there is a dearth of research on the combined effects of various types of motor and cognitive fatigue. While extensive research has been conducted on mental and physical fatigue alone, a notable gap exists in exploring motor and cognitive fatigue’s combined effects on subsequent motor performance, thus failing to capture the complex reality where multiple types of fatigue frequently coincide. Therefore, this research study explored the combined effects of motor and cognitive fatigue on subsequent motor performance. Participants (N = 28) completed a physical fatigue task, mental fatigue task, and combined mental and physical fatigue task in a randomized fashion. Each fatigue condition was followed by a post hoc reaction time task to assess motor performance. A two-way repeated measures ANOVA revealed significant main effects for time and condition; however, they were superseded by the time-by-condition interaction, F(2,54) = 74.14, p < .001, η² = .733. Post-hoc testing revealed significant post-fatigue differences in anticipatory reaction time between the physical and combined fatigue conditions, p < .001. Additionally, significant differences were found between mental fatigue compared to combined fatigue, p < .001. As for workload, results from a repeated measures ANOVA demonstrated significant main effects (F[1,61,43.48] = 24.24, p < .001, η² = .615) for mean global NASA TLX scores. Post-hoc testing for multiple comparisons found statistically significant differences in global NASA-TLX workload scores for combined fatigue as compared to physical fatigue (p < .001) and mental fatigue (p < .001). The results of this study suggest when motor and cognitive fatigue occur simultaneously and continuously, deficits in subsequent motor performance and perceived workload compound over time relative to only experiencing motor or cognitive fatigue.

Effect of mental and physical fatigue on force production capability and Stroop error rate
Joshua Springer, University of Tennessee, Knoxville, United States Army; Jared Porter, University of Tennessee, Knoxville

Throughout the literature, fatigue emerges as a complex, multifaceted construct that has been defined and explored in various ways. Regarding the impact on motor performance, fatigue has primarily been investigated using two distinct lenses: physical or mental. Recent studies suggest that acute muscle fatigue may negatively impact subsequent task efficiency and overall motor performance. Similarly, numerous studies have explored the impact of mental fatigue on motor performance. Results suggest that mental fatigue resulted in a decline in accuracy and motor skill performance time. Furthermore, mental fatigue has been shown to increase error rates and impair performance during self-paced and constant load tests of endurance. Participants (N = 28) completed a physical fatigue task, mental fatigue task, and combined mental and physical fatigue task over the course of 14 days. Force production and Stroop error rate measurements were captured during each fatigue condition. Results exploring the effect of task-specific fatigue demonstrated no significant differences in percent reduction in force production capability between the physical fatigue condition (M = .33, SD = .08) and the combined fatigue condition (M = .36, SD = 1.02), t(27) = -.874, p = .407. Additionally, results exploring the effect of task-specific fatigue demonstrated statistically significant differences in Stroop error rates between the mentally fatiguing condition (M = .022, SD = .012) and the combined fatigue condition (M = .030, SD = .022), t(27) = -3.55, p = .017. Results from this study suggest that adding a mentally demanding task to physical exercise had a limited effect on force production capability compared to physical exercise alone. Conversely, adding physical exercise to a mentally demanding task had a negative impact on mental error rates over time when compared to performing a mentally demanding task in isolation. Further research should expand these findings by examining the effects of comprehensive mental and physical fatigue in the context of real-world applications.

Accounting for individual differences in acquisition: The efficacy of a custom-made adaptive practice schedule
Andrew Strick, University of Tennessee, Knoxville; Joel Velten, University of Tennessee, Knoxville; Josh Springer, University of Tennessee, Knoxville, United States Army, Joint Base San Antonio, Texas; Andrew Shaw, University of Tennessee, Knoxville; Young-Joon Kim, University of Tennessee, Knoxville; Jared Porter, University of Tennessee, Knoxville

Practice schedule optimization is an important topic for practitioners and researchers alike. One way to optimize a practice schedule and promote motor skill learning is to account for individual differences in practice performance. This study investigated a novel method for creating an individualized adaptive practice (IAP) schedule by adapting the practice structure based on the individual differences derived from the learners’ performance. Hence, the practice schedule evolved relative to the skill level of the individual learner for each task variation of a motor skill. The novel manipulation of the IAP schedule was that task variations performed more poorly were scheduled in greater volume and task variations performed well were scheduled in lesser volume. Thus, the purpose of this study was to investigate if an IAP schedule would enhance motor skill learning compared to a non-custom yoked schedule. Participants (N = 128) performed a linear positioning task with three task variations of equal nominal difficulty at different distances along a linear trackway. Following familiarization, participants performed a 30-trial pre-test, and 150 acquisition trials. Two 30-trial post-tests were administered immediately following the cessation of practice and one day following practice. Both absolute error (AE) and variable error (VE) were analyzed with separate (2
group x 3 test) mixed ANOVAs. No significant group-wise differences were observed between the IAP group and yoked counterparts for AE and only a significant reduction in VE was observed between groups on the immediate post-test. From the results it can be inferred that receiving an IAP schedule based on individual differences may improve short-term motor performance consistency but may not facilitate long term motor learning. Future work should investigate if other practice performance variables can account for individual differences to enhance motor skill learning within an adaptive practice context.

The limits of motor planning span: Findings from two iterations of a non-binary planning span assessment

Breaanna E. Studenka, Utah State University; Caleb Phillips, Utah State University; Ella Schwebach, Utah State University

End-state comfort refers to a phenomenon where individuals tend to plan their initial grasps so as to maximize comfortable postures at the end of object manipulation tasks. Typically, these tasks utilize binary grasp choices (e.g., thumb up). More recently, non-binary tasks have been used to assess different aspects of planning, namely planning span – the extent to which the beginning grasp is sensitive to the end state given intermediary action steps. While measuring the ability to plan for multiple grasp states in a sequence is important, there is currently no established task specifically designed to measure planning span. The purpose of these two studies was to develop and test a non-binary measure of motor planning span. Sixty participants performed a grasp and place task where they moved a round object with 8 different pointers and placed up to three pointers against a target in a specific order. The first study involved only one of five targets lighting up with either one, two or three lights. The second study utilized up to three different targets lighting up. For both studies, the participant then grasped an object and rotated it to match up to three colored pointers with the colors of the target(s) in order from left to right. The number of pointers/lights (1, 2, or 3) was manipulated to test different levels of planning span. For the first task, adjustment of the initial grasp posture was greater for span 1 than for spans 2 and 3. Adjustment of grasps for spans 2 and 3 did not differ. It was hypothesized that the second task would be easier as it entailed only one rotation, however, participants exhibited the same pattern of adjustment, which was greater for span 1 and smaller for spans 2 and 3. Additionally, for span 3 tasks, there was greater adjustment for span 1 than for spans 2 or 3. Additionally, participants exhibited greater adjustment of postures on day 2 than day 1, indicating some learning for this task. These findings document some limits on motor planning span regardless of the difficulty of the movement(s) involved. Funding source: Utah State University.

Understanding individuals’ decision processes when choosing between individual and joint actions

Jiaqiao Tang, McMaster University; Mikayla Lalli, McMaster University; Nour Al Affi, McMaster University; Hibaa Hassan, McMaster University; Jacqueline Zheng, McMaster University; Scott Rathwell, University of Lethbridge; Michael J. Carter, McMaster University

Although the motivation to engage in joint action is obvious when a task goal cannot be easily achieved on your own (e.g., moving a heavy couch), what is less clear is when joint action is not necessary or optimal based on instrumental costs (i.e., reduced reward and greater effort). Curioni et al. (2022) recently found that when given the choice to complete a computerized box-clearing task alone or with a partner, human adults preferred joint action despite the increased costs and negative impact on performance compared to individual action. Interestingly, in a solo version of the task, participants preferred the more efficient, unimanual condition over the more costly, bimanual condition. While these results suggest that various sociological and/or psychological factors affect the computation of the utility of acting together, the underlying motivations for such preferences remain unclear. Here, partners (N = 50 pairs) performed the same computerized box-clearing task and were randomly assigned the role of “Decision Maker” or “Helper”. In 50% of trials, the Decision Maker was forced to complete the task alone or together with the Helper. In the remaining 50% of trials, the Decision Maker could choose to act alone or cooperate. At the end of the experiment, we queried the Decision Maker about why they chose to complete the task alone or together using open-ended questions. We performed an inductive thematic analysis on these data, which identified several themes underlying the decision-making process. When choosing to act alone, a major theme was “prioritizing the task goal”. When choosing to act together, two themes that emerged were “feeling intrinsically motivated” and “consideration for one’s partner”. These results suggest that although participants were aware that individual action was more optimal for achieving the task goal, they ascribed additional reward value to performing the task with their partner. Thus, sociological factors can override decisions based on instrumental utility alone, resulting in cooperative behaviour even when it is suboptimal. Funding source: Natural Sciences and Engineering Research Council of Canada, Canadian Foundation for Innovation, Ontario Research Fund.

Investigating effortful practice and its association to long-term learning using electrophysiology

Jet Taylor, Boise State University; Juliana O. Parma, San Francisco State University; Matthew W. Miller, Auburn University; Mariane F. B. Bacelar, Boise State University

A key motor learning principle is that, to be effective, practice should be effortful. Specifically, from an information processing perspective, the allocation of more cognitive resources for motor programming during the acquisition phase should be correlated with better learning. Past evidence suggests that the electroencephalographic measure motor upper-alpha power recorded during movement preparation (motor-preparatory upper-alpha power) has an inverse relationship with cognitive resource allocation for motor programming. Thus, in the present exploratory study, we used motor-preparatory upper-alpha power to investigate whether cognitive resource allocation during practice predicted learning in a mini shuffleboard task. In line with the principle that effortful practice leads to better learning, we predicted that motor-preparatory upper-alpha power would be negatively associated with post-test radial error. Data from 39 participants were entered into a mixed-factor ANCOVA with post-test radial error serving as the dependent variable, post-test type (retention/transfer) serving as the within-subject factor, and motor-preparatory upper-alpha power during acquisition serving as the independent variable. As the main goal was to determine the unique contribution of motor-preparatory upper-alpha power to the post-test scores, participants’ pretest performance and average practice performance were entered as covariates in the model. Contrary to our prediction, results showed that average motor-preparatory upper-alpha power did not predict post-test performance (p = .776). This is inconsistent with past studies finding an inverse relationship between motor-preparatory upper-alpha and motor performance. Notably, these studies typically focus on short-term performance. Here, we examined whether the same relationship applies to learning. This is relevant to our understanding of the distinct processes underlying performance and learning, and future studies should continue to find ways to uncover their neurophysiological mechanisms.
Testing for between-partner contextual interference effects in the learning of different movement sequences

Porter M. Trevisan, University of British Columbia; April Karlinsky, California State University; Matthew W. Scott, University of British Columbia; Georgia Grieve, University of British Columbia; Nicola J. Hodges, University of British Columbia

Contextual interference (CI), the phenomenon where skills are acquired more slowly in a random practice schedule but retained better compared to blocked practice, has been observed in various independent settings. Practicing with a partner (dyad practice) has been shown to impact future practice decisions based on a partner’s schedule; but learning outcomes have not been sensitive to between-partner CI effects based on tasks and manipulations so far. In this study, we used a keypress timing task (where participants practised 3 sequences with distinct timing goals), which has been shown to be sensitive to CI effects and a design where all primary groups had a blocked practice partner. We manipulated whether blocked practice individuals practised alone or alternated with a partner and whether the partner matched (same schedule) or mismatched (different blocked or random schedule). This resulted in four groups: Blocked alone (n = 28), Blocked-matched partner (n = 32; 16 pairs), Blocked-mismatched partner (n = 32), or Blocked-random partner (n = 16 so far). On Day 1, participants completed a pre-test and practice phase and on Day 2, retention tests were conducted, with and without feedback. In preliminary analysis, where we have just looked at movement time error (%), participants improved across practice (p < .001), but there were no differences between the blocked participants. In retention tests, the dyad blocked groups generally showed less error than the alone group (p = .06). These analyses suggest that practicing a motor task with a partner has advantages for learning novel sequence timing skills, but the effects so far appear small. Once we have a full data set, we will be able to comment on factors driving any between group differences, which for now appear to be due to beneficial partner effects, independent of the degree of between-partner contextual interference. Funding source: Discovery grant awarded from the Natural Sciences and Engineering Research Council of Canada.

Increased sensitivity to postural perturbation following COVID-19 infection

Brittany Trotter, East Carolina University; Kendall Nelson, East Carolina University; Mackenzie Hoye, East Carolina University; Linda P. Bolin, East Carolina University; Stacey A. Meard, East Carolina University; Nicholas P. Murray, East Carolina University; Zachary J. Domire, East Carolina University

There is increasing evidence of long-term effects indicative of central nervous system involvement following COVID-19 infection. Assessment of postural sway, a measure of static stability, can reveal even mild impairments in sensorimotor control due to disease or injury. The purpose of this study was to investigate the effects of both acute and long COVID-19 infection on sensorimotor control through postural sway assessment. We hypothesized significant differences in center of pressure (COP) 95% confidence ellipse area would be seen between those who have experienced a COVID-19 infection and whose symptoms resolved within 4 weeks (ACUTE), those who had COVID-19 and at least one symptom persisted longer than 4 weeks (LONG), and those with no history of COVID-19 infection (CONTROL). COP was measured during quiet standing on a force plate during eyes-open (EO), eyes-closed (EC), and a virtual reality balance task consisting of a baseline eyes-open measurement (VR), visual perturbation with “moving room” (MR), and a recovery period in the VR environment following cessation of the moving room (RC). COP data was then processed using a custom MATLAB script and data was analyzed with an RMANOVA. Differences within the groups across conditions were noted. There were no significant differences in 95% confidence ellipse area between conditions in the CONTROL group (n = 17). A significant increase in area was seen in the ACUTE group (n = 20) between the EO (M = 33.37mm) and EC (p = .03, M = 53.66mm), VR (p = .007, M = 48.56mm), and RC (p = .03, M = 105.41mm) conditions. Additionally, significant differences were identified in the LONG group (n = 15) between the EO (M = 23.16mm) and EC (p = .036, M = 45.73mm), VR (p = .004, M = 41.96mm), and MR (p = .04, M = 40.98mm) conditions. Additional differences in COP measures were also evident. Results indicate individuals who have experienced COVID-19 infection may be more sensitive to mild perturbations of balance than those who have not been infected. However, these results do not discriminate between acute and long COVID. Funding source: Barnhill Family Foundation.

Stay positive! Knowledge of results about more accurate versus less accurate trials benefits motor learning and psychological factors

Joi Velten, University of Tennessee, Knoxville; Jared Porter, University of Tennessee, Knoxville

Research has demonstrated providing knowledge of results (KR) regarding more accurate rather than less accurate performance benefits learning. However, the acquisition phase in previous studies was short, consisting of just one session. Thus, the question arises if the same learning benefits continue with an extended period of practice. Therefore, the primary purpose of the present study was to investigate whether providing KR on more accurate trials enhanced motor learning, motivation, and self-confidence relative to providing KR on less accurate trials. We also investigated whether anxiety was affected by the provision of feedback. Participants (N = 60) performed a volleyball serve over four days of practice under one of two conditions. After each block of six trials, one group received feedback on the three most accurate (MA) trials, whereas the other group received feedback on the three least accurate (LA) trials. One week following practice, participants performed a retention test without feedback. Participants also completed the Intrinsic Motivation Inventory (IMI) and the Competitive State Anxiety Inventory-2 (CSAI2). A 2 (group) x 24 (trial blocks) repeated measures ANOVA was conducted to evaluate service accuracy scores, and independent t-tests were conducted to evaluate potential differences between experimental groups. Results indicated that the MA group had more effective learning as well as higher motivation and self-confidence scores than the LA group. Additionally, the MA group had lower cognitive and somatic anxiety compared to the LA group. The MA group had higher motivation and self-confidence scores and lower anxiety compared to the values reported on the pre-test. Conversely, the LA group had lower motivation and self-confidence scores relative to the pre-test values, and tended to have increased cognitive and somatic anxiety following practice. The results of this study demonstrate that providing KR about more accurate trials facilitates motor learning and increases motivation and self-confidence whilst lowering levels of somatic anxiety.

Really different: Virtual and augmented reality alter motor planning and control

Xiaoye Michael Wang, University of Toronto; Michael Nitsche, Georgia Institute of Technology; Gabby Rich, Ontario Tech University; Ali Mazalek, Toronto Metropolitan University; Timothy N. Welsh, University of Toronto

Virtual (VR) and Augmented (AR) Reality technologies that provide digital simulations of physical interactions could revolutionize education.
and professional training. However, it is unclear how perceptuomotor behaviors differ across VR, AR, and actual, unmediated reality (UR), which could directly impact the effectiveness of these technologies for training and education. Therefore, it is important to understand how movements are planned and controlled in VR and AR and to evaluate whether these processes are shared with those that underlie motor performance in UR. The current study analyzed the targeted manual aiming movements in VR, AR, and UR to evaluate their similarities and differences in terms of motor planning and control. Participants in VR (N = 20) moved in an immersive 3D environment, while those in AR (N = 20) moved while wearing an optical passthrough headset that enabled them to see the real world with a virtual object overlay. Participants in UR (N = 20) pointed to targets on a computer screen. Results showed that movements in VR were slower than movements in UR but had a comparable level of online control. In contrast, movements in AR were equally as fast as movements in UR but were more variable and had less online control. The contrasts between VR and UR suggest that the perceptual distortions and increased temporal lag of visual information in VR that result from isolating the observers from the physical environment motivated the observers to adopt an active compensation strategy that increased reliance on time-consuming online regulation. Conversely, because the optical passthrough in AR presented the target object over the unmediated physical environment, the virtual object may have obscured the hand and led participants to plan more ballistic movements and to rely less on online modulation. Overall, these findings indicate that VR and AR fundamentally alter movement planning and execution in targeted movements. These differences provide insights into considerations when designing VR/AR-based motor training programs for successful transfer to the physical environment. Funding source: Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council of Canada, the Canada Foundation for Innovation, Ontario Ministry for Research and Innovation.

Unraveling decision-making and evidence accumulation in single anticipation trials
Henrietta Weinberg, Friedrich Schiller University; Jena; Florian Müller, Friedrich Schiller University Jena; Rowwen Cañal-Bruland, Friedrich Schiller University Jena

Due to the time constraints in penalty situations goalkeepers face the challenging task to make decisions often within just a few hundred milliseconds. A key finding of anticipation research is that experts outperform novices both in terms of decision accuracy and speed, for instance, by using advanced cues. Yet, how evidence is accumulated within a single decision (i.e., within hundreds of milliseconds) remains to be determined. In this study we aimed to unravel the process of evidence accumulation in single anticipation trials. To this end, 27 participants (M_{age} = 22.37 ± 3.5 years) watched videos of handball penalty takers on a touch screen and predicted shooting direction. Videos stopped the moment the ball left the hand. Participants provided their decision either with a discrete or continuous response by pointing or swiping to a left or right target, respectively. As dependent measures we collected response times and accuracy scores from a total of 200 pointing and 200 swiping trials. To analyze evidence accumulation in single trials, we adopted a novel approach from decision-making research in psychology and neuroscience, called hierarchical drift diffusion modeling (HDDM). HDDM provides several decision-making parameters, including drift rate, an indicator of the rate of evidence accumulation, and non-decision time, a temporal measure of perceptual and motor processes. HDDM analyses confirmed differences regarding drift rate (P_{drift(effect)} > 0.994) and non-decision time (P_{nontime(effect)} = 1.0) between discrete and continuous response measures (see also Leontyev & Yamauchi, 2021). More specifically, participants accumulated evidence faster in pointing than in swiping trials. Yet, they showed shorter non-decision times in swiping than in pointing trials. These findings attest to the potential of applying HDDM to unravel evidence accumulation in single trial, thereby improving our understanding of decision-making processes on extremely short time scales.

Virtual reality displays mitigate head orientation effects on coordination dynamics: Insights from a bimanual force coordination study
Madison Weinrich, Texas A&M University; Yiyu Wang, Texas A&M University; Renee Abbott, Texas A&M University; Ana Diaz-Artiles, Texas A&M University; Deanna Kennedy, Texas A&M University

The use of virtual and augmented reality in domains such as education, entertainment, healthcare, military, sport, and telecommunication to space travel and humans on the Moon and eventually Mars, advances in science and technology have transformed the way billions of people interact with and move within their environment. Nevertheless, the impact of display type and head orientation on motor performance remains unclear. To understand how constraints associated with these environmental manipulations influences coordination dynamics, an experiment was designed to assess bimanual coordination performance with two display conditions (virtual display, natural environment) and two head orientation positions (head-down [0°], head-up [90°]). Right limb dominant participants (N = 12) were required to produce a continuous 1:1 bimanual force pattern with a 90° relative phase offset. Lissajous feedback information was shown via virtual reality displays or on a screen directly in front of the participant. A tilt table was used to manipulate head orientation using a head-up tilt (HUT)/head-down tile (HDT) paradigm. Participants performed 14 trials for each environment (virtual reality, natural) and head orientation (head-down, head-up) condition, counterbalanced across conditions. Each trial was 30s. Absolute error (AE) of the continuous relative phase was used as a measure of the degree to which the required goal relative phase was achieved. Variable error (VE) was used as a measure of stability, and constant error (CE) was used as a measure of coordination bias. Results indicated a significant difference between head orientation in the natural environments. Participants were more accurate (lower AE) in head-down than the head-up condition. However, no differences associated with head orientation were observed in the virtual environment. Results suggest that virtual displays may mitigate the influence of constraints such as head orientation on motor performance.

“Taking the easy route”: Procrastination in a sequential task
Timothy Welsh, University of Toronto; Joseph Manzone, University of Toronto; April Karlinsky, California State University – San Bernardino

When deciding when to complete a task, actors tend to “pre-crastinate” and act sooner than later even if acting sooner increases task difficulty or effort. For example, when an actor is asked to pick up and carry only one of two buckets to a far table, the actor tends to choose a bucket that is close to them over a bucket that is farther even though that close bucket is carried for a longer distance. Actors, however, are often presented with decisions about which task on a list to do first and which to save for later. The present study was designed to assess how the potential rewards of different actions shape decisions in a sequential task (actors perform one task and then the other). Participants (N = 40) chose between two movement options that varied in potential reward (maximum expected gain–MEG). Participants were presented with 2 target-penalty configurations in which a target circle was partially overlapped by a penalty circle. MEG for each target-penalty configuration was
altered by changing the potential for a successful movement, the value
deducted for failure, or both. By varying the amount of overlap (a spatial
parameter related to the probability of contacting the target) and the cost
of the penalty region (a value parameter), the configurations could have
similar or different MEGs. Participants were instructed to imagine
performing aiming movements to one target-penalty configuration and
then the other, and then indicated which of the configurations they
“aimed” to first. The following biases emerged: 1) when the MEGs of
the two options differed, participants imagined aiming to the configura-
tion with the higher MEG first more often than the lower MEG; and, 2)
when configurations had similar MEGs, participants imagined aiming to
the configuration with the smaller spatial overlap (increased probability
of success) first. Overall, the results indicate that actors would perform
tasks with higher MEGs before tasks with lower MEGs, and that actors
tend to weight spatial parameters more highly than penalty parameters
when differences in MEG are unclear. Funding source: Grants and
scholarships from NSERC.

Sociocultural factors, gender, and sensorimotor control: A scoping
review examining implications for anterior cruciate ligament injury
Katherine F. Wilford, Mary Baldwin University; Texas Tech University
Health Sciences Center; Maria Jesus Mena Iturriaga, Universidad del
Desarrollo; Texas Tech University Health Sciences Center; Macarena
Wainer, Universidad del Desarrollo; Margaret Vugrin, Texas Tech
University Health Sciences Center; Troy L. Hooper, Texas Tech University
Health Sciences Center; Toby Brooks, Texas Tech University Health
Sciences Center; C. Roger James, Texas Tech University Health
Sciences Center; Shinye Kim, University of Wisconsin-Madison; Gesine
H. Seeber, Carl von Ossietzky Universität Oldenburg; University of
Groningen; Phillip S. Sizer Jr, Texas Tech University Health Sciences
Center

Women sustain anterior cruciate ligament injuries more often than men.
Many neuromuscular and biological risk factors have been identified in
the literature; however, these characteristics do not fully explain gender-
specific sensorimotor control (SMC) observed in daily tasks or across the
lifespan. There is a need to explore other important factors that may have a more subtle influence on, or relationship with, SMC. Due to well-
established gender-related differences in SMC, a close examination of
key sociocultural factors is warranted. To fully explore the breadth of
literature and identify gaps in knowledge, a scoping review (ScR) is
justified. The purpose of this ScR was to examine the correspondence
between sociocultural factors and SMC. Conducted in accordance with
the Preferred Reporting Items for Systematic Reviews and Meta-Anal-
yses extension for Scoping Reviews (PRISMA-ScR), this ScR searched
the following databases: Pubmed®, Embase®, Scopus®, CINAHL
Complete®, Academic Search Complete™, Pre-Prints Database®, and
Rehabilitation Reference Center from inception to September 2023.
Additionally, relevant grey literature was identified. Screening, study
selection, and data extraction was performed by two blinded reviewers.
Data from bibliometric and sociocultural variable-families were ex-
tacted from 68 included articles. Stereotype threat, gender, and race
have been examined more than other sociocultural constructs. Sensori-
motor control was assessed in upper and lower quarter tasks and
physical activity. Task assessment method varied, often focusing on
task completion or completion speed. While evident that sociocultural
factors may have an influence on SMC, the exact mechanism remains
unclear. Future research should further explore this correspondence as it
relates to biomechanical profiles associated with increased injury risk.
Additionally, sociocultural construct inventory scores could be added to
existing ACL injury screening programs to create a more gendered
approach to risk mitigation.

Is golf putting an appropriate motor skill to assess learning? An
exploratory data processing to examine the study design and
methodology
Masahiro Yamada, Whittier College

According to the traditional learning stage model, behavioral charac-
teristics of motor learning begin with a greater magnitude of errors with
less consistency, followed by a decrease in errors and an increase in
consistency. Many research topics of motor learning/psychology are
aimed at optimizing individuals to move through the learning stages.
Golf putting (GP) is commonly adopted to assess motor learning.
However, using two datasets, this study presents that GP may not be
the most appropriate task depending on the study design and research
methodology. In one dataset, three groups of participants practiced GP,
either 40 cm (n = 25), 150 cm (n = 25), or 180 cm (n = 25) from the
target for 50 trials. Although 50 trials are common in the literature, a detailed
inspection showed no indication of learning, with large errors and SD
across the trials. A regression analysis of radial error on time showed
that the slope (time) was not significant (p > .05). In another unpublished
dataset, three participants practiced 156 trials from a distance of
304.8 cm. Although fluctuations of radial error and SD were high, the
mean performance was better than the other dataset that utilized shorter
distances. Interestingly, an observable pattern emerged only when the
results were smoothed to the mean of every 12 trials (among 2, 3, 6, and
12 trials). Regardless of data processing, SD did not show any im-
provements. Moreover, individual differences among the subjects were
qualitatively observable, which was not evident from either M or SD of
performance. The two datasets showed that (a) GP requires many more
trials than 50 trials for motor learning to have sufficient statistical power
if the outcome measure is radial error, (b) the performance average may
need to be obtained with a large number of trials (e.g., 10 – 12 trials) to
develop a pattern from noisy performance outcomes, (c) consistency
does not follow the traditional learning stage, (d) a farther distance may
not necessarily indicate a more difficult task, and (e) additional mea-
asures beyond M and SD may be required.

The improvement and learning rate of a golf putting task between
varying task difficulty groups: A preliminary result.
Masahiro Yamada, Whittier College; Mahdi Babapour Lashanlou, Urmia
University; Kale Lanza, Whittier College; Jala Dehghanizadeh, Urmia
University

To maximize motor learning, the optimal difficulty has been proposed to
have a 60 – 70% success rate. In contrast, Parma et al. (2023) showed no
significant performance difference between higher (approx. 45%) and
lower (approx. 10%) success rate groups. Also, the authors found that
the number of successes, not the rate, determined a significant difference
in psychological measures between groups, where the success number
around five trials in the experiment may be borderline to show differ-
ences. Thus, the present study examined three groups with varying
success rates in golf putting to understand a lower threshold that
promotes motor learning. Seventy-five participants (21.09 +/-
2.23 years) were randomly and equally assigned to one of the short
(S, 40 cm from the target), medium (M, 150 cm), and long (L, 180 cm)-
distance groups. The success trial was defined as a ball resting within
a 14-cm diameter circle from the target. The distance was determined to
target 60 – 70%, > 10%, and < 10% success rates for the S, M, and L
groups, respectively. After the 30 familiarization trials and ten baseline
trials, participants practiced golf putting for ten blocks of five trials,
followed by ten trials of a 24-hour retention test. For performance, the
radial error distance block mean was normalized between –1 and +1.
For psychological measures, self-efficacy (0 – 100) and modified intrinsic motivation inventory (interests, competence, and effort; each construct includes three 7-point Likert scales) were obtained. The performance results (one-way ANOVA) showed no significant group difference during practice ($F(2,72) = .539, p = .586$) or retention test ($F(2,72) = 1.343, p = .267$). An exploratory analysis to predict performance from the number of successes also did not show significance by the number of successes ($b = 0.027, SE = .016, t = 1.65, p = .105$). The psychological measures neither had any significance in all variables ($p > .05$). Given that the previous studies used fine motor skills, the optimal success rate may be task dependent.

A holistic focus of attention enhances vertical jump performances among Division 1 football players
Tatiana Zhuravleva, Southwestern University; Cabel J. McCandless, New Mexico State University; Christopher Aiken, New Mexico State University

Directing one’s attention externally is more advantageous for motor performance than directing attention internally (Wulf, 2013). Recent research has shown that a holistic focus (HF) yields similar performance outcomes to an EF focus among experienced individuals (Zhuravleva & Aiken, 2023; Zhuravleva et al., 2023). There remains a need to examine kinetic and kinematic measures under a HF to more fully understand the underlying mechanism for the benefits. 17 American football players performed 12 vertical jumps in a counterbalanced order under four conditions with three jumps in each: Internal Focus (IF), External Focus (EF), HF, and control (CON). All participants performed the vertical jumps on a force plate with 16 reflective markers placed on their lower extremities. A self-reported questionnaire was used to investigate adherence to the various focus conditions. Repeated measures ANOVA’s with Sidak post-hoc were used to analyze jump height, mean and peak force, peak power, impulse, velocity, and knee and hip flexion. Friedman’s non-parametric test was used to analyze adherence. A significant main effect for jump height was observed ($F(3,48) = 8.14, p = .003, \eta^2_p = .34$). HF and EF jumped significantly higher than CON ($p = .020$; $p = .024$). No significant difference was observed in jump height between HF and EF ($p = .666$), IF and HF ($p = .110$), IF and EF ($p = .150$), or CON and IF ($p = .699$). In addition, no significant difference was observed in mean and peak force, peak power, impulse, velocity, and flexion of the knee and hip ($p’s > .05$). Friedman’s test did not reveal a significant difference in adherence scores between conditions ($\chi^2(2) = 4.41, p = .110$). The results of our study support previous research in that both an EF and HF significantly improved jump performance, however, the benefit was not attributed to improved kinematic or kinetic outcomes. More research is warranted to understand the underlying mechanics of HF.

Sport and Exercise Psychology Abstracts

Adolescent female swimmers’ navigation of femininity and muscularity
Samantha Adler, Springfield College; Kathleen Mellano, Springfield College; Jill Kochanek, Springfield College; Elizabeth Mullin, Springfield College

Adolescent girls experience high risks of body-related maladaptive behaviors and high rates of sport drop-out. Discrepancies exist between girls’ ideal athletic and social physiques, and discomforts arise when they do not perceive themselves in alignment with societal beauty standards. Swimmers, who develop muscularity in body-revealing uniforms, are a unique group to examine in light of this construct. Adolescent female swimmers’ perceptions of femininity and muscularity have rarely been explored, especially across intersecting identities. The present study used a feminist cultural approach to examine adolescent female swimmers’ perceptions of sociocultural expectations, femininity, and muscularity. Adolescent female swimmers ($N = 11, M_{age} = 16.4$ years) participated in individual, semi-structured Zoom interviews. Questions pertained to thoughts on their current physique, athletic and social physique ideals, drives for femininity and muscularity, comfort in swimming or social environments, sociodemographic influences, and management strategies. The primary researcher used reflexive thematic analysis to analyze the data. Preliminary themes included: desires to reject norms with impulses to conform; perceptions of femininity and muscularity; clothing/attire as a form of (dis)comfort; ideals from an intersectional perspective; protective factors related to body image; management of body image concerns; and improving support before adolescence. The findings suggest many adolescent female swimmers feel comfort in their swimming environments due to the presence of similar, understanding others. In social settings, they struggle to fully resist sociocultural expectations (e.g., muscularity in moderation), despite the desire to do so. Factors influencing their perceptions and differences include their values, identities, and social agents. More exploration in marginalized groups is warranted.

The dark side of sport: Athletes’ experiences of abuse and mental health symptomology
Katherine N. Alexander, Utah State University; Daniel J. M. Fleming, University of Hull; Travis E. Dorsch, Utah State University; Matthew Cook, Utah State University; Leslie A. Page, Utah State University; Kolby Leonard, Utah State University; Spencer D. Bradshaw, Utah State University

Elite sport participation can facilitate the violence of athletes who participate (Kerr et al., 2020), and research suggests that these experiences can have negative long-term impacts, including mental health impairments and symptoms of post-traumatic stress disorder (PTSD; Alexander et al., 2023). The aim of the current study was to explore reported coach and authority figure violence in sport as they relate to athletes’ mental health symptomology, along with the potential additive effects of violence across these authorities. Data were collected from 256 current and former high-level athletes ($M_{age} = 22.22$ years, $SD = 4.66$, 85.7% female) who identified that they were over 18 years of age, had dedicated a significant amount of time to sport, and had a meaningful relationship with a coach and or other authority figure during their athletic participation. Data were collected via online surveys that included validated psychometric scales for PTSD, generalized anxiety, depression, and dissociation symptoms and all analyses were conducted using R (R Core Team, 2023). Four moderated regressions were fit utilizing structural equation modeling and Full Information Maximum Likelihood (FIML) was used as a robust alternative to multiple imputation for missing data due to small effect sizes (Azur et al., 2011). Findings indicate that coach violence was a significant predictor of symptoms of PTSD ($B = .199, p = .001$), generalized anxiety ($B = .103, p = .008$), depression ($B = .106, p = .013$), and dissociation ($B = .119, p = .006$). Violence from non-coach authority figures was a significant predictor of symptoms of PTSD ($B = .276, p = .041$), generalized anxiety ($B = .233, p = .048$), and depression ($B = .304, p = .018$). Of particular interest, there were no significant interaction effects between coach and authority figure violence in any of the four models, suggesting that there are no additive effects of violence from multiple individuals. These results pose implications for future investigations related to generalized athlete violence and well-being. Funding source: Utah State University Graduate Research and Creative Opportunities (GRCO).
The dynamics of approach and avoidance motivations in sport: An attempt at agent-based system modeling

Rémi Altamore, University of Montpellier and IMT Mines Alès; Sylvain Vauchier, IMT Mines Alès and University of Montpellier; Anne Téboul, University of Montpellier; Christophe Gernigon, University of Montpellier and IMT Mines Alès

Based on the complex dynamical system perspective, approach and avoidance motivations in achievement context have been conceptualized by Gernigon et al. (2015) as two competing attractors. The strength of approach and avoidance attractors is assumed to evolve over time depending on the complex interactions among three key social cognitive variables (competence expectancies, expected benefit for the self, and threat for the self) that take place within and across personal, contextual, and situational levels. The complexity of these interactions is not accessible via conventional statistical tools, but can be modeled by computer programs (Gernigon et al., 2023) such as Agent-Based Models (ABMs). The first aim of this work was to develop a first version of an ABM capable of simulating the dynamics of approach and avoidance motivational patterns consistently with the literature on achievement motivation and with Gernigon et al.’s (2015) dynamical model of approach and avoidance motivation. The second aim was to compare the data resulting from the simulations with longitudinal data relating to the motivational states reported weekly by 10 athletes who were pursuing an important mid-term (from 1 to 2 years) goal. Detrended Fluctuation Analysis (DFA; Peng et al., 1993) was used to detect typical signatures of complex dynamical phenomena in the form of 1/f-power-law distributions (i.e., pink noise) in the time series of both virtual and ecological data sets. The time series of the ecological data showed 1/f distributions, whereas those of data resulting from the ABM’s simulations did not (brown noise). In other words, the ecological data did reflect a non-linear dynamics typical of complex systems, whereas virtual data mainly evolved under the influence of random information. Therefore, future improvements to the ABM of approach and avoidance motivation are needed to make the model more able to resist to external perturbations, consistent with the nonlinear dynamics observed in real life.

Exploring the association between mindful eating and health behaviours in university students

Kristan Amendola, McMaster University; Yasaman Jabbari, McMaster University; Sameena Karsan, McMaster University; Jennifer Heitz, McMaster University

Mindful eating involves using your senses to enhance your eating experience. This includes paying particular attention to the taste of your food, how hungry or full you feel, and being aware of your emotions while eating. Although mindfulness has been associated with improved mental well-being, research regarding the potential benefits of mindful eating is limited. Therefore, the purpose of this study is to explore the association between mindful eating and health behaviours. To test this, 166 university students ($M_{age}$ = 18.6 ± 1.95 years) participated in an online study where they completed the following questionnaires: the Mindful Eating Questionnaire to assess mindful eating behaviours, the Five Facet Mindfulness Questionnaire to assess trait mindfulness, the Physical Activity and Sedentary Behaviour Questionnaire to assess physical activity levels, and the Depression, Anxiety, and Stress Scale to assess mental health status. The results revealed that more mindful eating was associated with less stress ($r_{[164]} = .18, p < .05$), anxiety ($r_{[164]} = .28, p < .001$), and non-judging ($r_{[164]} = -.27, p < .001$), and was negatively correlated with observing ($r_{[164]} = -.27, p < .001$). No significant relationships were found when comparing mindful eating with physical activity, sedentary behaviour, or sleep. These findings suggest that mindful eating is associated with mental well-being and that individuals higher in trait mindfulness are more likely to engage in mindful eating behaviours. Although more research is needed to further explore these associations, these preliminary findings hold promise for the role of mindful eating in promoting overall health and well-being. Funding source: Arts Research Board, McMaster.

Playing your part: The nuanced roles of coaches, peers, and parents in positive youth development through sport

Jim P. Arnold, Oregon State University; William V. Massey, Oregon State University

Youth sports are generally touted as tools for healthy and positive youth development (PYD), yet research in this area is both limited and murky (Holt et al., 2017, Whitley et al., 2019). Holt and colleagues (2017) proposed that for PYD to occur in a sport setting, positive coach, peer, and parental relationships are necessary. The purpose of the current study was to examine how changes in coach, peer, and parental across a sport season impacted PYD outcomes in a sample of youth sport participants. Participants included 40 youth soccer athletes ($M_{age}$ = 11.85 years, 61% boys) at the start and conclusion of a five-month soccer season. Changes across the season in coach-athlete relationships (Coach-Athlete Relationship Questionnaire; Jowett & Ntoumanis, 2004), peer social cohesion (Youth Sport Environment Questionnaire; Eys et al., 2009), and parental investment (Parental Involvement in Sport Questionnaire; Lee & MacLean, 1997) were used to predict PYD outcomes at the end of the season. To measure PYD outcomes, participants completed the Youth Experience Survey for Sport (YES-S; MacDonald et al., 2012; Sullivan et al., 2015) which measures perceptions of cognitive skills, social skills, goal setting skills, and initiative. The results of regression analyses, which controlled for age and gender, showed changes in coach-athlete relationship predicted athlete perceptions of cognitive skill acquisition across the season ($β = .36, p = .005$), but not social skill acquisition. Conversely, social skill acquisition, but not cognitive skill acquisition, was predicted by changes in parental involvement ($β = .40, p = .03$) and peer social cohesion ($β = .19, p = .02$). These findings support a relationship-based model of PYD in sport, where each relationship is independently necessary. Organizations should prioritize sport relationship quality, while also insuring any individualized needs of athletes are supported through these relationships. Low-quality or absent relationships in sport may undermine the intended and wanted benefits of youth sport for participants.

Mental health of college athletes post COVID-19 restrictions

Diana Avans, Vanguard University; Jaelah Butler, Vanguard University; Elena Gonzalez, Vanguard University

The COVID-19 pandemic had a significant impact on the mental health of athletes, with social isolation, disrupted training schedules, and uncertain competition prospects. With the lifting of COVID-19 restrictions, it was important to assess the athlete’s current state of mental health. This was a follow-up study to Avans, Chavez, and Hirahara (2021) that used the Depression, Anxiety, and Stress Scale (DASS-21) to assess mental health of athletes during the pandemic. The results showed that athletes displayed symptoms of depression, anxiety, and stress that were above
normal. Female athletes reported higher levels of depression, anxiety, and stress than males and freshman athletes showed higher levels. Since the restrictions were lifted, a follow-up study was needed to determine if DASS-21 scores had changed. The current study attempted to obtain data from the same data set as the previous study. A total of 49 athletes participated in the current study. The results showed that there were normal levels of depression and stress, and anxiety score was classified as mild. Comparison tests were conducted with the current scores and previous scores. The values for depression, anxiety, and stress were significantly lower than the values of the past study ($p = .001$). Although the current study had a smaller sample size, the participants showed positive change. There were not enough participants to assess gender differences. The participants were asked how they have been adjusting to life post COVID-19. Forty one percent stated that academic motivation has improved since restrictions were lifted, and 67.4% found that their physical activity has improved, and they have found it easy to adjust. This new data shows that the student athletes’ mental health has improved, and they have found it easy to adjust back to in person activities. This study was a follow-up to a previous study on athlete mental health and it is important to keep athlete mental health in the forefront of discussion.

**How kids feel at recess matters: An investigation into the relationships between body size, affective experiences, and attraction to physical activity**

Megan Babkes Stellino, University of Northern Colorado; Danielle Belcher, University of Northern Colorado; Lindsey E. Visscher, University of Northern Colorado; Cadie E. Hodge, University of Northern Colorado; William V. Massey, Oregon State University

Physical activity (PA) is essential for a healthy lifestyle; however, students with bigger body sizes have reported lower motivation to engage in PA. Despite school recess providing students with opportunity to gain critical PA, internal motivation is required for PA due to recess’ discretionary engagement nature. Contents of Competence Motivation Theory (Harter, 1981) suggest the importance of affect in determining intrinsic motivation levels. As such, and given that affect is largely understudied in the recess environment, it may contribute to bigger body sized students’ decreased motivation to engage in PA. The multi-faceted purpose of this study was, therefore, to investigate: group differences in affect among students of various body sizes across four time points; if those differences impacted students’ attraction to PA; and if the relationship between affect and attraction to PA changed throughout the school year. Surveys were administered to 4th and 5th grade students ($n = 247, 45.7\%$ Female, $20.6\%$ Black, $20.6\%$ Hispanic, $50.6\%$ “just the right” body size) that included one self-reported body size question, the shortened version of the Positive and Negative Affect Schedule (positive: $M_{total} = 3.93, SD = .75$; negative: $M_{total} = 2.18, SD = .71$), and the Children’s Attraction to Physical Activity (CAPA) scale ($M_{total} = 2.52, SD = .43$). Analyses revealed no significant group differences in average positive affect, negative affect, or CAPA at recess throughout the school year between students of various body sizes. Correlation analyses of average scores over all time points revealed a significant positive correlation between CAPA and positive affect scores ($p = .435$) and a significant negative correlation between CAPA and negative affect scores ($p = .423$). Findings suggest that reported body size may not have any bearing on students’ affect or attraction associated with recess PA. However, affective experiences may be an important consideration at recess and impact the extent to which students are motivated to engage in PA during their discretionary time. Funding source: Playworks Education Energized.

**Does education prepare teachers to learn: An analysis of pre-service physical education teachers’ reflective ability**

Eric Baker, West Virginia University; Samantha Ross, West Virginia University

Reflection is critical for physical education teachers’ effectiveness (Jung, 2012). Reflective teachers are more able to manage the complex environment of a classroom, be more confident in the decision-making, and encourage more autonomy in their students (Schön, 1987). It is important that universities develop their students’ reflective ability, as new teachers who had more developed reflective skills were able to self-assess their performance and better integrated their knowledge of literature into their practice (Stark, 1991). While reflective practice is stressed in the research, many physical education teaching undergraduate programs include only vague instruction and lack of evaluation and students often graduate ignorant of effective reflective strategies (Partington et al., 2015). The aim of this study was to assess the effectiveness of a physical education teacher education curricula is at developing future teachers’ reflective practice throughout an adapted physical education practicum. As part of an adapted physical education practicum course, a required course for all physical education undergraduate curriculum, Video-based, verbal reflections were assigned. 11 of the students agreed to have their reflections transcribed and analyzed for this study. Students’ video reflections were transcribed, then deductively analyzed using Gibbs’ Reflective Cycle (1988). This analysis highlighted pre-service teachers: (a) use reflection to describe their perspective and/or justification for actions, (b) are hesitant to critically analyze their teaching behaviors, (c) personal development is contained within the context of the practicum rather than extrapolating to outside experiences.

**Team effects of the perceived motivational climates on athletes’ goal motives and burnout symptoms**

Isabel Balaguer, University of Valencia; Natalia Martínez-González, University of Valencia; Francisco L Atienza, University of Valencia; Joan L Duda, University of Birmingham

The motivational climate created by coaches holds important implications for athletes’ mental health and functioning (Duda, 2013). Based on the self-concordant model (SCM), the motivational climate is predictive of differences in the regulations underpinning athletes’ goals (Martínez-González, et al. 2021). Via multilevel analyses, this study examined the relationships between perceptions of the empowering and disempowering features of the motivational climate to reported physical and emotional exhaustion (burnout symptoms) via athletes’ goal motives (autonomous, controlled). 414 male and female athletes, aged 17–33 years ($M = 20.61$ years; $SD = 2.58$), responded to a questionnaire assessing the targeted variables. All participated in a team sport (one of 38 teams) and competed in their university sports championships. After examining that the assumptions to justify the aggregation of lower-level data were met, four multilevel models of the 2-1-1 type were tested. Results revealed that a perceived empowering climate at team-level negatively related to individual-level reported physical and emotional exhaustion both directly and indirectly through individual autonomous goal motives (model 1; IE = −.19, 95% CI [−.42, −.01]). The indirect effect for controlled goal motives was not significant (model 2; IE = −.04, 95% CI [−.19, .09]). A perceived disempowering climate positively related to individual-level physical and emotional exhaustion when examining the direct relationship, and also indirectly through autonomous goal motives (model 3; IE = −.13, 95% CI [.01, .31]) and controlled goal motives (model 4; IE = .06, 95% CI [−.42, −.01]).
Findings support the promotion of empowering coaching strategies and diminution of disempowering climates to facilitate more adaptive motives for goal striving and diminish feelings of physical and emotional exhaustion in team sport athletes. In line with SCM, the results also suggest positive consequences for athletes’ mental health, when they pursue their sporting goals for autonomous reasons in contrast to controlled reasons. Funding source: Spanish Ministry of Education, Culture & Sport.

Effects of COVID-19 on performance development in athletics

Alexander Bateman, The University of the West Indies; Akosua Gyimah, The University of the West Indies; Dennis Dreiskämper, University of Muenster; Bernd Strauss, University of Muenster

The COVID-19 pandemic has had a significant impact on elite sports, affecting training possibilities, but also psychological well-being, motivation and social environments of athletes. It also caused the postponement of Tokyo 2020, four months before the original start. Initial studies showed a correlation between performance and training restrictions, but also factors such as athlete motivation or uncertainty of financing. Despite this change, there were 10 world records in athletics in the run-up to Tokyo 2020, although world records should become increasingly unbeatable. Can performance be predicted by factors such as individual development, age or doping proximity of disciplines? This study compares the last two Olympic cycles, considering individual development and performance-related factors at Level 1 (time) and Level 2 (athlete: age, gender) in athletics and controls for doping prevalence in the disciplines. For this purpose, worldwide competition results (except multi-events & relays) at least at the national level from London 2012 to Tokyo 2020 were considered. We analyzed the performance curves of these Olympic cycles using a hierarchical multilevel model, which included individual conditions (random intercept) for N = 2,383 athletes (52% male, N = 15,766 outcomes). The conditional growth model (ICC = 41.7%) shows that men improved less in the Olympic cycle before Tokyo (b = .14, SE = .11) than in the previous cycle (b = .18, SE = .11). Meanwhile, women improved consistently from 2013 to 2016 (b = .21, SE = .08) and from 2018 to 2021 (b = .22, SE = .08). Age (in years, centered to M = 25.66) was a significant predictor (b = .16, SE = .03), whereas prevalence of doping violations was not (b = .02, SE = .03). The present multilevel analysis provides information about individual performance trends in international athletics and their variability. It showcases the effects of COVID-19 and consequential psychosocial changes on performance. With these results, further reasons can be investigated to find out which factors led to the individual progressions.

Measurement of barriers to physical activity and their association with leisure-time physical activity in Jamaican adults: A cross-sectional study

Andre Bateman, The University of the West Indies; Akosua Gyimah, The University of the West Indies; Robyn Brown, The University of the West Indies; Chelsi Ricketts, Michigan State University; Nicholas Myers, Michigan State University

Like most adults worldwide, Jamaican adults may not be engaging in sufficient physical activity (PA) for health. To guide PA promotion and advance the global PA agenda more research is needed exploring culturally-relevant correlates of PA, especially in low- and middle-income countries (e.g., Jamaica). Most research in this area has been conducted in high-income countries (e.g., the USA). This study explored the measurement of barriers to PA and their association with leisure-time physical activity (LTPA) in Jamaican adults. Participants (N = 347; Mage = 31.1 years; female = 57%; lower socioeconomic status [SES] = 74.0%) completed self-report measures of demographic variables, LTPA, and barriers to PA (nbarrier = 32). Average BMI was 26.3 (i.e., overweight). Participants engaged in approximately one, two, and three 15-minute bouts of strenuous (S-LTPA), moderate (M-LTPA), and light (L-LTPA) LTPA per week, respectively. Exploratory structural equation modeling provided psychometric evidence for two categories of culturally-relevant barriers (nbarrier = 17) to PA: (1) environmental/demographic (e.g., access to facilities), (2) psychosocial (e.g., self-management skills). The psychosocial category was composed of two sub-categories: (1) high-perceived behavioral control (H-PBC; e.g., lack of enjoyment) and (2) low-perceived behavioral control (L-PBC; e.g., no partner). Path models, controlling for age, gender, SES, and BMI uncovered three main findings. First, H-PBC was associated with M-LTPA (β = −.12, p = .037) and S-LTPA (β = −.21, p < .001). Second, there was some evidence that psychosocial barriers were associated with M-LTPA (β = −.09, p = .049, one-tailed). Third, age, and/or gender were significant correlates of various forms of LTPA. Culturally-relevant barriers to PA in Jamaican adults may be categorized as environmental/demographic and two forms of psychosocial barriers (i.e., L-PBC and H-PBC). Gender- and age-appropriate PA-promoting behavioral interventions targeting culturally-relevant psychosocial barriers may be most effective for Jamaican adults.

Latent self-efficacy to regulate physical activity and its effects on physical activity in a physical activity intervention for adults with obesity

Andre Bateman, The University of the West Indies; Nicholas D. Myers, Michigan State University; Meredith Wekesser, University of Illinois Chicago; Deborah Feltz, Michigan State University; Seungmin Lee, Binghamton University; Adam McMahon, University of Miami; Isaac Prilleltensky, University of Miami; Ahnalee M. Brincks, Michigan State University

Self-efficacy to regulate physical activity (SERPA) refers to capability beliefs regarding engagement in physical activity despite barriers. There have been reports that most adults with obesity do not meet public health guidelines for physical activity. A potential strategy to promote physical activity in adults is to target self-efficacy associated with physical activity. The objective of this study was to determine the effectiveness of a newly proposed two-dimensional SERPA construct to predict physical activity in adults with obesity. SERPA data were previously analyzed under a traditional observed score approach based on a unidimensional assumption. This study is a secondary data analysis of responses to the SERPA scale under a latent variable framework. Data were analyzed from the Well-Being and Physical Activity Study (WBPA; ClinicalTrials.gov; identifier: NCT01394854) randomized controlled trial, which deployed the Fun For Wellness (FFW) intervention. First, the indirect effects of the FFW intervention on physical activity through each dimension of the two-dimensional latent SERPA were examined. Second, the direct effects of two-dimensional latent SERPA on physical activity were examined. There was evidence that latent SERPA based on social considerations (e.g., receiving encouragement from others; Factor 1) was an effective determinant of physical activity and mediator of the intervention’s effect on physical activity. Latent SERPA based on an internal subjective evaluation of barriers (e.g., in bad weather; Factor 2) was not an effective determinant of physical activity, nor mediator of the intervention’s effect on physical activity. These findings provide both substantive and methodological support that self-efficacy to regulate social consideration barriers to physical activity was a mediator and determinant of physical activity in adults with obesity in the WBPA randomized control trial. These findings also have implications for developing and scaling effective physical activity-promoting interventions. Funding source: Erwin and Barbara Mautner Charitable Foundation through the Erwin and Barbara Mautner Endowed Chair in Community Well-Being at the University of Miami.
Sustaining and disrupting psychologically abusive coaching practices: A critical analysis on the case of National Hockey League coach Mike Babcock

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

The athlete maltreatment crisis and associated cover-ups in sport has received considerable public attention (Kavanagh et al., 2020; Owusu-Sekyere et al., 2022). While focus is often directed towards those who perpetrate harmful behaviours, calls have been made to critically reflect on broader social norms or features of the sport domain that may enable and sustain such behaviours (Hartill, 2013; Kerr et al., 2019). To demonstrate that maltreatment is a systemic issue, we provide a critical analysis of the case of Mike Babcock, a highly regarded coach in the National Hockey League who was known to have engaged in psychologically abusive conduct for decades. Utilizing Bronfenbrenner’s (1999) ecological systems theory, we discuss sociocultural (e.g., win-at-all-costs philosophies), organizational (e.g., self-governance), and interpersonal (e.g., power dynamics) level factors that enabled Babcock to engage in psychologically abusive behaviours with professional adult men athletes in ice hockey over decades without consequences, and why, after all these years, Babcock’s coaching methods are finally receiving appropriate criticism. Recommendations are posed for advancing safe, inclusive, and welcoming sport.

Does sport and uniform type influence body image in female athletes?

Lauren Baumgartner, Vanguard University; Shyla Carter, Vanguard University; Diana Avans, Vanguard University

According to Frederick et al. (2012) 20 to 40% of women suffer from body dissatisfaction across all ages. Furthermore, sport type, BMI, and uniform type can play a role in body dissatisfaction among athletes (Weber et al., 2011; de Bruin et al., 2011) created the Contextual Body Image Questionnaire for Athletes (CBIQA) to measure athlete’s self-perceptions of appearance, body shape, weight, fat percentage, and muscularity in the context of daily and sport life. The range of CBIQA is 15–105 (the ends of the continuum indicate more body image distortions); the midpoint score is 60. Stewart et al. (2021) discovered a female athlete paradox; the contradiction between the ideal body type in daily life and the typically muscular body type accepted in athletic domains. The hypotheses for this study were that athletes that participate in team sports would have a more positive body image; athletes with lower BMI levels will have a more positive body image; and the athletes wearing tight uniforms will have body image scores away from the mid-line more than other uniform types. Female athletes representing 13 different sports from a NCAA Division I university, a NAIA university, and a junior college (N = 144) participated. The CBIQA and BMI were assessed. T-tests, ANOVA, and Pearson’s r analysis were used. Uniforms were classified as tight (n = 70), form fitting (n = 41) and loose fitting (n = 33). The mean for the sample was 65.27 ± 11.33. There were no significant differences based on team or individual sport classification and no significant differences based on uniform type. The mean BMI score was 23.97 ± 3.55. There was a significant correlation between BMI and CBIQA scores (r = .655, p = .01). Although our hypotheses were not supported, our overall findings were similar to those from Stewart et al. (2021). Continuing to explore uniform type with comparison with teammates holds promise as does expanding the sample size and levels of competition can be explored.

Performance in physical activity affects social identification

Vista Beasley, SUNY Brockport

Social identification can alleviate symptoms of depression, trauma, and burnout; aid recovery from stroke and trauma; and facilitate willingness to exercise. However, effectiveness of physical activity interventions aimed at increasing social identification and reducing depression symptomology has varied (Steffens et al., 2021). Based on self-categorization theory, the purpose of this study was to examine performance failure as a factor which impairs development of social identification in physical activity. In study 1, 98 hikers (women n = 38; age M = 37.19 years) who attempted to hike the Appalachian Trail in less than a year completed an online survey after ending their attempts; 56.1% (n = 55) were successful (i.e., finished the thru-hike). Finishers’ post-hike social identification scores (M = 6.23, SD = .80) were significantly higher (t [96] = 3.12, p = .003) than non-finishers’ scores (M = 5.53, SD = 1.27) with a medium effect size (d = .69). In study 2, hikers (N = 170; women n = 54; M = 37.59 years) who attempted to hike the Appalachian Trail completed a pre-hike and post-hike survey; 52.4% (n = 89) were successful. Per a 2x2 mixed ANOVA, performance significantly predicted post-hike social identification even after controlling for pre-hike social identification. Finishers’ social identification increased from pre-hike (M = 5.42, SD = 1.23) to post-hike (M = 6.13, SD = .99), with a medium effect size (d = .64). Non-finishers’ social identification decreased from pre-hike (M = 5.56, SD = 1.17) to post-hike (M = 5.13, SD = 1.35), with a small effect size (d = .34). These findings may inform the design of physical activity interventions to de-emphasize task competency and goal acquisition as group norms and sources of in-group status in order to enhance intervention effectiveness.

Psychology of exposure in modern Korean creative dance

Hyun-Soon Beck, Korea National Sport University; Hye-Young Kim, Korea National Sport University

For dancers who create dance works using their bodies, physical condition, including external beauty, is very important. Korean creative dance, which establishes a relationship of mutual communication with others through the body, has increased the exposure of the body in recent years and has now changed to a dance performed with the belly button exposed. This study seeks to determine the psychological causes that brought about these changes in Korean creative dance. The research method was based on the researcher’s direct phenomenological experience, recording and interviewing dance phenomena expressed by dancers, and then drawing conclusions. The first of these psychological causes can be seen as a change in the expression method of Korean creative dance due to collaboration between dancers and artists of other genres. In other words, it seems that as costumes and props have been modernized, they have changed into modern-day costumes (with a lot of exposure). Second, most dances are performed by women, and in the expression method of Korean creative dance, which establishes a relationship of direct communication methods are expressed through images, and the images themselves are converted into text. In this way, dance expressed through the body has no choice but to be more obsessed with body image.
Can morning exercise reduce the negative affect from insufficient sleep?

Anjali M. Bedi, McMaster University; Connor D.E. Gibala, McMaster University; Jennifer J. Heiz, McMaster University

Acute sleep restriction (2–4 hours for one night) impacts affect by increasing anxiety and aggressive behaviours and decreasing positive affect. Exercise improves affect and therefore may help to counteract the effects of insufficient sleep. The purpose of this study was to explore whether a single bout of high-intensity interval training (HIIT) performed before a night of restricted sleep would attenuate the negative impacts of insufficient sleep on affect. It was hypothesized that performing exercise would reduce anxiety, aggressive behaviours, negative affect, and increase positive affect after sleep restriction compared to a sedentary control. Thirty-one healthy, physically active young adults between the ages of 17–30 (10 male; 21 female) completed a within-subject randomized control trial where participants either exercised or did not exercise before sleep restriction. All participants completed each condition in counterbalanced order, separated by 3–5 days. Each session began in the morning (between 8:00 am and 9:30 am), where the participant came into the lab to complete three questionnaires: the State-Trait Anxiety Inventory, the State Hostility Scale, and the Positive and Negative Affect Scale. Then, participants either performed a 10-minute HIIT session on a cycle ergometer (EX), or an equivalent period of rest (SED). That night, participants’ sleep was restricted to 4 hours. Their affect was re-assessed the following morning. Sleep restriction had no effect on anxiety (p > .05) but it increased aggression (F(1,30) = 11.90, p = .002; EX, M = +15% SD = 32%; SED, M = +11% SD = 22%) and decreased positive affect (F(1,30) = 18.76, p < .001; EX, M = −8% SD = 21%; SED, M = −11% SD = 15%). Exercising before sleep restriction or not had no impact on affect. These findings suggest that a short, intense bout of exercise the morning before may not relieve the negative affect of insufficient sleep.

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PAUSE-Yoga: An 8-week mindfulness-based yoga intervention for women’s sport student-athletes

Ling Beisecker, The University of North Carolina at Chapel Hill; Emily Grace Thomas, The University of North Carolina at Chapel Hill; J.D. DeFreez, The University of North Carolina at Chapel Hill

This study tested the feasibility and efficacy of PAUSE-Yoga, an 8-week mindfulness-based yoga program to mitigate symptoms of depression, anxiety, and stress among women’s sport student-athletes. Women’s sport student-athletes (N = 28, M_age = 19 ± .9 years old) from one Division I ACC collegiate athletic team were enrolled in the intervention. Data were collected three times: pre-program (T1), at the midpoint (4-weeks, T2), and following program completion (8-weeks, T3). Our study evaluated the feasibility of our intervention through recruitment and retention rates. We exceeded our recruitment goal of 22 women’s sport student-athletes and observed a retention rate of 60.1% (n = 17) slightly shy of our 70% goal. We had a survey response rate of 100% at T1 (n = 28), 53.6% at T2 (n = 15), and 39.3% at T3 (n = 11). We evaluated preliminary efficacy through within- and between-group comparisons of aggregated data at T1, T2, and T3. During the 4-week period, there were no significant changes in participant’s reported symptom levels of depression (F(1,14) = .04, p = .844), anxiety (F(1,14) = .83, p = .379), or stress (F(1,14) = 1.86, p = .195). However, over the 8-week period, there were significant improvements in participant’s reported symptom levels of depression (F(1,10) = 12.04, p = .006) though not anxiety (F(1,10) = 4.05, p = .072) or stress (F(1,10) = .08, p = .786). Notably, significant differences were observed among participants in these variables at both the 4-week and 8-week mark, respectively, for depression (F(1,14) = 12.76, p < .003; F(1,10) = 45.26, p < .001), anxiety (F(1,14) = 35.79, p < .001; F(1,10) = 55.87, p < .001), and stress (F(1,14) = 21.46, p < .001; F(1,10) = 36.42, p < .001). These findings underscore the importance of considering participants’ baseline characteristics when conducting effective mindfulness-based interventions. Based on the data, it is crucial for clinicians and researchers to customize their interventions and assessments to account for participants’ baseline characteristics. Future investigators should consider long-term program engagement to achieve sustained positive outcomes.

Funding source: Atlantic Coast Conference.

Does appearance matter? The impact of perceived body size and physical self-perceptions on students’ attraction to physical activity

Danielle J. Belcher, University of Northern Colorado; Megan Babkes Stellino, University of Northern Colorado; William V. Massey, Oregon State University

Drastic declines in recess physical activity (PA) have been observed within recent years (CDC, 2021). Due to recess’ discretionary nature, psychosocial variables associated with PA are predictors of students’ PA levels. Recess is also a time of heightened bullying occurrences (Villanicourt et al., 2010). Appearance-based bullying is the most common type of victimization that occurs in schools, transpiring more often in children with larger BMIs, and possibly altering students’ physical self-perceptions. Physical self-perceptions have been shown to impact PA motivation, however, it is still unknown the extent to which appearance-based bullying, body size, and physical self-perceptions may impact attraction to PA in the recess environment. The first purpose of this study was to examine group differences in various body sized students’ levels of appearance-related victimization, physical self-perceptions, and attraction to PA at recess. The second purpose of this study was to identify the relationship between appearance-based victimization and physical self-perceptions with attraction to PA levels at recess. Students in 3rd – 5th grades (N = 795, 49.3% male, 56.1% regular body size, 46.4% 4th grade, 27.3% Hispanic) completed surveys that included one self-reported body size question, a perceived victimization scale, the physical appearance subscale of the Self-Perception Profile for Children, and the Children’s Attraction to Physical Activity (CAPA) scale. Group difference analyses revealed “just the right” body sized children had a significantly higher perception of their physical appearance (p < .001) and attraction to PA (p < .001) compared to smaller and bigger body sized children. Correlation analyses showed that student’s perceived physical appearance had a significant direct correlation (p < .001, r = .423) with student’s attraction to PA. Findings provide evidence that negative physical appearance perceptions may pose a risk and diminish a student’s attraction to PA, and therefore, physical appearance perceptions may be a meaningful focus of recess interventions. Funding source: Playworks Education Energized.

Barriers and facilitators to exercise and physical activity among adults with multiple sclerosis with mobility impairments: A qualitative study

Lucia Beratto, University of Turin; Lara Bressy, University of Turin; Anna Mulasso, University of Turin; Matteo Ponzano, University of British Columbia

Exercise has positive effects on fitness and psychosocial outcomes in people with multiple sclerosis (PwMS). However, PwMS commonly report suboptimal physical activity (PA) levels, and a higher Expanded Disability Status Scale (EDSS) has been associated with lower PA. Hence, the aim of this study was to explore barriers and facilitators towards exercise and PA experienced by PwMS with moderate-to-severe mobility impairments. The second purpose of this study was to identify barriers and facilitators towards exercise and PA experienced by PwMS with moderate-to-severe mobility impairments, and to categorize them in terms of capability, opportunity, and motivation according to the COM-B model. We conducted semi-structured interviews with five PwMS living in Italy (3F, 2M, aged 55 ± 3 years, EDSS 5.4 ± 8) and performed thematic and content analyses from a constructivist perspective. We identified the following barriers: Capability—walking and balance impairments, fatigue, and pain; Motivation—beginning the exercise session;
exercising with someone with a more severe disability; group programs not tailored to individual needs; and fear of exercising with exercise physiologists with no expertise in MS; Opportunity—Lack of knowledge on PA; no referral to exercise physiologists; and work, house chores, and family. We identified the following facilitators: Capability—physical abilities to perform the favorites activities; short bouts of physical activity distributed throughout the day; aquatic exercise; tailored exercise prescription, videos, and resources; Motivation—feeling PA as a pleasure; encouragement to exercise from family members; group exercise programs to “not feel alone fighting the beast”; feeling able to do more PA; peer-support within exercise groups; Opportunity—exercising at home; working with exercise physiologists with expertise in MS; referral to exercise physiologist from physician; practical help to be physically active from family. PwMS should be referred to exercise physiologists with expertise in MS. Group exercise programs supplemented by tailored home exercise prescriptions may be an effective strategy to address individual needs while promoting peer-support and social participation.

Do physical activity behavioral interventions increase physical activity in people with a lower limb amputation? A systematic review and meta-analysis
Luca Beratto, University of Turin; Lara Bressy, University of Turin; Matteo Ponzano, The University of British Columbia

Rehabilitation guidelines after a lower limb amputation (LLA) recommend aerobic and progressive resistance training to improve gait, mobility, strength, and performance of activities of daily living. However, LLA patients are associated with a sedentary lifestyle, and over 60% of people with a LLA report low PA levels. Hence, PA behavioral interventions may represent a strategy to increase adherence to PA, rehabilitation, and exercise programs. The aim of this systematic review and meta-analysis was to determine the effect of PA behavioral interventions on PA levels in people with LLA. We performed systematic searches in four electronic databases to identify randomized controlled trials that: 1) included people with a LLA of any etiology; 2) delivered an intervention designed to increase PA; 3) had one or more studies; 4) used a physical activity outcome measured with a PA questionnaire, daily diary, accelerometer, or pedometer; 5) had a control group; 6) participants ≥ 18 years old; 7) randomized allocation; 8) published in English. We included PA outcomes measured with an accelerometer or pedometer in the meta-analysis. Of the 301 studies identified, 22 studies were included in the meta-analysis, involving 1866 participants. The average intervention length was 12 weeks. The average intervention duration was 3.7 ± 1.2 months, and all of the studies measured daily step count with an accelerometer. PA behavioral interventions can increase daily step count in people with LLA (MD = 747.642 steps day⁻¹, 95% CI 242.182 to 1253.101 steps day⁻¹; 84 participants; 3 studies; F = 0%). Future trials in people with LLA should test the effects of behavioral interventions on moderate-intensity PA, or parasport participation. Behavioral interventions in people with a LLA should be based on behavior change theories, tailored to individual needs, and delivered using appropriate behavior change techniques.

Understanding changes in identity and motivation in collegiate athletes immediately after retiring from sport
Karan Bhatia, Ball State University; Eshita Garg, Wright State University; Jean-Charles Lebeau, Ball State University; Lawrence Judge, Ball State University; Lindsay Blom, Ball State University

Moving from active sports participation to retirement often leaves former collegiate athletes struggling to maintain physical activity levels, potentially leading to escalated risk of health complications. This study aimed to examine post-retirement changes in physical activity motivation among college athletes, along with athletic and exercise identity. Prior studies have addressed these concepts among active athletes, although immediate post-career changes remain less examined. Two female and two male soccer players in their final year of eligibility were recruited from two Midwestern universities through a blend of convenience and reverse snowball sampling methods. Participants completed the Behavioral Regulation in Exercise Questionnaire—2 (BREQ-2), Exercise Identity Scale (EIS), and Athletic Identity Measurement Scale (AIMS) every month from immediately after retirement to four months after, and participated in an interview at retirement and four months after to delve into alterations in their identities and motivation levels over four months post-retirement. Both EIS and AIMS were rated on a 7-point Likert scale, with scores ranging from 7 to 49 for the EIS and 10 to 70 for the AIMS. Results indicated a slight increase in autonomous motivation scores by 0.16 from baseline to post-retirement month four, while exercise identity and athletic identity scores decreased by 2.25 and 3.75, respectively. Additionally, autonomous motivation was significantly correlated to athletic identity (r = −0.73) and exercise identity (r = 0.73), indicating that as autonomous motivation increases, exercise identity increases, but athletic identity decreases. Themes emerging from qualitative data around the transition experience included reduced pressure, time management challenges, identity redefinition, social support, and resources accessibility. Detailed exploration of these themes may further illuminate post-athletic retirement challenges and facilitate the development of supportive interventions.

Organized sport and binge drinking in Canadian student populations
Edina Bijvoet, University of Toronto; Melissa delonge, University of Toronto; Catherine Sabiston, University of Toronto

Organized sport involvement (e.g., varsity, intramurals) among post-secondary students may impact engagement in binge drinking. Yet, limited research has examined alcohol consumption as a health risk behaviour among students engaged in organized sport. Research on this subject is important because sporting environments involve strong social norms and traditions, which can contribute to an environment where resisting poor health behaviours (like binge drinking) may be especially difficult. The present study aimed to examine whether organized sport involvement impacts binge drinking among post-secondary students. Students (N = 4,868, Mage = 21.16, 70.4% Woman) completed the 2020 Canadian Campus Wellbeing Survey. Based on binary logistic regression models, varsity sport participation was found to be a significant predictor of binge drinking (p < .001), and varsity athletes were 2.38 times more likely to engage in binge drinking compared to those not engaged in varsity sports. Students involved in a sports club or community sports group were 1.27 times more likely to be classified as binge drinkers (p < .02), and students involved in intramural sports were 2.03 times more likely to be classified as binge drinkers (p < .001). Students who did not participate in any type of organized sport were 0.585 less likely to binge drink than students who were involved in organized sports (p < .001). These results suggest that organized sport participation may increase the likelihood of binge drinking. More work is needed to explore the nuances within this data, such as sport type and geographic location. Further research can also help inform policy and programming aimed at reducing binge drinking culture, and increasing awareness of health repercussions among post-secondary students engaged in organized sport.

A randomized control trial study of a mental health intervention in varsity sport
Mishka Blacker, Brock University; Josh Celebre, Brock University; Philip Sullivan, Brock University

Their dual role of student-athletes makes them at least as equally vulnerable to mental illness as their non-athlete student peers (U SPORTS, 2020;
Wolanin et al., 2016). Almost half of sampled student-athletes reported there was a time when they wanted to seek help from mental health services but chose not to (Giovannetti et al., 2019). The Canadian Mental Health Association developed the Talk Today Program in partnership with the Ontario Hockey League to raise awareness and reduce the stigma surrounding mental health in sport. The purpose of this study was to pilot CMHA’s Talk Today program in a sample of Canadian intercollegiate athletes during their competitive season. The study was designed to address recognized limitations in previous literature, including lack of valid and reliable measures, randomized control trials, and long-term retention measures (Breslin et al., 2022). Four varsity sport teams (two female, two male) were assigned to either the program or a waiting list control condition. The program included a team-based workshop and structured connection with community mental health services. Outcomes, including psychological distress (Kessler-6; Kessler et al., 2003), mental health stigma (Self Stigma of Seeking Help Scale; Vogel et al., 2006), and mental health literacy (Multicomponent Mental Health Literacy Measure; Sullivan et al., 2021) were measured prior to and after the workshop and again after the season. A series of repeated measures factorial ANOVAs showed a non-significant effect of the intervention on all outcomes. Results confirmed the relatively high level of psychological distress and stigma in university student athletes. The study also highlighted many of the challenges for such research, including the difficulties of scheduling interventions and measures with such a busy community, and the temporal patterns in helps seeking and mental health across the academic term, which may conflict with the impacts of interventions. Funding source: MITACS.

The effect of stress exposure on motivation states to be active and sedentary in novice and expert rock climbers

Rebekah Blakemore, University of Otago; Nia Fogelman, Yale University; Paul McKee, Duke University; Sophia Hoogenboom, University of Otago; Erin Barry, Teachers College – Columbia University; Matthew Stults-Kolehmainen, Yale New Haven Hospital

Motivation states to move, be active, and sedentary likely vary: a) in response to exogenous stimuli, and b) by exercise training status. The purpose of this study was to determine if exposure to stressful and pleasant visual stimuli influence motivation states and how that varies by novice versus expert athletic status. Rock climbers (14 novices; 13 experts) came to the laboratory on just 1 occasion. They were randomly exposed to pleasant and unpleasant visual stimuli. The CRAVE scale (13-items with 2 subscales: Move and Rest; Stults-Kolehmainen et al., 2021) was administered 3 times (i.e., baseline and after exposures). Six statistical models were run (3 for Move and 3 for Rest). Across all participants, unpleasant images resulted in greater desire to move compared to pleasant and baseline conditions (p’s < .027). This was true for all Move models (1–3). In Rest models (4 & 5) with and without a baseline included, there was no effect of stimulus exposure, but experts reported lower desire to be sedentary (main effects, p’s < .045). Using a change score to examine differences from baseline (Model 6) yielded no significant differences. Motivation states to move, but not be sedentary, vary in response to stressful and unpleasant stimuli. Furthermore, the desire to be sedentary is lower for expert rock climbers. Future studies should attempt to assess motivation states in other groups of athletes.

Exploring the lexicon of NBA and NHL draft profiles

Garrett Blakey, Ontario Tech University; Zaynab Nuweisr, Ontario Tech University; Bryan McLaughlin, Ontario Tech University; Ben Csiernik, Ontario Tech University; Joe Baker, University of Toronto; Kathryn Johnston, University of Toronto; Nick Wattie, Ontario Tech University

Notable inconsistencies exist in the utilization and definition of commonly employed terms within athlete development and selection, as highlighted by Dohme et al. (2016). This pilot study explored terms used to label and describe prospective athletes in basketball and hockey. We used NBA.com and Eliteprospects.com to source the terminology within draft profiles of the first-round National Basketball Association (NBA) and National Hockey League (NHL) 2023 draftees. In total, 74 draft profiles were analyzed (32 for NBA draftees, 32 for NHL draftees). Using quantitative text analyses, a document feature matrix was created by categorizing 408 descriptors (NBA = 216; NHL = 192) into one of four categories: physical, psychological, skill, or combination (i.e., descriptors that combined these categories). There were significant asymmetries in the proportion of descriptors used between and within leagues. Within the NBA, physical and skill descriptors were more frequently observed and psychological descriptors the least observed (χ^2 [3] = 51.9, p < .001). Within the NHL, skill and combination descriptors were most, and psychological descriptors least, observed (χ^2 [3] = 28.1, p < .001). Overall, NBA draft descriptors utilized physical and skill descriptors more frequently than the NHL, while the NHL utilized combinations of descriptors more frequently (χ^2 [3] = 17.01, p < .001). While it would be valuable to examine the meaning behind these individual descriptors, it was often difficult to discern whether (or not) terms were being used in a consistent manner (i.e., jingle-jangle fallacy). To foster conceptual clarity of common nomenclature, it may be important to establish shared understanding of the terminology commonly used in this field generally and across contexts. Where draft profiles are used to identify and select athletes, the lack of psychological descriptors may impact decision-making. Going forward it maybe useful to expand these analyses to other draft rounds and years to better understand the generalizability of these findings.

A linguistic and meaning extraction analysis of lessons learned from high school sport

Jedediah Blanton, University of Tennessee, Knoxville; Kylee Ault-Baker, The Ohio State University; Lauren McReynolds, University of Tennessee, Knoxville; Kayleigh Hart, University of Tennessee, Knoxville; Allison Pooley, University of Tennessee, Knoxville

The belief that “sport builds character” underscores a decades old, sometimes evangelical (Coakley, 2011) approach to youth sport that claims a young person will build a repository of skills from sport that can be used in their life in the future. To date, the research is mixed on such findings related to outcomes based on participation (Turgeon, 2019). Previous research has attended to this aim through both qualitative and quantitative methods; yet common pitfalls of the methodologies guiding the investigations limit the generalizability or nuance of the data. In qualitative explorations, small sample sizes limit the breadth of experiences and considerations to take from the results. In survey-based data, there is limited nuance as tools used to explore the phenomena are very specific. Thus, the purpose of this investigation was to examine the “experiential learning of life skills” from high school sport in a manner that adds to the robustness of methods in contemporary literature. This study used open-ended self-descriptive narratives from current high school students (N = 6392) who submitted short essay responses on the lessons learned from high school sport participation. Linguistic inquiry supported by a computerized text analytic tool was used to analyze the corpus of text. A principal component analysis was conducted using the results of the linguistic analysis to identify common dimensions within the larger data set. A 14-factor structure was deemed the most appropriate representation of the data after the PCA (KMO = .639, Bartlett’s test = 282307.93, p < .001), with the 14 factors accounting for 9.3% of the variance. Primarily, high school athletes report that they learn lessons regarding time management skills, establish important relationships, and learn to work through adversity by competing in high school sports. This presentation will further discuss the novel methods used in this study and the full
Examining sustained attention indices in elite youth athletes

Michelle Blumberg, York University; Kathryn Johnston, University of Toronto; Nick Wattie, Ontario Tech University; Joseph Baker, University of Toronto; Magdalena Wojtowicz, York University

There is evidence that executive functions differ across sport types, yet little is known about the relationship between sport type and indices of sustained attention. Attention plays a critical role in supporting other cognitive functions and may influence an athlete’s ability to learn and perform. The present study examined the relationship between sport type and sustained attention indices, including speed, accuracy, and reaction time (RT) variability measures. Elite youth provincial athletes from Ontario (N = 199, M_age = 17.6, 54.3% female) completed the Sustained Attention to Response Task. Athletes were categorized in the following sport type groups: Team (N = 100), Precision-skill (N = 65), or Speed-strength (N = 34). For each participant, mean RT, signal detection (accuracy; d’), standard deviation of RT (SD_RT), and coefficient of variation (CV_RT) were calculated across trials. Linear regressions were conducted to examine the association between sport type and sustained attention indices, while controlling for age and sex. Being in the Precision-skill group (B = .12, p = .002) or in the Speed-strength group (B = .07, p = .027) was associated with significantly less accuracy compared to being in the Team group. Age was significantly and positively related to accuracy (B = .01, p < .001), and significantly and negatively related to SD_RT (B = −2.11, p < .001) and CV_RT (B = −.01, p < .001), such that as age increased, variability in sustained attention decreased. There were no other relationships between sport type, age, or sex on the attention indices. The observed associations between age and performance variability are in line with expected development of sustained attention during early adolescence. Meanwhile, the superior signal detection observed in team-based athletes may reflect higher demands on vigilance and attention to changing demands in those sports. These results suggest that different characteristics of athletes may differentially relate to distinct indices of sustained attention. Funding source: SSHRC.

Impact of a sport-based positive youth development program: Parents’/caregivers’ perspectives

Nicole D. Bolter, San Francisco State University; Lindsay E. Kipp, Texas State University; P. Brian Greenwood, Cal Poly San Luis Obispo

Consistent with evaluation research, physical activity-based positive youth development (PA-PYD) programs have shown promise in yielding social, emotional, and physical growth among participants. Parents/caregivers play a significant role in children’s sport experiences as providers, interpreters, and role models, and their views on program impact are important to understand. The focus of this study was on one sport-based youth development program, The Junior Giants, that caters to 5–13-year-old boys and girls by teaching them life skills and social emotional competencies through baseball and softball. Parents/caregivers (N = 8,495) who had a child participating in The Junior Giants program completed an online survey about the program’s impact on their child’s character development, healthy habits (change in physical activity, fruit intake, veggie intake), reading, anti-bullying, and social emotional competencies. Descriptive statistics revealed very positive reports from parents/caregivers about their child’s character development, anti-bullying strategies, and social emotional learning, as well as their satisfaction with the league’s organization, communication, and coaches. Three multiple regressions and four binary logistic regressions were completed (one for each expected program outcome listed above). Predictors included demographic variables (child’s age, years in program, race/ethnicity, gender) and experiences in the program (perceptions of league communication, satisfaction with coaches, social emotional climate). All regression models were significant (R^2 = .11–.26, p < .001), with the largest, significant beta coefficients being league organization and communication, satisfaction with coaches, feelings of acceptance, and race/ethnicity. Results suggest that from parents’/caregivers’ perspectives, The Junior Giants is having a positive impact on participants and that satisfaction with the organization and communication from administrators and coaches are key predictors of youths’ social, emotional, and physical growth. Funding source: The Giants Community Fund.

Examining the effects of tailoring messages to socioemotional goals on attention and retention of health behaviour messages in older adults

Laurence Bouchard, McGill University; Lindsay R. Duncan, McGill University

Despite well-established guidelines, most older adults do not engage in sufficient physical activity to achieve health benefits. Health messages tailored to socioemotional goals may help to promote physical activity in this population. The purpose of this study is to explore whether physical activity promotion messages tailored to older adults’ socioemotional goals attract attention and support retention of information among older adults. We hypothesized that messages highlighting emotionally meaningful goals would attract more attention and be better recalled among a sample of older adults compared to non-emotional messages. Participants were older adults (N = 20, M_age = 71, SD = 7.8 years), of varying physical activity levels and with a limited future time perspective (as predicted by socioemotional selectivity theory). Participants looked at a series of messages with emotional (n = 7) and non-emotional (n = 7) content on a computer screen equipped with an eye tracking device, then underwent a test of their recollection of the message content. We conducted r-tests to explore if time spent looking at (a) the message as a whole and (b) specific regions of interest differ for more vs. less emotional messages. We coded the interview transcripts for recall of emotional or non-emotional physical activity content and used chi-square tests to determine if recall is better for messages with more vs. less emotional content. Contrary to our hypothesis, time spent on emotional vs non-emotional content was not significantly different (p > .05). However, recall for emotional content was significantly greater than non-emotional content. The findings support predictions extended from socioemotional selectivity theory that older adults may be most interested in physical activity messages with emotionally-meaningful content.

Clarifying the psychological states underpinning excellent performance: A critical review

Patrick Boudreau, Ara Institute of Canterbury; Patricia Jackman, Lincoln University; Scott Goddard, Southern Cross University; Stuart Vella, University of Wollongong; Matthew Schweickle, University of Wollongong; Christian Swann, Southern Cross University

The results of bibliometric reviews illustrate the scale of research interest toward psychological states underlying excellent performance; publications on these psychological states (e.g., flow, peak experience) are among the most highly cited articles in the sport and exercise psychology field. Despite the accumulation of significant evidence in this area, we have illustrated how this literature is replete with issues that are stifling scientific advancements. To bring clarity to this field and highlight issues that might be stifling scientific progress, we present a narrative review of psychological states underlying excellent performance in sport. First, we identify, synthesise, and critique
individual concepts that have emerged in literature on the psychology of excellent performance in sport over the preceding five decades. Second, we critically examine cross-cutting issues in the field. Finally, we offer recommendations for researchers and practitioners to support the development of research in this area. Researchers and practitioners should be aware that there is growing evidence, from different research groups, that multiple psychological states – rather than a single psychological state – may underpin excellent performance. Furthermore, studies conducted to date on psychological states underlying excellent performance in sport have mainly recruited and focused on athletes. Although some studies have been conducted with coaches, further research is warranted to understand the perspectives of coaches, sport psychology practitioners, parents, and other key social agents in the athletic milieu. For researchers to make a meaningful contribution to psychological states underlying excellent performance, we suggest that future research efforts should be invested into a smaller number of more conceptually and empirically sound concepts and/or psychological states that show promise and merit further examination.

The psychology of indoor and outdoor climbing: A crossover in-situ comparison

Patrick Boudreau, Ara Institute of Canterbury; University Otago, Otago University; Ken Hodge, Otago University

Physical activity in nature may be uniquely suited to improving psychological well-being. In response to the growing popularity of indoor climbing and the evolving dynamics between indoor and outdoor climbing practices in Aotearoa New Zealand, this study sought to address the question of how climbers perceive and engage with these distinct contexts. This study aimed to explore the motivations and perceptions of indoor and nature-based climbing environments. Employing a qualitative crossover design, in situ interviews were conducted with experienced rock climbers who engaged in both indoor and nature-based climbing activities. Reflective thematic analysis was employed to uncover emerging themes related to motivations, perceptions, and optimal experiences. The findings describe the nuanced interplay between indoor and outdoor climbing experiences. Indoor climbing emerges as a controlled and convenient environment valued for safety, social interactions, technical focus, and fitness enhancements. On the other hand, outdoor climbing is cherished for its authentic and holistic nature, offering a sense of exploration, engagement with natural surroundings, and challenges posed by aesthetically pleasing routes. The study also underscores the role of flow experiences in both contexts, influenced by factors like movement variety and autonomy. This study contributes to a deeper understanding of climbers’ experiences and preferences across different climbing environments. The research emphasizes the intricate relationship between psychological dimensions and physical contexts, providing insights into implications for well-being, skill development, and the overall climbing experience. Implications for indoor climbing facilities in Aotearoa includes understanding the importance of socially conducive environments. For example, indoor gym managers could provide a social lounge and coffee area for their climbers. Implications for outdoor climbing enthusiasts and guides includes the importance of providing mental skill training.

NCAA’s mental health best practices still need coaching: Perceptions of Division I student-athletes on strategies and support offered by their schools

Christopher Boyer, North Carolina State University; Jason Bocarro, North Carolina State University; Lulu Black, North Carolina State University; Austin Thompson-Spain, North Carolina State University

The NCAA recognized the growing issue of student-athlete mental health over the last decade through publishing of best practices, passing of legislation, and surveying of student-athletes and coaches related to mental health. Depression rates in the U.S. are highest among 18 to 25 year-olds, with suicide now the second leading cause of death for collegiate student-athletes. Yet, many student-athletes do not use available services, and, according to a 2021 NCAA survey, 31% of women and 37% of men do not know where to go on campus with mental health concerns. Our study consisted of virtual focus groups with two to four student-athletes utilizing a semi-structured interview format. The interview guide was informed by emergent Mental Health Literacy theory (MHLt), 2016 NCAA recommended mental health best practices and 2019 mental health legislation. Twenty-two student-athletes representing 10 different sports at 14 Division I institutions participated in seven focus groups before saturation was reached related to our questions. The overarching themes that emerged included (a) importance of coaches; (b) institutional/administrative culture; (c) barriers to seeking support (time, stigma, resources); and (d) triggers and root causes. The importance of coaches as a standalone theme and influencing factor on the three other primary themes is the focus in our results and contextualized through related discourse in the NCAA mental health best practices and Coaches Well-Being Study. Additionally, our data indicates support of the MHLt hypothesis that knowledge, attitudes, and beliefs around causes and sources of knowledge regarding mental health issues can help predict ability to seek help. It extends MHLt into the sport ecosystem by indicating coaches play a leading role in the MHL of athletes, as they consider coaches to be a primary source of knowledge and support around mental health. Our results show current failures by institutions to effectively and consistently implement related best practices and opportunities for improvement among coaches and administrators. Funding source: NCAA.

A meta-analysis of behavioral interventions in people with multiple sclerosis: Effects on physical activity and psychosocial outcomes

Lara Bressy, University of Turin; Luca Beratto, University of Turin; Matteo Ponzano, The University of British Columbia

People living with multiple sclerosis (PwMS) often manifest symptoms of depression and anxiety. PwMS report lower step count and minutes of moderate to vigorous intensity physical activity (MVPA), as well as greater sedentary behavior, compared to individuals without MS. Behavior change interventions have been increasingly used over the years to increase PA, and improve well-being and health related quality of life (HRQoL) in PwMS. Therefore, the aim of this systematic review and meta-analysis was to determine the effect of PA behavioral interventions on PA levels, subjective (SWB), psychological (PWB) and social well-being (SoWB), and HRQoL. We performed systematic searches in four databases to identify randomized controlled trials that: 1) involved PwMS ≥18 years old; 2) delivered a physical activity behavioral intervention; 3) had one comparator group that received no intervention; 4) had SWB, PWB, SoWB, or HRQoL as outcomes. Pairs of authors 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 extracted the behavior change techniques (BCTs) used in each study according to the BCT taxonomy (v.1), performed random-effects meta-analyses, and assessed heterogeneity between trials using the I² statistics. We included 15 studies (1,309 participants, 62% females) that delivered an average of 12 ± 3 BCTs. PA behavioral interventions increased PA (d = .53, 95%CI .32 to .73; 1,024 participants; 12 studies; I² = 57%) and improved SWB (d = .41, 95%CI .11 to .71; 652 participants; 6 studies; I² = 68%), PWB (d = .37, 95%CI .18 to .57; 424 participants; 5 studies; I² = 0%), and HRQoL (d = .18, 95%CI .03 to .32; 741 participants; 7 studies; I² = 91%). The effects on SoWB are uncertain (d = .12, 95%CI -.04 to .27; 631 participants; 6 studies; I² = 0%). PA behavioral interventions should be implemented to improve PA levels, SWB, PWB, and
HRQoL in pwMS. Future trials are encouraged to test the effects of different intervention components on SoWB.

Physical and psychosocial benefits of a judo program for children with autism

Candace Brink, West Virginia University; Jeanette Garcia, West Virginia University

Youth diagnosed with autism are less likely to participate in physical activity compared to their typically developing peers due to factors such as limited motor skills, anxiety over social interactions, and lack of physical activity self-efficacy. Martial arts, such as judo, have been shown to address many of these barriers to physical activity, however, few studies have examined the benefits of judo on youth with autism. A total of 18 children (13.17 years ± 3.76, 78% male) were included in this study. Judo sessions occurred once a week for 45 minutes over a 14-week period. Parents of the participants completed the Autism Social Skills Profile (ASSP) to assess any changes in social skills, and open-ended questions regarding their child’s experience in the program. The ASSP consists of 49 items that are classified into three subscales: 1) Social Reciprocity; 2) Social Participation; and 3) Detrimental Social Behaviors. Paired sample t-tests were conducted to examine changes in ASSP subscales from baseline to post-judo program, and open-ended surveys were reviewed and coded for any physical or psychosocial benefits of the program. There was a significant increase in scores for the Social Participation subscale from baseline (2.44 ± .41) to post-judo (2.51 ± .49, p=0.002), however, no significant differences existed for Social Reciprocity (p =.39) or Detrimental Social Behaviors (p = .78). For the open-ended survey responses, 13 (72%) of parents reported observing psychosocial benefits, with 7 out of 18 (39%) parents reporting increased levels of confidence in their child. A total of 10 (56%) parents reported physical benefits of the program, with 7 (39%) reporting increased physical fitness/physical health, and 5 (28%) reported improvements in motor skills, balance, or flexibility following their child’s participation in the judo program. Findings from this study indicate that children with autism may obtain both physical (improved motor competency) and psychosocial (increased confidence) health benefits from participating in a judo program.

Exploring physical activity counseling for young adult cancer patients: Insights from the ACCESS pilot randomized controlled trial

Jennifer Brunet, University of Ottawa; Jenson Price, University of Ottawa; Monica Taljaard, Ottawa Hospital Research Institute; Amirtha Srikanthan, The Ottawa Hospital; Fiona Gillison, University of Bath; Martyn Standage, University of Bath; Mark Beauchamp, University of British Columbia; Jennifer Reed, University of Ottawa Heart Institute

Young adults diagnosed with cancer (YAs) report personal barriers to physical activity (PA) (e.g., no/low motivation, enjoyment, social support, and self-efficacy) that contribute to their insufficient PA levels. PA counseling may help YAs overcome some of the identified barriers to initiate, maintain, or increase PA. Yet, PA counseling for YAs has seldom been studied, and published interventions often lack theoretical underpinning and evidence of feasibility and acceptability. The physical activity counseling (PAC) model (Andrews et al., 2020) aims to deliver a counseling intervention informed by self-determination theory to increase PA among YAs. In this study, we assessed the feasibility and acceptability of the ACCESS trial methods and intervention. A parallel, 2-arm pilot randomized controlled trial was conducted with 44 YAs living in Canada. Repeated data (i.e., continuous, baseline, post-intervention) were collected via staff tracking, online surveys, interviews, and accelerometers. Interview transcripts were analyzed using content analysis to explore the acceptability of the intervention (IG=19) and trial methods (IG=19; UC=17). The content analysis yielded 5 themes; 3 reflect factors that positively impacted intervention acceptability (i.e., experienced benefits, appropriate structure, valuable content and delivery agents), 1 reflects factors that negatively impacted intervention acceptability (i.e., generic structure and content), and 1 offered recommendations to optimize the feasibility of the trial methods (e.g., shorter data collection, more aesthetic accelerometer) and intervention (i.e., more tailored approach). Results complement our quantitative results, which provided evidence for the feasibility and acceptability of the ACCESS trial methods and intervention. Additionally, results offer insights to inform future intervention trials. Funding source: University of Ottawa, Faculty of Health Sciences.

Team performance crises: Cognitive evaluation processes before and after competitions

Stephanie Bünnemann, University of Muenster; Charlotte Raue, University of Muenster; Maike Tietjens, University of Muenster; Katherine Tamminen, University of Toronto; Bernd Strauss, University of Muenster

During every season, it is not unusual for the media to report about at least one team to presumably be stuck in a crisis. Often, these crises are characterized by unexpected poor performances typically accompanied by a series of defeats. Performance slumps are underrepresented in existing research (Stead et al., 2022). Thus, the goal of this contribution is to understand the crisis phenomenon from a psychological perspective. Team performance crises are defined as persistently weak performances perceived as threatening, which cannot be adequately coped with and lead to dysfunctional team processes (Buenemann et al., 2023). According to the model of team performance crises, a crisis should become more severe over time (Buenemann et al., 2023). Thus, perceived threat should increase with consecutive losses and decrease with victories. In this study, teams were surveyed before and after their matches regarding their evaluation of the upcoming (before) or the next (after) competition. N = 161 team athletes (Mage = 24.63, SDage = 5.81) each answered the German, team-adapted version of the challenge and threat sports scale (Rossato et al., 2018) and indicated whether they had lost/won one, two, or three consecutive games. Results show an effect of perceived threat before the game based on the number of losses (F[2, 47] = 3.493, p <.05; threat for one lost game: M = 2.30, for two: M = 2.24, for three: M = 3.14), but not after the game, (F[2, 48] = 3.493, p = 0.09. In winning streaks, a contrasting pattern emerges: no effect on threat before the game (F[2, 97] = 2.617, p = .08), but after the game, threat depends on the number of victories, F(2, 74) = 4.928, p < .05 (threat for one won game: M = 2.07, for two: M = 2.28, for three: M = 1.67). These results provide initial insights into crisis development in teams, suggesting that the upcoming task appears more threatening after losing streaks.

Exploration of safe sport practices and safe sport culture through youth coach perspectives

Samantha Burelle, York University; Karl Erickson, York University

Despite substantial research and advocacy, including advancement of Safe Sport policy, cases of harassment, abuse, neglect, and maltreatment, as well as the broader (re)production of maladaptive sport culture, are still present in the Canadian sport system. Sport advocates and participants are calling for change to repair the damages and repercussions experienced. While most of the scrutiny on Safe Sport in Canada is occurring at the national level, it remains unclear whether the calls for action and associated response (i.e., policies) are meaningfully unfolding within grassroots sport, let alone being implement by those charged with enacting them ‘on the ground.’ Coaches are a critical nexus in youth sport playing a central role in the uptake and implementation of such policies and policy-driven
practices. Although coaches play a vital role in implementation and promotion of positive sporting environments, there continues to be a lack of consensus and clarity as to what constitutes a ‘safe sport’ from their perspective. Employing qualitative interviews and Reflective Thematic Analysis (Braun & Clarke, 2019), this study explored the knowledge, perceptions, and implementation experiences of Safe Sport practices among coaches at grassroots level youth sports (N = 12). Furthermore, Graber’s (1976) condensation symbol guided the analysis by investigating the nuances of ‘safe sport’ by better understanding individual connotations of the term. Although there seems to be more mention of ‘safe sport’ than ever before in Canadian public consciousness, this study emphasized that there remains challenges with the implementation of Safe Sport policy and related initiatives due, in part, to the conceptual murkiness around what is ‘Safe Sport’ and to whom it applies, especially at lower levels of sport. The study provides insights as to how Safe Sport is conceptualized and implemented (or not) at its most elementary stage, informing better translation to higher levels of sport and/or long-term sport participation.

**Effects of physical activity on executive functions in children: A meta-analysis on the role of cognitively engaging and aerobic programs**

Marcelo Odilon Cabral de Andrade, Michigan State University; Ioanna Pournara, National and Kapodistrian University of Athens; Myrto Mavridi, University of Wollongong; Maria Koutsoubi, National and Kapodistrian University of Athens; Fotini Venetsanou, National and Kapodistrian University of Athens; Matthew Pontifex, Michigan State University; Spyridoula Vazou, Michigan State University

Previous research shows that participation in physical activity (PA) programs positively impacts children’s executive functions (EFs). However, it is unclear which type of PA is the most beneficial for EFs. This systematic review and meta-analysis examined the effects of PA programs on EFs in children, considering the cognitive and/or metabolic demands of PA. A systematic search of electronic databases (PubMed, Google Scholar, and Sport Discus) was conducted using keywords related to PA and EFs. A total of 50 studies were included, with 18 studies (and Sport Discus) was conducted using keywords related to PA and EFs. A total of 50 studies were included, with 18 studies focused on the acute effects of PA and 32 studies focused on the long-term effects of PA on EFs. Three subdomains of EFs (working memory, inhibitory control, and cognitive flexibility) were distinguished. Effects for different study designs (acute or long-term PA programs), cognitive and/or metabolic demands of PA (cognitively engaging, aerobic, physical education, or control), and test measures (reaction time or accuracy) were examined separately. The effect sizes were calculated based on means and standard deviations for pre- and post-test changes. For acute studies, cognitively engaging PA had a small positive effect on accuracy for working memory (d = .29; 95% CI: .12, .47; p < .001), compared to sedentary control. For long-term studies, largest effects emerged for cognitively engaging PA on reaction time for cognitive flexibility (d = .49; 95% CI: .13, .85; p < .0008), compared to aerobic education. In addition, participation in cognitively engaging PA had a small positive effect on accuracy for inhibitory control (d = .19; 95% CI: .01, .36; p = .03), compared to aerobic PA. The examination of different types of PAs on EF allows to get insight into their interplay to reap largest cognitive benefits in PA programs for children.

**Unama’ki surf program: The importance of leading place-based sport**

Bettina Callary, Cape Breton University; Neylan Stevens, Cape Breton University; Simon Barrick, Cape Breton University

The Unama’ki surf program is run by the First Nation Mi’kmaq Physical Activity Leaders (MPALs), in conjunction with the Surfing Association of Nova Scotia on the shores of Unama’ki (Cape Breton Island) in Canada. There is a need for evidence-based findings grounded in the experiences of Indigenous peoples to develop meaningful sport programming. Our participatory action research project explored Mi’kmaq ways of knowing about place-based cultural sport participation, from the perspectives of leaders and youth involved in the Unama’ki Surf program. The importance of the land for Indigenous ways of knowing makes a surf program, dependent on the environment and place, a conduit for exploring the significance of cultural programming. Data were collected over two years via researcher fieldnotes as outsider-participants in a supporting coach role and leaders of workshops at the beach. In these workshops, we gave the youth surf boards with blank white bottoms (prepared for painting), and they were encouraged to paint the meaning that surfing has on their lives. They were given prompts, such as connection to the land, life, physical activity, mental health, Mi’kmaq terms/words, and clan animals. Photos, video, and audio recordings were taken during the workshops, when the youth were surfing, and on the beach. Three themes were identified from the field notes, and conversations with youth, two youth surf leaders, five MPALs, three Mi’kmaq sport leaders, and an Elder. These themes include surfing as a means of connecting with water; supporting growth despite intergenerational trauma, and building and supporting Indigenous communities. Findings are discussed with regards to the meaningfulness of the Indigenization of the surf program and the focus away from technical instruction. Researchers are encouraged to think about how they may (continue to) support equity, diversity, inclusion, and Indigenization through the study and dissemination of alternative programming perspectives. Funding source: Social Sciences and Humanities Research Council of Canada.

**A multivariate approach to understanding cognitive functioning in elite youth athletes**

Carmel Camilleri, York University; Kathryn Johnston, University of Toronto; Nick Wattie, Ontario Tech University; Joseph Baker, University of Toronto; Magdalena Wojtowicz, York University

Recent studies have highlighted that cognitive abilities, particularly in the domain of executive function, are superior in high performance athletes. However, most studies have examined differences using traditional mean-based approaches and few, if any, have assessed the comprehensive multidomain cognitive profiles. The current study introduces a novel multivariate neuropsychological approach to characterizing cognitive profiles in elite athletes. 162 elite athletes from the Canadian Sport Institute Ontario (64% female; aged 17–25) completed a cognitive battery encompassing 12 tasks evaluating: verbal reasoning, inhibition, spatial planning, mental rotation, deductive reasoning, paired associate learning, visual attention/search, visuospatial processing, and verbal/spatial working memory. Participants’ scores were age and sex matched to a normative sample of non-athletes (n = 5,000) and converted into t-scores. Proportion of high scores were examined and multivariate base rates (MBRs) were calculated in relation to 3 cutoffs (i.e., 75th, 84th, and 91st percentiles). A greater proportion of athletes than expected achieved high-level scores. Specifically, 34.0% attained scores at ≥75th percentile in visuospatial working memory and 29.0% scored ≥275th percentile in mental rotation. When interpreting MBRs, the majority of athletes achieved one or more scores at ≥75th, ≥84th, and ≥91st percentiles (i.e., 81.5%, 67.9%, and 59.3%, respectively). Elevating the threshold to three or more high scores, a large proportion of athletes excelled in multiple domains at ≥75th, ≥84th, and ≥91st percentiles (i.e., 47.53%, 26.52%, and 10.49%, respectively). MBRs provide a multi-domain lens of cognitive profiles in elite athletes that can reveal the unique strengths and weaknesses of individual athletes. Further research is required to explore how sport type, training history, and athlete characteristics may impact profiles of cognitive performance. Funding source: SSHRC.
Multi-domain cognitive profiles across sport types of elite youth athletes
Carmel Camilleri, York University; Kathryn Johnston, University of Toronto; Nick Wattie, Ontario Tech University; Joseph Baker, University of Toronto; Magdalena Wojtowicz, York University

Prior research suggests high performance athletes exhibit enhanced cognitive abilities (e.g., executive function) and that this may differ based on sport type. The present study examined multi-domain cognitive profiles in elite athletes that belong to the following sport types: team (e.g., ice hockey; n = 99); speed-strength (e.g., cycling; n = 42); precision/skill-dependent (e.g., diving; n = 21). 162 elite athletes from the Canadian Sport Institute Ontario [64% female; aged 17–25; mean (SD) age=18.47 years (1.7)] completed a cognitive battery encompassing 12 tasks evaluating: verbal reasoning, inhibition, spatial planning, mental rotation, deductive reasoning, paired associate learning, visual attention/search, visuospatial processing, and verbal/spatial working memory. Participants’ scores were age and sex matched to a normative sample of non-athletes (n ~5,000), converted into t-scores, and multivariate base rates (MBRs) were computed in respect to 3 cutoffs (i.e., 75th, 4th, and 91st percentiles). Associations between raw cognitive scores and sport type were explored using linear regression models, while controlling for age and sex. There were no group differences in proportion of high scores between sport types across all tests. When examining raw scores, being in the team sport group was associated with higher performance, compared to the speed-strength group, on two tests of visuospatial working memory (B = .21, p = .036; B = .24, p = .014). MBRs revealed that all sport types commonly attained one or more scores at ≥75th, ≥84th, and ≥91st percentiles (e.g., 84%, 76%, and 89% at ≥75th percentile for team, speed-strength, and precision/skill groups, respectively). A large proportion of high-level scores were observed across athletes regardless of their sport group, although there was some evidence of superior visuospatial working memory in athletes from team-based sports. Future research should examine the consistency of this finding to assess if and how visuospatial working memory may be favoured by athletes engaged in team sports.

Funding source: SSHRC.

The mediating effect of resiliency on the relationship between athlete status and mental health outcomes in university students during COVID-19
Quinten Carfagnini, Brock University; Joshua Celebre, Brock University; Philip Sullivan, Brock University

Mental health differences between athletes and non-athletes have generated equivocal results, particularly within the university settings. The COVID-19 pandemic appears to have had further mental health ramifications for post-secondary student-athletes. During the pandemic, university students showed higher prevalence of anxiety, depression, sleep problems, and suicidal ideation than adults in the general population (Dragioti et al., 2022). Furthermore, resiliency may differ between athletes and non-athletes, affecting both mental health outcomes and responses to drastic events such as the COVID-19 pandemic. The current study examined if resiliency mediated the relationship between athlete status and the outcomes of psychological distress and wellbeing among Canadian university students during the COVID-19 pandemic. The study used the Spring 2020 deployment of the Canadian Campus Wellbeing Survey (CCWS). A sample of 17,718 university students (n = 558 athletes) completed the survey, which included the Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), and Kessler Psychological Stress Scale (K10), as well as a two-item measure of resilience. Resilience was measured using two items developed by the CCWS. The items had the participant rate their ability to handle unexpected and difficult problems and their ability to handle day-to-day demands in their life. For the K10, the beta weight for athlete status was reduced from −.017 (p < .05) to .006 (p = .34) whereas for the WEMWBS it reduced from .038 (p < .001) to .007 (p = .20). Therefore, resiliency perfectly mediated the relationship between athlete status and both the K10 and WEMWBS. These results are consistent with the conceptual nature of resiliency and offer further support for the potential role of sport participation as a source of resiliency. These results are also consistent with the notion of sport induced resilience; the positive adaptations observed during COVID-19 were not due to athlete status, but due to differences in resiliency levels among the students within the study sample.

The correlation between training hours and injuries in Canadian elite figure skaters
Antonia Cattie, University of Toronto; Kathryn Johnston, University of Toronto; Joseph Baker, University of Toronto

Athletes participating in sports that tend to specialize ‘early’ may be at an increased risk of injury and other negative outcomes due to the increased training demands during early phases of development. This study aimed to gain an understanding of Canadian figure skaters’ training schedules and whether these affected skaters’ current injuries. Using the Exposure to Sport Survey (ESS; Mosher et al., 2023), training and injury data were collected from 23 elite figure skaters (8 men and 15 women) competing in the 4 main skating disciplines (men’s and women’s singles, pairs and ice dance) at either the junior or senior level of competition. Overall, skaters’ weekly training hours ranged from 10 to 25 hours/week; however, males reported greater hours (M = 19.38, SD = 6.05) than females (M = 15.68, SD = 3.87). Similarly, pairs and ice dancers had a slightly higher weekly averages (M = 18.63, SD = 4.60) than singles skaters (M = 16.08, SD = 5.03). Although these slight differences were observed between averages, t-tests confirmed no significant differences between the groups (men vs. women p = .15. Pairs and Ice Dance vs. Singles p = .24). Finally, a descriptive assessment of injuries revealed that 8 skaters (~35%) currently had training-related injuries (4 women and 4 men), varying in injury type (e.g., ankle sprain, groin strain, concussion, stress fracture and ligament tear). The results of this study emphasize the need to design developmentally-appropriate training parameters for elite skaters that accommodate variability in individual training hours, injury risk/management, and other relevant constraints.

Assessing the validity of the Dual Continuum Model of mental health with intercollegiate student athletes
Josh Celebre, Brock University; Philip Sullivan, Brock University

Research on the mental health of student athletes has generated ambivalent results. One of the reasons for this inconsistency may be the use of the traditional model of mental health mental health as a continuum from mental illness to health. Alternatively, the Dual Continuum Model views mental health and mental illness are two separate but related constructs (Keyes, 2002) and has begun to be embraced by researchers within sport (Foster et al., 2019; Van Slingerland et al., 2018). The current study was designed to assess the factor structure and criterion validity of this Dual Continuum Model. The 2022 Canadian cohort of the National Collegiate Health Association’s American College Health Assessment was used for these analyses. A sample of 349 university student athletes (65% female, 46.4% underclass, 53.1% living off campus) completed the Mental Health Continuum-Short Form (MHC-SF; Keyes, 2008), the Kessler K6 (Kessler, 2002), the Connor Davidson Resiliency Scale (Connor & Davidson, 2003), and the UCLA Loneliness Scale (Russell, 1996). A Confirmatory Factor Analysis of obliquely related factors of mental health (i.e., MCH-SF) and illness (i.e., K6) showed strong fit of the model to the data (CFI = .986; RMSEA = .087) with a moderate negative correlation (~.67) between the
two factors. Of the 6 groups of mental health proposed within the Dual Continuum Model, mentally ill moderate (moderate mental health with mental illness; n = 74) and mentally ill flourishing (high mental health with mental illness; n = 68) showed relatively large and equal cell sizes. t-tests comparing these two groups showed that mentally ill flourishing athletes had significantly higher resilience and significantly lower loneliness than mentally ill moderate athletes. These results support that mental illness and mental health may be separate but related constructs, and are consistent with recent calls that providing support to promote flourishing mental health in this population is as important as reducing mental illness (Uphill et al., 2016).

Perceived social support moderates the relationship between concussion history and depression in college-aged athletes

Madison C. Chandler, Elon University; Maggie Bevier, Elon University; C. J. Fleming, Elon University; Eric E. Hall, Elon University; Caroline J. Ketcham, Elon University

Individuals with a history of concussion often report higher levels of depressive symptoms than those without. In the general population, one factor shown to mitigate depressive symptoms is having higher levels of perceived social support. The potential moderating role of social support in the context of concussion history and depression has not yet been explored. The purpose of this investigation was to determine whether social support moderates the relationship between concussion history and depression in college-aged athletes. Participants in this cross-sectional study were club and varsity-level student athletes (N = 347, M_age = 18.7 ± 1.1 years; 49.3% females) at a mid-sized university. In a concussion baseline testing battery, individuals provided demographic and concussion history information and completed measures of depression (PHQ-9) and social support (MSPSS). One hundred individuals (28.8%) reported at least one previous concussion (M = 1.7 ± 1.0, range = 1–6). Having a greater number of previous concussions was correlated with higher depression scores (r = .19, p < .001). Higher levels of social support were correlated with lower depression scores (r = −0.13, p = .02). In a linear regression model controlling for age and sex, both number of concussions (B = 2.90) and the interaction between number of concussions and social support (B = −.03) were significant predictors of depression scores (F[5, 320] = 7.04, p < .001, R²_adj = .09). The interaction manifested such that a greater number of concussions predicted higher depression scores in those with average and below-average levels of social support (simple slopes B’s ≥ .46, p’s ≤ .01), but this relationship was attenuated (non-significant) for those with above-average levels of social support (B = .06, p = .78). Findings suggest that higher levels of social support could buffer the relationship between concussion history and depression in college-aged athletes. Future research should explore social support-focused intervention strategies for those with a history of concussion and concomitant depressive symptoms.

Does the formula buff really exist?

Ye-ji Choi, Yonsei University; Soo-Jung Yang, Yonsei University; Seon-Young Ahn, Yonsei University; Min-Jae Ju, Yonsei University; Jong-Hyun Lee, Yonsei University; Yong-Jin Yoon, Yonsei University; Seong-Kwan Cho, Texas A&M International University

In South Korea, the term “formula buff” is often used for athletes. It refers to the phenomenon of temporarily improving performance after the birth of a child by working harder to earn money for the child’s formula. Culturally, it is natural for the head of the household to take on the responsibilities of a family and the rising costs of living after the birth of a child. So, it is not surprising that the term formula buff was coined. However, there has been no scientific research on whether the formula buff actually affects game results or individual performance. In this study, we used data from the Korean professional baseball league to analyze whether the formula buff affects players’ performance. We selected a total of 40 Korean professional baseball players whose childbirth dates were available, and utilized indicators related to players’ salary negotiations based on the meaning of the formula buff, which is “to earn the price of formula”. Based on previous studies, AVG, OBP, OPS, and WAR were analyzed using a paired sample t-test. As a result of the study, the difference in AVG before and after childbirth was significant (p = .019), and the difference was −.016. In addition, the difference in OBP was also significant as p = .049, and the difference was −.013. These results suggest that after childbirth, players feel more responsible for their family and focus more on the game to improve their salary. On the other hand, there was no statistically significant difference between OPS and WAR. The reason for this result is the characteristics of OPS and WAR. OPS is the sum of OBP and SLG, so it is greatly influenced by player’s slugging power. The importance of OBP and SLG changes depending on the player’s batting order, but this study analyzed without distinguishing the batting order. So, OPS is not significant in this study. In addition, WAR is calculated including several external factors (defense, stolen base, etc.) and hitting, so WAR does not properly to simply see the effect of formula buff.

Development and initial validation of the Emotional Regulation Questionnaire in Korean athletes

Haeyong Chun, Michigan State University; SeYun Park, Chungnam National University; Dae-hyun Yun, Chungnam National University; Nicholas D. Myers, Michigan State University

The Emotional Regulation Questionnaire (ERQ) battery was developed to evaluate how Korean athletes control their emotions in diverse situations. The ERQ battery consists of four separate questionnaires that are divided into cognitive and behavioral strategies based on positive and negative situations: (a) cognitive strategy in positive situations (CP); (b) cognitive strategy in negative situations (CN); (c) behavioral strategy in positive situations (BP); (d) behavioral strategy in negative situations (BN). The purposes of this study were to (a) present the development process and (b) test the construct validity of the ERQ using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). 263 Korean collegiate and professional athletes participated in two studies. In Study 1, item generation for each strategy and the initial content validity of the ERQ were developed. In study 2, the factor structure of the ERQ battery was tested via EFAs and CFAs. Internal consistency reliability was also tested to calculate Cronbach’s α. Each questionnaire employed EFAs using oblique-target rotation to align the extracted structure with theoretical frameworks. CFAs were examined for each questionnaire and showed acceptable fit indices. The results were (a) 3 factors with 9 items, $\chi^2 = 31.55; p = .085$; RMSEA [90% CI] = .04 [.00, .07]; CFI = .95; TLI = .97; SRMR = .04 in CP; (b) 2 factors with 9 items $\chi^2 = 27.64; p = .230$; RMSEA [90% CI] = .03 [.00, .06]; CFI = .99; TLI = .99; SRMR = .04 in CN; (c) 6 factors with 18 items $\chi^2 = 118 = 164.57; p = .003$; RMSEA [90% CI] = .04 [.02, .05]; CFI = .98; TLI = .97; SRMR = .04 in BP; (d) 5 factors with 15 items $\chi^2 = 77.38; p = .467$; RMSEA [90% CI] = .00 [.00, .03]; CFI = 1.00; TLI = 1.00; SRMR = .03 in BN. Cronbach’s α was .66-.88. In conclusion, the ERQ has demonstrated acceptable content, factorial construct validities, and internal consistency as a measurement of emotional regulation in Korean athletes.
A systematic scoping review of the research on peer motivational climate in youth sports and physical activity

KeonYoung Chung, Michigan State University; Marcelo Odilon Cabral de Andrade, Michigan State University; Spyridoula Vazou, Michigan State University

The motivational climate created by peers plays a crucial role in children’s sports and physical activity experience. Despite the importance of peer influence, the progress of the overall research on peer motivational climate remains intermittent. The purpose of this systematic scoping review was to quantify the literature on peer motivational climate with psychosocial factors as well as examine its interplay with other social agents. A literature review was conducted using PubMed, PsychInfo, Eric, and Google Scholar. The term “peer motivational climate” was used as a keyword and all studies published in English were included. From the 45 studies included, the majority were cross-sectional (n = 28, 62.23%), with fewer studies being longitudinal (n = 9), qualitative (n = 5), experimental (n = 2), and mixed methods (n = 1). Adolescents (n = 34 studies, 75.56%) were the most frequently researched subjects, whereas adults and children were less frequently examined. Peer motivational climate was explored in competitive sports (48.89%), and non-competitive exercises (42.22%), and only 4 studies were conducted in the PE contexts. Eight research themes were analyzed and discussed: (1) self-determination theory, (2) morality, (3) peer climate exploration, (4) cohesion, (5) dispositional achievement goal, (6) positive youth development, (7) affect and behavior, (8) well-being. Regarding the interplay between peers and other social agents: 17 studies focused only on peers, and the remaining included coaches, and parents (n = 14), coaches (n = 9), teachers (n = 4), and parents (n = 1). Overall, a peer task-involving climate has been more linked to adaptive outcomes while there were also relationships between a peer ego-involving climate and maladaptive outcomes but the latter were less consistent. Furthermore, peers’ influence was also powerful, and importantly, the ways peers and adults affect youngsters’ motivation were distinct. This scoping review will guide researchers in expanding the literature on peer motivational climate and transferring the knowledge to the applied setting.

DE-PASS – Modifiable determinants of physical activity behaviours in older adults: Preliminary results of a systematic review

Simone Ciacciioni, University of Rome “Foro Italico”; Sofie Compernolle, Ghent University; Maren Lerfald, Norwegian University of Science and Technology; Federico Palumbo, University of Rome “Foro Italico”; Floriana Fadda, University of Rome “La Sapienza”; Ginevra Toma, University of Rome “La Sapienza”; Cristina Cortis, University of Cassino and Lazio Meridionale; Paul Janie Mork, Norwegian University of Science and Technology; Laura Capranica, University of Rome “Foro Italico”; Ciaran MacDonncha, University of Limerick; Linda Ernstsen, Norwegian University of Science and Technology

Despite strong evidence supporting the benefits of physical activity participation, substantial numbers of individuals are insufficiently active later in life. To promote active lifestyles, inform policy makers and develop targeted interventions for older adults (aged ≥65 years), it is crucial to investigate modifiable determinants of their physical activity and sedentary behaviours (PAB/SB) and the quality, strength, and relevance of the underpinning evidence. Thus, a systematic literature review leading to a best-evidence statement (BES) was conducted, involving a search in PubMed, EBSCOhost and Web of Science resulting in 31,727 individual studies. The best evidence based on 52 randomized controlled trials was selected and assessed for risk of bias using Cochrane’s RoB 2.0 tool. Published between 2012 and 2022, the studies were carried out in America (n = 18), Asia (n = 7), Europe (n = 15) and Oceania (n = 12) with 9,112 individuals identified either in community- (n = 30) or healthcare- (n = 22) settings. Respiratory diseases (e.g., COPD) were the most common clinical conditions. Interventions to improve PAB and reduce SB encompassed light, moderate-to-vigorous intensity, multicomponent, sport exercises as well as education- and device-based programs performed in- or outdoor, autonomously or assisted, in group or individually. Comparison groups included no-exercise and usual care controls as well as different exercise or education interventions. Psychological (e.g., motivation, self-efficacy), physical (e.g., anthropometry, functional fitness) and multifactorial (e.g., quality of life, health status) modifiable determinants emerged. Both self-reported and device-based PAB/SB measurements have been identified. Mixed outcomes emerged with quality of life and functional fitness as the most reported PAB/SB determinants. A meta-analysis has been planned to synthesize sufficiently homogeneous studies. From the present research and connected reviews targeting different age groups a BES will be developed. Funding source: COST Action CA19101 Determinants of Physical Activities in Settings (DE-PASS), supported by COST (European Cooperation in Science and Technology).

Social support strategies for fitness professionals and participants in physical activity interventions for adult populations: A rapid review

Bobbie-Ann P. Craig, University of Calgary; Lindsay Morrison, University of Calgary; Meghan H. McDonough, University of Calgary; Catherine Sabiston, University of Toronto; Erica Bennett, University of British Columbia; Isabelle Doré, Université de Montréal; Stephanie Won, Recreation and Social Programs, City of Calgary; Pamela Manzara, Recreation and Social Programs, City of Calgary; S. Nicole Culos-Reed, University of Calgary; Cari Din, University of Calgary; Jennifer Hewson, University of Calgary; Sarah Kenny, University of Calgary; Chantelle Zimmer, University of Calgary; Amanda Wurz, University of the Fraser Valley; Kari Stone, Unison at Kerby Centre

Social support (SS) can enhance physical activity (PA) interventions for adult populations by fostering initiation and maintenance of PA behaviour, reducing isolation, and building connections with others in similar circumstances or of similar demographics. Fitness professionals and PA participants can provide and facilitate SS in PA interventions in group and one-on-one settings, guidance on effective SS strategies that can be utilized is limited. There is a need to identify and synthesize strategies that exist in the literature to support adults in PA interventions. In conjunction with an overview of reviews study, this rapid review synthesized primary literature published in 2020 onward. Two independent reviewers screened 20% of abstracts in duplicate with conflict resolution required for 7.1%. One reviewer then screened the remaining abstracts with the second reviewer screening only those excluded. Data were extracted and synthesized from 58 studies, and nine categories relating to SS strategies were identified: feeling welcomed and included (e.g., encourage the group to be accepting of all social and physical abilities), making PA fun (e.g., use jokes, humour, and small talk), modelling PA (e.g., physically demonstrate PA and modifications well), providing information (e.g., provide guidance and answer questions about PA, equipment, etc.), providing encouragement (e.g., in the online environment acknowledge participants even if cameras are off), supporting mastery (e.g., help set measurable goals focused on effort and improvement), providing autonomy support (e.g., be open to and receptive of suggestions, feedback, and requests), providing emotional support (e.g., offer comfort and words of encouragement), and fostering social connections (e.g., initiate discussions by asking questions and encouraging sharing with the group). These findings elucidate and consolidate SS strategies that will be used to develop evidence-based resources for fitness professionals working with various adult populations in PA contexts. Funding source: Social Sciences and Humanities Research Council Partnership Development Grant.
Differential ratings of perceived exertion and coach-athlete congruency in women’s collegiate ice hockey

Ben Csiernik, Ontario Tech University; HM Logan-Sprenger, Ontario Tech University; Nick Wattie, Ontario Tech University

Ratings of perceived exertion (RPE) are used in team sport to quantify the exercise intensity of training sessions; however, limited work exists evaluating the utility of differential RPE (dRPE) in ice hockey. Further, while various forms of training load monitoring have been studied in ice hockey, there is an absence of information on coach-athlete congruency and the perceived demands of training. The purpose of this study was to examine and quantify the relationships between RPE and dRPE in ice hockey, and explore coach-athlete congruency on perceived training difficulty. Twenty-six women’s varsity ice hockey players (15 forwards, eight defenders, three goalies) recorded session RPE (sRPE) scores, and three dRPE scores (sRPE-Breathlessness, sRPE-Leg muscle exertion, and sRPE-Cognitive/Technical). Coaches reported a coach-intended sRPE score prior to the training session, and a coach-observed sRPE score following the completion of the training session. In total, 480 responses were provided by ice hockey players, and 73 responses by coaches over 25 training sessions. Using a multivariable linear model, dRPE explained 76.3% of the variance seen in sRPE scores, indicating that dRPE can be used to isolate specific contributions to the perceived demands of training. Additionally, the relationship between coach-intended sRPE and athlete sRPE was strong (r = .53, CI: .17 -.76), and coach-observed sRPE and athlete sRPE was very strong (r = .73, CI: .48 -.87) when goaltenders were excluded from the analysis. These results suggest that dRPE may provide coaches with relevant information surrounding the specific demands of ice hockey athletes during practice. Further, this study highlighted that the congruency of coach-observed sRPE and athlete sRPE was stronger than coach-intended sRPE in this sample, though both demonstrated strong levels of agreement. Ice hockey teams should consider the use of dRPE and sRPE for players and coaches as one component of athlete monitoring, as they provide relevant information on the perceived demands of training.

Between the pipes: The influence of team practice structure on the training demands of ice hockey goaltenders

Ben Csiernik, Ontario Tech University; HM Logan-Sprenger, Ontario Tech University; Nick Wattie, Ontario Tech University

In team sports, the goaltending position is regularly referred to as a specialty position due to its unique demands relative to other players on the team. In ice hockey research, goaltenders are regularly excluded from analyses due to the positional differences of observable metrics of external training load, such as distance travelled, number of accelerations, and speed. The objective of this study was to evaluate the perceived training demands of collegiate women’s ice hockey players. Twenty-six women’s varsity ice hockey players (15 forwards, eight defenders, three goalies) recorded a session rating of perceived exertion (sRPE) score, and differential ratings of perceived exertion (dRPE) scores over 25 training sessions during the pre-season, and the beginning of the regular season. Practice microstructure, including the types of drills, drill duration, and overall practice duration, was recorded. On average, goaltenders consistently reported lower sRPE scores compared with defenders, and forwards (32.5 vs. 43.3 vs. 49.1). Goaltenders also demonstrated lower scores across all dRPE measures (sRPE-Breathlessness, sRPE-Leg muscle exertion, and sRPE-Technical/Cognitive) by 25% or greater. Further, multiple linear regression models revealed that drill type and duration did not significantly influence the sRPE scores of the entire team (R-squared 0.078), forwards (R-squared 0.099), or defenders (R-squared 0.038). However, drill type and duration significantly impacted sRPE scores of goaltenders (R-squared 0.36, p-value < 0.001). Goaltender sRPE decreased as the amount of time spent on team tactics, and flow drills, increased. This study provides preliminary evidence that goaltenders experience unique training demands across multiple domains compared with forwards and defenders, while also highlighting that goaltenders may be the group most influenced by team practice microstructure. Coaches should consider how certain drill types affect goaltenders training experience when designing practices. Further research is required to expand on these findings.

Anxiety levels for return to play in Division I athletes

Dean Calpepper, Texas A&M University-Commerce; Sarah Mitchell, Texas A&M University-Commerce

The global impact of the COVID-19 pandemic has touched every facet of life. Collegiate athletes, who already contend with more stressors compared to their non-athlete peers, found themselves in a situation where they had to persevere through the uncertainties surrounding their sports. This study aimed to assess the anxiety levels of collegiate athletes as they contemplated a return to competition amid the COVID-19 pandemic. 241 Division I, II, and III athletes completed the State-Trait Anxiety Inventory (STAI). There were significant gender differences F(1, 204) = 16.65, p < .001 but no differences for school status (e.g. freshman). Division differences were found, F(1, 204) = 5.13, p = .025 with Division III scoring higher (M = 58.92, SD = 13.19) than Division II (M = 54.35, SD = 13.37). No other significant differences between divisions were found. Football and volleyball were the only sports where significant differences (p = .023) were found, (F[9, 172] = 3.05, p = .001,Eta-squared = .137). The mean of the STAI for the entire sample was extremely high (M = 58.24, SD = 13.42) which might account for the lack of differences among the groups. On the other hand, it highlighted the extreme anxiety about having to perform in the middle of a pandemic. Athletes are generally considered hardier than the normal population, yet the anxiety exhibited reported was extremely high.

A pathway to resilience: Sport confidence as a mediator between imagery use and psychological resilience in athletes

Samantha D’Agostino, University of Windsor; Krista Munroe-Chandler, University of Windsor

An athlete’s ability to buffer against negative effects of stressors has been attributed to their level of psychological resilience. Protective factors, specifically confidence, influence the development of resilience qualities. Moreover, utilizing mental skills (i.e., imagery) is beneficial for developing confidence and increasing levels of resilience-related outcomes. With confidence relevant in both resilience and imagery concepts, the purpose of the present study is twofold: (a) to investigate relationships between imagery and psychological resilience in athletes and (b) to determine if this relationship is mediated by sport confidence. A sample of 243 student athletes (Mage = 21.2, SD = 3.01) competing at the varsity or club level were recruited to complete questionnaires measuring psychological resilience, imagery use, and sport confidence. Results from bivariate correlations indicated that psychological resilience is related to all functions of imagery, except motivational specific, with the strongest relationship occurring between resilience and motivational general-mastery imagery (p < .001). A Confirmatory Factor Analysis (CFA) was run on the Sport Imagery Questionnaire (c2[265] = 474.731, CFI = .939, TFI = .931, RMSEA = .057, SRMR = .045) and Sport Confidence Inventory (c2[51] = 64.07, CFI = .994, TFI = .992, RMSEA = .032, SRMR = .019) measurement models to ensure adequate model fit. As the CFA informed
the revised measurement models for the structural equation model (SEM), results from the SEM indicated that sport confidence did not mediate the relationship between imagery and psychological resilience, as no indirect or total effects were significant ($ps > .001$). Future research should look to examine the relationships between imagery and psychological resilience and consider other variables, such as coping and challenge appraisal, that could impact the strength of that relationship. Funding: SSHRC. Funding source: SSHRC.

Examining the influence of smartphone use on time perception during exercise
Paul Davis, Umeå University; Axel Brünström, Umeå University; Marcus Dahlberg, Umeå University; Elisabeth Åström, Umeå University

The aim of the study was to examine the influence of smartphone use on time perception during exercise. Twenty-four physically active participants (16 females, $M_{VO2max} = 43.0$ ml/kg/min; 8 males, $M_{VO2max} = 56.9$ ml/kg/min; $M_{age} = 24.40, SD = 4.35$) completed an experimental study comprised of randomized conditions alternating between cycling at a hard intensity and seated rest, whilst their smartphone was: a) used to view ‘TikTok’ videos; b) present but not viewed; or c) out of sight. In each condition participants were asked to verbally produce a target amount of time (i.e., 37s) during the trial and upon its completion estimate the duration of the trial (i.e., 330s). Repeated measures ANOVAs indicated smartphones significantly affected participants’ perception of time during and following intervals of cycling and rest. Bonferroni corrected post hoc tests showed that the time production during cycling viewing was significantly shorter when watching videos compared to when the phone was present but not viewed ($M_{diff} = -6.19, p < .012$), 95% CI [−11.2, −1.17], as well as when the phone was out of sight ($M_{diff} = -4.65, p < .022$), 95% CI, [−8.72, −5.75]. Following each condition participants estimated the duration of the trial was less time than actual chronometric time, a significant effect of the smartphone conditions was observed $F(2,44) = 7.10, p < .002$, $\eta^2 = .24$, although not of physical activity $F(1, 23) = 3.33, p = .08$, $\eta^2 = .13$. Participants were more accurate in estimating the duration of the trial when they viewed videos on their smartphone. The results of the present study suggest that viewing videos on a smartphone can induce participants to perceive time passing more quickly during exercise, and upon completion of the physical activity judge the duration of exercise to be less than reality.

Between peak performance, hormones, and individuality: The impact of menstrual cycle symptoms on the performance of female elite athletes
Hanna de Haan, German Sport University Cologne; Andrea Roffler, Goethe University Frankfurt; Lisa Musculus, German Sport University Cologne; Laura Will, German Sport University Cologne; Karen Zentgraf, Goethe University Frankfurt; Markus Raab, German Sport University Cologne

Acknowledging female performance is gaining significance in elite sports, with the influence of the menstrual cycle being a key, individual factor under intense research. Studies on perceived performance indicate that female athletes tend to assess their performance as comparatively lower under intense research. Studies on perceived performance indicate that female athletes tend to assess their performance as comparatively lower with the in:prove project on individualization, we conducted anamnesis questionnaires with 107 female athletes ($M_{age} = 18.4$ years) from various Olympic sports, exhibiting natural menstrual cycles. Athletes provided information on the regularity of their menstrual cycles, the date of menstrue, and symptoms throughout their cycle. Chi-square analysis revealed no significant differences between the number of symptoms and the current performance level ($\chi^2 = 1.27, df = 2, p = .938$), as well as no significant differences between the number of symptoms and the development of athletes ($\chi^2 = 1.45, df = 4, p = .835$). This suggests that female athletes may develop effective coping strategies for their symptoms. Simultaneously, the subjective nature of coach evaluations underscores the necessity for establishing objective standards for performance assessment.

Collegiate athlete health and well-being profiles, transition markers, and life satisfaction
J.D. DeFreese, UNC-Chapel Hill; Ling Beisecker, UNC-Chapel Hill; Marcia Josephson, University of Kentucky; Adrian J. Boltz, Datalys Center for Sports Injury Research and Prevention; Pascale Paul, UNC-Chapel Hill; Avinash Chandran, Datalys Center for Sports Injury Research and Prevention; UNC-Chapel Hill

Athlete transition from sport to non-sport endeavors has important implications for the lifespan health and well-being of collegiate athletes. Health and well-being variables have been shown to be relevant during athlete transition. However, it is not well understood how athlete patterns (i.e., idiographic profiles) on these variables are relevant to broader transition and well-being outcomes (i.e., transition markers, life satisfaction). The current study purpose was to examine athlete health and well-being variable profiles (i.e., anxiety, depression, emotional support, physical functioning, injury history) and their associations with transition markers and life satisfaction. We hypothesized that distinct idiographic profiles would exist and be differentiated according to transition markers and life satisfaction scores. Participants were current ($n = 66$) and former ($n = 46$) American Division I collegiate athletes ($N = 112$). Participants self-reported measures of anxiety, depression, emotional support, and physical functioning characteristics (PROMIS subscales transformed for comparisons with general U.S. population norms; $M = 50$, $SD = 10$), transition status (i.e., current vs. prospective), pre-transition planning (i.e., use of specific strategies vs. not), life satisfaction (SWLs), and demographics. A K-means cluster analysis was conducted to probe the existence of hypothesized profiles with follow-up group difference analyses used to compare resultant profiles on transition markers and life satisfaction. Two profiles emerged characterized by Profile 1 ($n = 55$): anxiety, depression, and emotional support scores above population norms, and Profile 2 ($n = 57$): only emotional support scores above the population norm. Profile 2 members reported higher life satisfaction scores than those in Profile 1 ($t = -5.48, p < .001$). Profile membership did not differ on transition status or pre-transition planning. Findings suggest the potential utilization of health and well-being profiles to better facilitate adaptive athlete outcomes during the critical transition from collegiate sport. Funding source: ACC-CRIA Innovation Initiative.

1:1 virtual and 1:1 in-person physical activity is effective for reducing anxiety and depression symptoms among post-secondary students
Melissa L. deJonge, University of Toronto; Delaney E. Thibodeau, University of Toronto; M. Lauren Voss, University of Toronto; Catherine M. Sabiston, University of Toronto

On-campus physical activity programs could be widely implemented to support the mental health and well-being of post-secondary students. Yet, the COVID-19 pandemic has impacted the post-secondary learning
environment, with North American institutions widely reporting a significant rise in distance education. The rise in distance education has disrupted student access to mental health initiatives traditionally offered in-person, including physical activity programming. To improve access to tailored physical activity programs for student mental health, it is imperative to understand the effectiveness of virtual and in-person physical activity delivery models. The current study used a pragmatic proof-of-concept pretest-posttest design to examine the effectiveness of 1:1 virtual and 1:1 in-person physical activity for reducing symptoms of anxiety and depression among post-secondary students. Help-seeking students (M_age = 23.69 + 4.80 years; 89% women; 45% white) engaged in a 6-week 1:1 virtual (n = 59) or 1:1 in-person (n = 80) physical activity program tailored toward supporting mental health. Results from a two-way repeated measures ANOVA demonstrated no significant interaction effect between physical activity delivery type (i.e., virtual or in-person) and pre-post changes in symptoms of anxiety and depression (F[2, 134] = .27, p = .77, η^2 = .004). Virtual and in-person delivery contributed to significant reductions pre-post program in anxiety and depression symptoms (F[2,134] = 48.06, p < .001, η^2 = .42). There is a well supported need for practical and scalable physical activity intervention approaches for supporting the mental health of post-secondary students. The current study provides support for implementing virtual physical activity delivery as an effective alternative to traditional in-person delivery. Future research focused on optimizing access to effective and accessible physical activity programs for student mental health within distance and traditional in-person contexts is needed.

**Enhancing the coaching efficacy scale – Youth sports teams II**

**Anthony G. Delli Paoli, Rutgers University; Christopher R. Hill, California State University – San Bernardino; Jordan A. Blazo, Louisiana Tech University**

The Coaching Efficacy Scale – Youth Sports Teams II (CES-YST-II) has been widely used to measure coaching efficacy beliefs in youth sports (Boardley, 2017). One aspect of youth sport coaching that is omitted in the CES-YST-II is a coach’s confidence in their ability to resolve or deescalate adverse interpersonal misbehavior (e.g., fighting, teasing, or verbal insults). This is most applicable for volunteer youth sport coaches who receive little training or none at all and commonly have no control over who makes it onto the team (everyone participates). Given that youth sport coaches should be equipped with the knowledge to prevent misbehavior among athletes to ensure a positive and inclusive team environment this pilot study aimed to measure adverse event efficacy as a component of coaching efficacy. Items were developed from previous research on peer victimization (Troop-Gordon, 2017) and with input from content experts. This led to six items that asked how well coaches could resolve social, verbal, or physical conflicts and manage athlete misbehavior. 152 volunteer youth sport coaches (M_age = 44.2 years, 31.6% female, 79.4% white) representing 12 sports reported on their coaching efficacy beliefs. The model with the adverse event efficacy showed good fit to the data χ^2(237) = 318.5, p < .001, RMSEA = .046, 90%CI[.032, .058], CFI = .999, TLI = .999. Results from this pilot study demonstrate that adverse event efficacy may be a salient component of the coaching efficacy beliefs of youth sport coaches. These findings encourage future research efforts to demonstrate measurement validity and invariance testing.

**From theory to practice: A re-examination of the DMSP 25 years after its inception**

**Travis Dorsch, Utah State University; Matthew Vierimaa, Acadia University; Jordan Blazo, Louisiana Tech University**

Côté and colleagues’ Developmental Model of Sport Participation (DMSP) is a comprehensive framework that has informed parents’, coaches’, and community leaders’ understanding of athlete development in sport from early childhood to elite levels. Originally conceptualized in 1999 through the notions of sport sampling, specialization, and investment, the DMSP offers a common set of principles through which young athletes’ sport involvement can be shaped and understood. What remains unknown is the extent to which the principles and recommendations offered by the model apply to a full range of sport participants in the present day. This study assessed three questions derived from core postulates of the DMSP: (1) Is deliberate play a common developmental experience for young athletes? (2) Are sampling and specialization mutually exclusive sport participation pathways? and (3) Is the model equally applicable across a diverse range of individuals, families, and communities? To address these questions, data were collected from parents of 8189 youth sport participants (ages 5 to 18; M = 12.06) in the United States. Results suggest that deliberate play is not engaged in as frequently as more structured forms of sport (e.g., practice and competition), even for athletes at the youngest ages of participation. Moreover, most athletes who “specialize” (i.e., devote high levels of time and financial resources to one sport) also “sample” one or more other sports. Finally, patterns of sport participation are shaped by sociodemographic factors such as athlete gender, family affluence, and community type. The DMSP has had a profound impact on the study of youth sports, reforming the way scholars think about athlete participation, development, and competition. However, it remains unknown how the model actually informs the full range of athletes, families, organizations, and communities that engage in sport. Seeking to better understand this juxtaposition has the potential to create a more positive and sustainable sports culture for athletes of all ages, backgrounds, and abilities. Funding source: Aspen Institute Project Play.

**‘Levelling the Playing Field’ for at risk ethnic minority youth through sport: Indicators of psychosocial development and well being**

**Joan L. Duda, University of Birmingham; Hannah Hammond, University of Birmingham; Paul Appleton, Manchester Metropolitan University; Rudro Sen, Alliance of Sport in Criminal Justice; Justin Coleman, Alliance of Sport in Criminal Justice**

Ethnically diverse children and young people (C&YP) are more likely to enter, or already be involved with, the Criminal Justice system. They are also less likely to participate in sport and/or be physically active. A major focus of the ‘Levelling the Playing Field’ (LtPF) project (in England and Wales) has been to use the ‘power of sport’ to address these disproportionalities and also improve often compromised health and life outcomes for ethnic minority youth. To help couch mean responses in this considered ‘hard to reach’ group, this study examined differences in indicators of personal and social development and well being in C&YP attending LtPF sport sessions to responses of youth engaged in more traditional, paid for, community sport programs. 194 ethnically diverse C&YP (M = 14.6 + 2.9 years; 87% identified as male, 13% female; 44% Black, 20% Asian, 19% White, 13% mixed ethnicity) completed an online survey comprised of established scales tapping resilience, peer support, interpersonal trust, identity exploration and reflection, and health-related QOL. A sample of youth sport participants in community clubs (n = 388; M = 16.5 ± 1.7 years; 54% identified as male, 45% as female; 59% White, 27% Asian, 7% Mixed Ethnicity, 6% Black) also responded to the online survey. Controlling for race/ethnicity, gender, and age, LtPF C&YP viewed their sport sessions as providing significantly greater opportunities for Identity Exploration and Identity Reflection (d = .78 and .77, respectively) than the community sport C&YP. The community sport C&YP reported they received more support from peers when participating in sport (d = -.43). No significant group differences emerged in resilience, interpersonal trust (toward peers and adults in sport), and health QOL with scores being positive overall. Findings suggest that the special delivery organisations providing sport
sessions for ethnic minority C&YP are promoting a more ‘levelled playing field’. Results reflect a particular potential for sport in providing a facilitating context for identity formation in ethnic minority youth. Funding source: London Marathon Charitable Trust.

Exploring contingent self-worth and the transition to first year varsity sport

Chloe Ellard, University of Toronto; Katherine Tamminen, University of Toronto

Transitioning to university may be challenging for varsity athletes as they face social, academic, and performance demands which may result in maladaptive behaviours, feeling overwhelmed, and decreased well-being (Tracey & Corlett, 1995). Between 31% – 48% of varsity athletes report anxiety or depression, which is greater than the 13% of Canadian first year students who report mental illness (Brown et al., 2014; Price et al., 2007). However, there is limited research examining the decrease in well-being among first-year varsity athletes. One possible explanation is that their self-worth is contingent on the achievement of obtaining inter-personal and intra-psyche expectations (Hill et al., 2011). Therefore, if athletes do not meet performance expectations or lack positive feedback, it may increase their vulnerability to ill-being, poor coping, self-handicapping, perfectionism, and burnout (Fairlamb, 2022). The purpose of this longitudinal case study was to explore varsity athletes’ transition from high school to varsity sport and their self-esteem may change over their first season. Two male and five female athletes from four Ontario universities competing in six different sports completed three interviews across their sport season to explore their academic, social, and athletic experiences during their transition to university. Athletes’ self-worth was threatened when sport, academic or social relationships were unstable or unsuccessful. Athletes who experienced decreased external validation in one area of self-worth (i.e., academics), turned to sport to reaffirm self-worth, reinforcing the idea that sport is linked to their self-worth or competence. Further, previous experiences with adversity before varsity sport reduced the impact setbacks or external validation had on an athlete’s self-worth. This project provides information on how contingent self-worth influences varsity athlete experiences. Additionally, this study provides practical information on how to support athlete well-being, specifically during transitions.

Concurrent and lagged effects of stress and anxiety on motivation states to be physically active and sedentary: ANTREC analysis 2

Nia Fogelman, Yale University; Matthew Stults-Kolehmainen, Yale New Haven Hospital; Paul McKee, Duke University; Maddie Pascoe, University of Otago; Markus Gerber, University of Basel; Rajita Sinha, Yale University; Rebekah Blakemore, University of Otago

How psychological stress impacts motivation for physical activity is unclear. In this analysis, associations of stress and anxiety with motivation states to be physically active (i.e., Move subscale of the CRAVE scale) and sedentary (i.e., Rest subscale) were disentangled into concurrent & lagged effects and further disaggregated into between person (BW) and within person (WP) differences. Concurrent effects related stress/anxiety and CRAVE scores within the same run, while lagged effects indicated the relationship between stress/anxiety scores with CRAVE in the run after. Stress & anxiety were assessed as moderators of the condition & timepoint relationship on CRAVE. Concurrent effects: WP anxiety as a main effect was positively associated with Move (p < .001). Condition x run x WP anxiety effects emerged on Rest, with a negative relationship between WP anxiety and Rest in the unpleasant (UP) condition at the start of the anticipation period (p < .014) and during all stress runs (p’s < .028). Condition x run x WP stress was significantly predictive of both Move and Rest (p’s < .001). A positive WP stress and Move relationship was present in the pleasant (PL) condition by the end of recovery phase (p < .032) and at the end of the stress phase (p < .003) in the UP condition. A negative relationship was seen in the UP condition’s anticipation runs (p’s < .047). With Rest, a positive WP stress relationship was seen in the UP condition in anticipation runs (p’s < .036) and negative relationships during the stress runs (p’s < .012). Lagged effects: Greater WP anxiety and WP stress predicted greater Move in the latter stress runs of the PL condition (p’s < .008) and lower Move in the latter stress runs of UP condition (p’s = .030). Similar, inverted findings were seen with Rest (p’s < .042). Lastly, condition order x timepoint effects emerged on Move (p < .003) and Rest (p < .002). In conclusion, there were numerous significant concurrent and lagged effects for stress exposure on motivation states for physical activity and sedentary behavior.

“It’s not bragging if you can back it up”: Fitness related self-conscious emotions across sport participation and gender

Sarah Galway, Brock University; Madeleine Mahieu, Brock University; Kimberley Gammage, Brock University

Fitness related self-conscious emotions have been examined in relation to sport and exercise engagement. Negative emotions (shame and guilt) have been linked to negative outcomes (e.g., lower sport enjoyment, exercise addiction); whereas pride (authentic and hubristic) have been linked to adaptive psychological outcomes and higher sport commitment. However, research has focused primarily on young female populations. The purpose of the present study was to examine fitness-related self-conscious emotions and self-compassion across sport participation (non-athletes, recreational athletes, competitive athletes) and gender. A total of 313 participants (n = 104 non-athletes, n = 105 recreational athletes, n = 104 competitive athletes; M_age = 20 years) completed the study. Participants self-reported fitness-related self-conscious emotions (shame, guilt, authentic and hubristic pride), self-compassion, and demographic information. A MANCOVA was conducted. The interaction between sport participation and gender was not significant (p = .073), although there were significant main effects for sport participation and gender (p’s < .001). Follow-up one-way ANCOVAs and post-hoc Bonferroni comparisons were conducted to examine differences across sport participation and gender. Competitive athletes reported significantly lower shame than recreational athletes, and lower guilt than recreational and non-athletes. Competitive and recreational athletes reported higher hubristic and authentic pride than non-athletes, however, did not differ from each other. Self-compassion did not differ across levels of sport participation. For gender, males reported significantly higher self-compassion and pride (authentic and hubristic), and lower levels of shame and guilt than females. Our findings highlight benefits of engaging in sport at both competitive and recreational levels. Fostering self-compassion and positive emotions in female athletes may be especially advantageous to promote well-being in young athlete populations. Funding source: Brock University Canada Games Grant.

Effects of a 10-week exercise intervention on post-traumatic stress disorder symptoms in refugees: The SALEEM pragmatic randomized controlled trial

Markus Gerber, University of Basel; Filippou Konstantinou, University of Thessaly; Florian Knappe, University of Basel; Ioannis D. Morres, University of Thessaly; Elisa Havas, University of Thessaly; Emmanouil Tzompatzakis, University of Thessaly; Christina Kalavrou, University of Thessaly; Chantal Zehnder, University of Basel; Lucre Pieters, University of Basel; Yannis Theodorakis, University of Thessaly; Antonis Hatzigeorgiadi, University of Thessaly

Compared to the general population, refugees are a particularly vulnerable population with regard to mental health disorders. Due to exposure
to multiple critical life events such as war, loss of family members, family separation, and resettlement, refugees have a particularly high risk to experience post-traumatic stress disorder (PTSD). Exercise has the potential to be used as an effective treatment for relieving mental health problems and improving well-being. In the present study, we examined the effects of a 10-week exercise and sport program on post-traumatic stress disorder (PTSD) symptoms in adults living in a Greek refugee camp. In total, 41 men and 57 women with a mean age of 29.2 years participated in the program. After the baseline data assessment, participants were randomly assigned to an intervention (n = 50) and control (n = 48) group. Principles of self-determination theory were used when the exercise program was developed to address participants’ needs and preferences. Exercise and sports were offered separately for men and women, and included activities such as football, volleyball, boxing, and dance. Activities were provided five times per week (40–60 min/sessions) and participants were invited to participate in at least two sessions per week. After ten weeks of exercise training, the participants were tested again. A comparison of the control and intervention group revealed no significant time x group effect for PTSD. Nevertheless, significant improvement in PTSD symptoms were found for participants attending on average two or more exercise sessions per week compared to those attending less sessions and the control group. Our results point out the importance of frequency for exercise interventions to be effective; more information is needed about internal and external factors that kept participants away from participating in two or more training sessions per week. Funding source: Swiss Network for International Studies (SNIS).

Long-term effects of physical activity counseling in in-patients with major depressive disorder: The PACINPAT randomized controlled trial

Markus Gerber, University of Basel; Jan-Niklas Kreppke, University of Basel; Robyn Cody, University of Basel; Oliver Faude, University of Basel; Sebastian Ludoga, University of Basel; Johannes Beck, Psychiatric Clinic Sonnenhalde Riehen; Martin Hatzinger, Psychiatric Services Sisikon; Christian Imboden, Private Clinic Wyss Muenchenbuchsee; Undine E. Lang, Adult Psychiatric Clinics, University of Basel; Thorsten Mikot, Psychiatric Services Sisikon; Nina Schweinfurth-Keck, Adult Psychiatric Clinics, University of Basel; Lukas Zahnner, University of Basel

Major depressive disorder (MDD) is among the most prevalent psychiatric illnesses worldwide. MDD is associated with a high risk of insufficient physical activity and an increased risk for cardiovascular diseases. Theory-based, individually tailored, in-person and remote physical activity counseling has the potential to increase physical activity levels in various populations. We therefore examined the effect of such a physical activity counseling intervention on the physical activity behavior of in-patients with MDD. The study was designed as a multi-center, two-arm randomized controlled trial including initially insufficiently physically active adult in-patients with MDD from four clinics located in the German-speaking part of Switzerland. In total, 220 participants with a mean age of 41.0 ± 12.6 years (52% women) were recruited and randomly assigned to an intervention (n = 113) and a placebo control group (n = 107). Accelerometer-based moderate-to-vigorous physical activity (MVPA) was used as the primary outcome. When comparing the intervention with the control group, no significant difference in minutes spent in MVPA was observed over the 12-month intervention period (β = −0.01, 95% CI: −0.106 to 0.864). Higher baseline physical activity significantly predicted physical activity at post and follow-up. Our study shows that delivering an individually tailored, theory-based physical activity counseling intervention to in-patients with MDD is feasible. Whereas the study was well received and perceived as effective by the majority of the patients, the accelerometer-based MVPA assessments did not mirror this finding. Further efforts are warranted to identify ways to make physical activity counseling more efficacious in patients with MDD. Funding source: Swiss National Science Foundation (SNSF).

Stressful life events, habits, and physical activity in older adults

Peyton Greco, University of North Carolina at Greensboro; Brynn L. Hudgins, University of North Carolina at Greensboro; Yeongju Seo, University of North Carolina at Greensboro; Erin Reifsteck, University of North Carolina at Greensboro; Jacqueline P. Maher, University of North Carolina at Greensboro

Physical activity (PA) has many positive benefits for overall health and well-being. Certain life events are known to impact PA engagement and part of this change in behavior may be the result of life events disrupting or reinforcing PA habits (i.e., contextually cued impulses to engage in PA). Using cross-sectional data from part of a longitudinal study of older adults (N = 194), the current study assessed the potential relationship between stressful life events (SLE), PA habits, and PA. SLE were assessed using the Social Readjustment Rating Scale to capture SLE that occurred in the last six months. Using a data-driven approach, participants were divided into two groups using their mean score as a threshold, separating the lower stress group (0) from the higher stress group (1). Habit strength, serving as a latent variable, was assessed using four observed variables from the Self-Report Behavioral Automaticity Index. Participants wore an accelerometer for 14 days, and PA was operationalized as average daily steps. PA habit strength was specified as a mediator in the relationship between SLE and average daily step counts. Maximum likelihood estimation with bootstrapping procedure was performed in R to analyze the mediation model. Our final model demonstrated an acceptable fit to the data χ² = 15.48 (p < .05), CFI = .99, RMSEA = .08 (90% CI: .02 – .13), SRMR = .03. A full mediation model was identified as SLE did not directly affect PA (B = −.11, p > .05) and instead indirectly affected PA through PA habit strength (B = −.05, p < .05). Direct associations showed that SLE negatively affected habit strength (B = −.19, p = .01) while habit strength positively influenced PA (B = .25, p = .01). While there was no direct relationship between PA and SLE, there are theoretical implications that SLE disrupt habitual PA and indirectly impact PA behaviors. Interventions aiming to promote the maintenance of PA should consider the amount of stress a person is experiencing as that may influence the motivational processes underlying PA in older adults.

Accept and move on – the interplay between reinvestment and mindfulness

Patricia Grove, German Sport University Cologne; Lisa Musculus, German Sport University Cologne; Markus Raab, German Sport University Cologne; Laura Voigt, German Sport University Cologne

Athletes who tend to reinvestment consciously attempt to control their movements using their explicit knowledge or monitor their decision processes and ruminate on previously made decisions. Motor and decision reinvestment can result in performance decrements. Mindfulness, the non-judgmental-present-moment awareness, could help to counteract these decrements because automated processes could be enhanced by redirecting attention and fostering increased acceptance, consequently reducing the necessity for control. The current study aimed to theoretically specify and empirically test the relationship between movement- and decision-specific reinvestment and mindfulness with the long-term goal of developing a mindfulness-based intervention for athletes. We derived specific hypotheses for each mindfulness subscale: We hypothesized that mindful awareness (Hyp1) would be positively related to all reinvestment subscales, as all
involve monitoring of internal sensations and processes. Acceptance (Hyp2) and refocus (Hyp3) would be negatively correlated with reinvestment, because not accepting current performance levels and struggling to reallocate the attention on task-relevant aspects may lead to more control. Athletes \( N = 371, \mu_{\text{age}} = 27 \pm 9 \text{ years} \) completed the Movement- and Decision Specific Reinvestment Scale and the Mindfulness Inventory for Sport. In line with the hypothesis, awareness correlated positively with both subscales of MSRS \( r = .324, p < .001; r = .249, p < .001 \), but contrary to the hypotheses not with DSRS. Acceptance correlated negatively with both reinvestment subscales of each reinvestment form (MSRS: \( r = -.207, p < .001; r = -.253, p < .001 \); DSRS: \( r = -.292, p < .001; r = -.359, p < .001 \)), while refocus positively with movement self-consciousness \( r = .197, p < .001 \) and negatively with decision rumination \( r = -.23, p < .001 \). The results underscore the crucial role of mindfulness as a potential strategy to prevent reinvestment-related performance declines. We will propose an experimental design to test the potential effects of a mindfulness-based intervention for athletes.

**Relational efficacy beliefs relate to effort, resilience, and performance in ROTC cadets: Expanding sport efficacy research to military settings**

Christine Habeeb, East Carolina University; Ajala Baker, East Carolina University

Efficacy beliefs have been a popular research topic in sport psychology for over 40 years. Recent knowledge of self-efficacy (confidence in oneself) has extended to other-efficacy (confidence in a specific other), relation-inferred self-efficacy (RISE; estimation of others’ confidence in oneself), and collective efficacy (team confidence). The relational efficacy belief framework has revealed that confidence in teammates and coaches is relevant to desirable outcomes such as effort, resilience, and performance. It also serves as a potential framework for studying confidence in the military. Like college athletes, members of the Reserve Officers’ Training Corps (ROTC) regularly train for individual and team physical tasks alongside maintaining academic standards. However, only two studies to date have measured efficacy beliefs in cadets and these solely focus on self-efficacy. The purpose of these two studies was to examine the unique predictive contribution of self-efficacy, other-efficacy, RISE, and collective efficacy beliefs to effort, resilience, and performance in an ROTC setting. In Study 1, Air Force and Army \( n = 114 \) cadets completed surveys on self-efficacy, other-efficacy, RISE, resilience, and extra effort. Results, from two linear regressions, indicated that other-efficacy \( \beta = .58, p < .05 \) was a unique predictor of extra effort, while self-efficacy \( \beta = .27, p < .05 \) and RISE \( \beta = .51, p < .05 \) were unique predictors of resilience. In Study 2, Army cadets \( n = 67 \) completed surveys on self-efficacy, other-efficacy, and collective efficacy. Their performance on the Army Combat Fitness Test was also recorded. Results indicated that self-efficacy had a small, positive relationship \( \beta = .29 \) and collective efficacy had a small, negative relationship \( \beta = -.25 \) with performance, although neither was significant \( p = .08, .10 \). Results demonstrate cadets’ relational efficacy beliefs link to personal outcomes in similar ways observed in athlete samples. This study adds to an integrated relational efficacy framework for athletes and military personnel. Funding source: Undergraduate Research and Creative Activity award, East Carolina University.

**Perceptions of youth sport experiences among black adolescent boys: Insights from parents, coaches, and school administrators**

Amand L. Hardiman, Utah State University; Travis E. Dorsch, Utah State University; Rebecca Elwood, Utah State University; Brianna Haderlie, Utah State University

Young athletes influence and are influenced by a multitude of people and contexts. This includes social agents such as parents, coaches, and school administrators. Historically, analyzing these relationships singularly has resulted in the creation of empirical silos. However, theoretical arguments support studying the collective influence of significant others. This is especially true for Black adolescent boys, for whom research highlights the complementary importance of parents, coaches, and school administrators to their development. Yet, little is known about the relation or contextual processes that influence Black boys’ development in sport. Thus, the present study sought to understand key social agents’ perceptions of Black boys’ sporting experiences. Semi-structured interviews were conducted with parents \( n = 6 \), coaches \( n = 3 \), and school administrators \( n = 4 \) in the Midwest region of the United States. A reflexive inductive-deductive analysis was conducted utilizing tenets from the Integrated Model of the Youth Sport System (Dorsch et al., 2022). Results indicate that parents, coaches, and administrations acknowledge the sport environment as a positive learning environment while exposing athletes to negative determinants such as discrimination and stereotype threat. Meanwhile, participants highlighted the role culture played in influencing athletes’ self-esteem and identity development at the family, societal, and community levels. Lastly, parents, coaches, and school administrators cited the benefits of sport, such as access to education and a positive path toward upward mobility. Yet, participants recognized many Black boys “go all in” on sport as the pathway to success despite the slim odds of playing sport beyond high school. Overall, this study emphasizes the significance of comprehending holistic perspectives, which can enhance scholars’ and practitioners’ understanding of how people and contexts play a crucial role in influencing experiences for Black boy athletes and potentially shaping their developmental trajectories.

**Exploring social and physical contextual factors on adolescent’s physical activity: An ecological momentary assessment study**

Sheereen Harris, University of Waterloo; Jason Yang, University of South Carolina; Pallavi Dutta, Brock University; Matthew Kwan, Brock University

Temporal trends suggest physical activity (PA) behavior peaks during early adolescence and declines during the transition to emerging adulthood. Understanding factors related to PA during adolescence is critical to inform strategies to attenuate such declines. We explored the effects of social (i.e., alone vs. with others) and physical (i.e., home vs. not home) contextual factors on PA, between-subject variance and within-subject variance among adolescents using ecological momentary assessment (EMA). Participants \( N = 190 \) grade 11 students; 83 females) responded to up to four EMA surveys each day during the after-school period while simultaneously wearing an accelerometer. EMAs assessed current social and physical context. Total minutes of moderate-to-vigorous intensity PA (MVPA) in the 180-minutes following each EMA prompt was calculated. This study used a mixed-effects location scale model to estimate a subject’s mean (location) and variability (scale) using the program MIXWILD. In each model, between- and within-person effects were disaggregated. Results showed significant between-person (coef = -.203, \( p < .001 \)) and within-person (coef = -.107, \( p < .001 \)) effects of physical context on MVPA and a significant within-person effect of physical context on within-subject variance (coef = -.32, \( p = .01 \)). There was no effect of social context on MVPA, between- or within-subject variance, and no effect of physical context on between-subject variance. Results suggest MVPA is lower for students who on average spend more time at home compared to those who spend less time at home. MVPA is lower when a person is home relative to when they are away from home. Within-subject variance decreased by 27% when a person was at home, relative to when they were not at home suggesting students are more consistent with MVPA behavior at home. Overall, findings highlight the role of physical context on real-time MVPA behavior in adolescents. Future work should continue
investigating how contextual factors impact behavior to inform real-time interventions designed to promote PA in dynamic contexts. Funding source: SSHRC.

Teammate doping confrontation efficacy and athlete doping consideration
Tyler Harris, Adrian College; Alan Smith, Utah State University

Evidence supports the role of coach doping confrontation efficacy (DCE; Sullivan et al., 2015) as a deterrent to athletes’ doping cognitions (Boardley et al., 2019; Sullivan & Razavi, 2017), but little is known about teammate DCE. Because teammates are influential social agents in sport (Smith & Ullrich-French, 2020), it is important to consider how an athlete’s perception of their teammates’ DCE relates to their personal doping-related cognitions. The purpose of this study was to determine if perceived teammate DCE predicted athlete doping consideration, directly and indirectly via doping moral disengagement (MD) and doping self-regulatory efficacy (SRE). Reliable and valid assessments of the study constructs were completed by competitive athletes (N = 89, 63.6% female, 33.0% rugby, 60.5% national/international level). Teammate DCE showed statistically significant correlations with doping MD (r = -.214), doping SRE (r = .339), and doping consideration (r = -.215). Stepwise path modeling showed prediction of doping consideration to be in expected directions and statistically significant for teammate DCE (β = -.215, p < .05), doping MD (β = .365, p < .05), and doping SRE (β = -.281, p < .05). All effects remained significant except for teammate DCE (β = -.051, p = .621) when the full set of predictors was included in the final step, suggesting an indirect effect of perceived teammate DCE on doping consideration. Results show an athlete’s perception of their teammates’ ability to confront a doping athlete associates with less consideration of doping themselves, which may stem from reduced doping MD and increased doping SRE. Causal research designs are needed in the future to assess this possibility. This noted, the findings suggest that athletes can play an important role in doping prevention, deterring their teammates from the behavior by possessing confidence in their ability to confront those who dope. Future research efforts should further explore how athletes themselves, beyond efforts of regulatory bodies, can promote a clean sporting environment.

More than physical: Multifarious potential of physical activity from life-story interviews with LGBTQ+ adults that experience disability
Shannon S. C. Herrick, The University of British Columbia; Erica V. Bennett, The University of British Columbia; Andrea Bundon, The University of British Columbia

Health is commonly misrepresented as a monolith which reinforces a stark dichotomy between who is considered ‘healthy’ and who is not, privileging certain bodies and experiences within society. Disability communities have long struggled against restrictive definitions of health that have neglected and, in some cases, demonized their experiences, while LGBTQ+ experiences were historically pathologized. In a research program that explored how physical and mental health were conceptualized, navigated, and negotiated by LGBTQ+ adults that experience disability, physical activity (PA) was consistently discussed. Reflexive thematic analysis of PA-discussions from a series of 3 life-story interviews with 7 adults (aged 26–35; 21 interviews total) identifying as LGBTQ+ and as experiencing disability resulted in three themes: 1. Challenging limits of PA accessibility—which describes participants’ complicated relationships with PA and their processes of reconceptualization to detangle PA from prominent discourses of ableism and cisheterosexism (e.g., redefining PA as any bodily movement that brings joy and not engaging in popular PA modalities that exacerbate pain); 2. From ignoring to honouring—which encapsulates how participants were often taught to ignore their bodyminds when they were younger in order to perform able-bodied cisheterosexual and how, in adulthood, they were learning how to listen to and honor their bodyminds’ needs through PA exploration and engagement; 3. De/re-medicalization of PA—which reflects participants’ contrasting desires to simultaneously see mindful PA professions and interventions integrated into healthcare and for generic prescriptions of exercise from primary care physicians to cease (e.g., proselytizing of PA guidelines without considerations of capacity). These findings provide multi-faceted insight into the transformative potential of physical activity to be more than physical, as well as how PA practices currently (re)produce ableism, cisgendering, and interconnected systems of oppression. Funding: SSHRC. Funding source: Social Sciences and Humanities Research Council of Canada.

Relationships among adolescents’ weight status, VO2max, self-efficacy, and motivation for physical activity and healthy eating
Logan Hobbs, Michigan State University; Hesam Varpaee, Michigan State University; Lorraine B. Robbins, Michigan State University; Corinne T. Zimmerman, Michigan State University; Aisha Hilliard, Michigan State University

To reduce obesity-related health disparities, reaching economically disadvantaged and/or minority status adolescents with opportunities to increase physical activity (PA) and healthy eating (HE) skills is vital. The Girls/Guys Opt for Activities for Life (GOAL) Trial is a 16-week intervention designed to increase moderate-to-vigorous PA and HE among adolescents. Guided by self-determination theory and the information-motivation-behavioral skills model, GOAL focuses on enhancing self-efficacy (SE) and motivation (MO) to improve both behaviors. For this study, a secondary analysis of baseline data from the ongoing trial was conducted to investigate the relationships among adolescents’ weight status (underweight, healthy weight, overweight, obese), VO2max, self-efficacy (SE), and motivation (MO) for PA and HE. The dataset included biophysical (height, weight, VO2max) and intrapersonal (SE and MO) data from 524 adolescents (Mage = 12.68, SDage = 1.03) in underserved communities in Michigan. Height was measured with a Shorr board, weight was assessed with a Tanita scale, and VO2max was estimated with a PACER shuttle run. Participants responded to reliable and valid scales assessing SE and MO for both PA and HE. An ANOVA showed a significant inverse relationship between weight status and VO2max (p < .001), and significant relationships between weight status and both MO-PA (p = .037) and MO-HE (p = .024). A Games-Howell comparison revealed higher MO-PA responses from overweight participants compared to obese participants (p = .038), and higher MO-HE responses from overweight participants compared to both underweight (p = .021) and healthy weight (p = .047) participants. No significant weight-related group differences emerged in SE-PA or SE-HE. Based on these results, we conclude that interventions may be particularly needed for adolescents with higher weight status to increase their motivation to engage in PA and HE, and, in turn, reduce their risk for developing adverse chronic health conditions associated with unhealthy weight status. Funding source: The National Heart, Lung, And Blood Institute of the National Institutes of Health, Award Number R33HL144896.

Exploring cumulative effects of sport participation over time on mental health difficulties among US youth
Matt D. Hoffmann, California State University, Fullerton; Michelle D. Guerrero, Independent Researcher; Matthew Nguyen, California State University, Fullerton; Joel D. Barnes, Independent Researcher

We explored the cumulative effects of organized sport participation over time on mental health difficulties among US youth. Data were from the Adolescent Brain Cognitive Development study—a longitudinal study

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examin ing health in a broadly representative sample of US youth. Analyses were based on data from four waves, collected between 2016 and 2021 (wave 1: \( n = 8082, 9–11 \) years; wave 2: \( n = 7948, 9–12 \) years; wave 3: \( n = 8031, 10–14 \) years; wave 4: \( n = 7634, 11–14 \) years). Youth mental health difficulties were measured using the Child Behavior Checklist. Data were analyzed using negative binomial mixed-effects regression. Compared to not participating in team sports across any of the waves, participating in team sports was generally associated with fewer mental health difficulties in a dose-dependent manner. Participating in team sports across waves 2, 3, and 4 was associated with 9%, 14%, and 20% lower anxious/depressed scores, 12%, 15%, and 23% lower withdrawn/depressed scores, and 12%, 20%, and 26% lower thought problems scores, respectively. Participating in team sports across waves 3 and 4 was associated with 16% and 20% lower social problems scores and 20% and 16% lower attention problems scores, respectively. Conversely, participating in individual sports (compared to not participating in individual sports across any of the waves) was associated with greater mental health difficulties, but the pattern was inconsistent across waves. Participating in individual sports across waves 1 through 4 was associated with 9%, 23%, 14%, and 22% greater thought problems scores, respectively. Participating in individual sports across waves 1, 2, and 4 was associated with 9%, 12%, and 19% greater anxious/depressed scores, respectively. Participating in individual sports across waves 1 and 2 was associated with 11% and 23% greater withdrawn/depressed scores and 13% and 20% greater attention problems scores, respectively. The results align with previous research suggesting team and individual sport participation may have differential associations with youth mental health.

High school coaches who create caring, task-involving motivational climates on their teams found to promote athlete well-being and motivation

Candace M. Hogue, University of Minnesota

The achievement goal perspective theory (Newton et al., 2007; Nicholls, 1984, 1989) research has shown the motivational climate created by leaders in physical activity settings can help predict how participants will respond. Caring climates (CCs) and task-involving climates (TICs) are generally linked to more adaptive psychological responses in youth, while ego-involving climates (EICs) are more often linked to less adaptive responses (Fry & Hogue, 2018). What is less understood is the impact the motivational climate in high school sport teams has on athlete well-being and motivation to continue playing their sport. High school athletes completed a survey halfway through their season in order to examine the impact of the motivational climate on indicators of well-being and motivation.

For athletes on girls’ teams \( (n = 129) \) CCs predicted adaptive responses including greater sport enjoyment \( (\beta = .52) \), state coping appraisals \( (\beta = .23) \), motivation to continue playing their sport \( (\beta = .46) \), and whether the athletes felt their coaches care about them \( (\beta = .46) \), as well lower stress appraisals \( (\beta = -.45) \), depression \( (\beta = -.30) \), shame \( (\beta = -.35) \), and psychosocial stress while playing \( (\beta = -.47) \). Adaptive state responses were also predicted by TICs for athletes on the girls’ teams, as well as lower life stress \( (\beta = -.24) \). For athletes on the boys’ teams \( (n = 52) \), CCs negatively predicted shame \( (\beta = -.25) \) and psychosocial stress \( (\beta = -.47) \) and positively predicted motivation to continue playing \( (\beta = .28) \); TICs positively predicted state coping appraisals \( (\beta = .52) \); and EICs negatively predicted whether the athletes felt their coaches care about them \( (\beta = -.31) \). These results suggest coaches should create highly CCs and TICs to elicit adaptive motivational responses and foster greater well-being in youth. Of critical note, more than a third \( (36.5\%) \) of athletes on the boys’ teams and nearly a quarter \( (24\%) \) of athletes on the girls’ teams reported that their coach was one of the only adults who cares about them, underscoring the critical role coaches can play during adolescence.

Motivation states to move: A scoping review of studies focused on physical activity and exercise

Matt Howard, University of South Alabama; Susannah Williamson, Walter Reed Army Institute of Research; Amanda Divin, Texas A&M University – Commerce; Sanaz Nosrat, Teachers College, Columbia University; Cyrus Yadid, Georgia Institute of Technology; Paul McKee, Duke University; John Krantz, Hanover College; Jessica Barker, University of Minnesota, Twin Cities; Skylis AnneMarie, Teachers College, Columbia University; Miguel Blacutt, University of Notre Dame; Danielle Reynolds, Yale University Medical School; Riley Avila, Teachers College, Columbia University; Michael Exsernia, The Hartford Financial Services Group, Inc.; Garrett I. Ash, Yale University; Matthew Stults-Kolehmainen, Yale New Haven Hospital

Motivation ostensibly predicts physically active (PA) behaviors, such as exercise, but only recently has it been considered from the perspective of a psychological state. Investigations that do exist appear to be unconnected, and rarely are validated tools used to assess motivation states for PA. The purpose of this scoping review is to determine the research landscape surrounding motivation states to move/be physically active. A subset of articles \( (N = 74) \) focused on exercise and PA outcomes was examined from a larger scoping review protocol that followed PRISMA and JBI’s SUMARI guidelines. Most studies involved healthy individuals \( (54.1\%) \), but many were clinical-focused \( (28.4\%) \). Seven studies specifically focused on anorexia nervosa, 5 on exercise addiction/dependence, and 4 on musical groove (e.g., the ability of music to spur muscular movement). “Desire”, “want”, and “urge” were the most common descriptors of motivation states (in that order), but other descriptors were also used, such as “feel like”, “craving”, “need”, “impulse”, “restlessness”, and “drive for activity”. 56.8% of studies were interested in exercise, specifically, and 21.6% were interested in physical activity. 76.7% reported original data. The only validated scale specific to motivation states for physical activity was the CRAVE scale (Stults-Kolehmainen et al., 2021), but 20.5% of studies used a validated scale to measure some aspect of motivation states. Many other non-validated scales, mostly consisting of a single-item, were utilized. Only 19.7% described the state as being purely positive in valence. 18.9% of studies described exogenous sources of motivation (e.g., music, social factors). In this subset of literature, motivation states to move were mainly described as a “desire” to move, and not “urge”. The literature on motivation states to move and be active appears to still be in its infancy, yet some conceptual models appear to be in place (i.e., WANT Model). There is a great need for research that utilizes valid measures to assess the phenomena before any further review is warranted.

Movement-related behaviors and mental health in Latina women

Brynn Hudgings, University of North Carolina Greensboro; Peyton Greco, University of North Carolina Greensboro; Eugenia Camacho Fernandez, University of North Carolina Greensboro; Sandra Echeverria, University of North Carolina Greensboro; Jaclyn Maher, University of North Carolina Greensboro

Latinas engage in low levels of moderate-to-vigorous PA (MVPA) and have high rates of sedentary behavior (SB). Research in other populations suggests that these movement behaviors are independently associated with mental health. Most studies examining the relationship between movement behaviors and mental health among Latinas assess typical levels of behavior. This study used Ecological Momentary Assessment (EMA) methodology to examine how movement behaviors acutely predict subsequent affect in real world settings. Latinas \( (N = 67, M_{age} = 39 \) years) completed a 7-day protocol with three, randomly delivered, EMA prompts/day on their personal smartphone. Each prompt assessed positive and negative affect using an adjective-based approach. Participants wore an
accelerometer during waking hours to measure MVPA and SB. Accelerometer data in the 30 and 60 min before each prompt were used to operationalize MVPA and SB. Multilevel models included both MVPA and SB and controlled for age, income, and health status. Results indicate SB in the 30 min before the prompt negatively predicted positive affect at the between-person level ($B = -0.01, p < 0.05$) and positively predicted negative affect at the within-person level ($B = 0.01, p < 0.05$). On occasions when Latinas sat for more time than usual in the 30 min before the prompt, they reported lower positive affect at the prompt. Latinas who, on average, sat for more time in the 30 min before the prompt experienced greater negative affect at the prompt. In the 60 min before the prompt, MVPA positively predicted positive affect at the within-person level ($B = 0.02, p < 0.05$), suggesting that on occasions when Latinas engaged in more MVPA for more time than usual before the prompt, they reported more positive affect at the prompt. Findings indicate differential associations between specific movement behaviors and affect depending on the time interval considered. Further research is needed among Latinas to better understand how movement behaviors acutely impact aspects of mental health in the context of everyday life.

“It should be my responsibility”: The invisible and inspirational labour of women coach mentors
Carbon Hummell, Brock University; Jesse Porter, University of Toronto; Corliss Bean, Brock University

Gender-specific barriers can impact women’s abilities to advance as coaches, often resulting in what is called a “concrete ceiling” effect. To help women coaches overcome such barriers, mentorship has gained popularity for its ability to support both the personal and career advancement of aspiring women coaches. Much of the research on mentorship for women in coaching has been conducted through the lens of the mentee coaches with less attention given to the coach mentors regardless of their instrumental involvement in the mentorship process. As a result, limited research exists exploring the experiences and perspectives of women coach mentors. Furthermore, mentoring is commonly accepted as a duty of a coach despite mentorship being an emotionally labourious and time-consuming task that often goes underacknowledged or unpaid. Therefore, the purpose of this study was to explore the experiences of women coaches who volunteer as mentors and their underlying motivations to engage in mentorship. Using a qualitative design, semi-structured interviews were completed with 10 women coach mentors. A reflexive thematic analysis revealed three major themes: (a) an obligation paradox, (b) a resistance to (advocacy against) dominant hegemonic heteronormative structures in coaching, and (c) the altruistic and inspirational labour of women coaches’ mentorship. Theoretically, this research contributes to the sports literature as one of the few studies to explicitly explore women coach mentors’ experiences and motivations to mentor aspiring women coaches. It is also one of the first studies to highlight the undervalued labour component of mentorship in the coaching context. Practically, with an increased focus on the invisible labour many women coaches already experience, this study provides important implications for how the sports system can better support women coach mentors to improve their experiences and increase their participation and retention as mentors for the future. Funding source: Lyle Makosky Values and Ethics in Sport Fund.

Examining the relationship between alexithymia and symptoms of depression and anxiety among injured athletes
Kirsten Hutt, University of Toronto; Devin Bonk, University of Toronto; Katherine Tamminen, University of Toronto; Jeanne Watson, University of Toronto

Athletes may experience emotions such as sadness, fear, and loneliness after an injury (Putukian, 2016), and being able to appropriately regulate one’s emotions after injury is important for helping athletes through rehabilitation. Alexithymia—the inability to regulate and identify one’s emotions—may present an issue for athletes who suffer a sport injury (Bagby et al., 1994). Individuals high in alexithymia typically select less effective emotion regulation strategies and are more likely to have abnormal emotional responses to injury (Tatsumi, 2023). However, there is a lack of research examining the relationship between injury, alexithymia, and mental health outcomes among athletes. Therefore, the purpose was to (1) determine if alexithymia predicted injury status and (2) examine mental health outcomes such as depression and anxiety symptoms among injured athletes. Athletes ($N = 272, 61\%$ female) completed online surveys of depression and anxiety symptoms, alexithymia, and injury status. Results of a $2 \times 2$ ANOVA suggest a main effect of gender ($F[1, 268] = 5.43, p = 0.02, \eta^2 = 0.02$), but not for injury status, nor their interaction, for scores of alexithymia. Two separate linear models were conducted predicting depression and anxiety scores, respectively, from alexithymia scores in a subset of injured athletes ($n = 42$). The overall regressions for depression ($F[2, 39] = 6.68, p < 0.05, R^2 = 0.26$) and anxiety ($F[2, 39] = 4.57, p = 0.02, R^2 = 0.19$) were statistically significant. Higher levels of alexithymia were significantly positively associated with depression ($b = 0.44, p < 0.01$) and anxiety ($b = 0.41, p = 0.01$), and remained significant when controlling for gender. While alexithymia was not associated with injury status, those injured athletes who had higher scores for alexithymia reported greater depression and anxiety symptoms. These analyses are an important first step addressing an existing gap in the literature, demonstrating the need to continue investigating experiences of injured athletes who score high on alexithymia to improve outcomes.

Identity disruption among performers during the covid-19 pandemic
Kirsten Hutt, University of Toronto; Rachel Dunn, University of Toronto; Katherine Tamminen, University of Toronto; Darryl Edwards, University of Toronto; Bina John, University of Toronto

Societal changes due to the COVID-19 pandemic presented considerable impacts on those within performance-based careers. Isolation from social groups, career transitions, and cancellation of events deprived many young adults of personal and social experiences that are salient to the development of their identities as performers (Erikson et al., 2020). Young adulthood represents a time to establish stability in one’s identity. The pianists reported more on their identities as instrumental performers compared to vocalists, discussing their uncertainties about career prospects and ways to perform, and (3) how performers coped during the pandemic. Twenty performers (7 athletes, 7 vocalists, 6 pianists) completed an online survey and an individual semi-structured interview at three timepoints. Interviews asked about stressors, coping strategies, and performers’ overall well-being at each time point. Analyses demonstrated that there were similarities in the stressors and coping strategies across performers; however, vocalists and pianists reflected more on their identities as musicians. For the pianists and vocalists, the lack of opportunities to perform further perpetuated a questioning of one’s identity. The pianists and vocalists discussed their uncertainties about career prospects and worries over maintaining skill more than athletes did, suggesting that there was a constant worry over losing the ability to perform as a career. These results demonstrate that for musicians and vocalists in this study,
the COVID-19 pandemic posed a more salient disruption to identity than it did for athletes.

A scoping review of physical education interventions for youth with intellectual and developmental disabilities: A narrative synthesis

Thi Huynh, University of Toronto; Kavini Rabel, University of Waterloo; Kelly Arbour-Nicitopoulos, University of Toronto

Youth with intellectual and developmental disabilities (IDD) participate in less physical activity (PA) than their same-aged peers without disabilities. School-based programs, such as physical education (PE) courses, offer a valuable opportunity for youth with IDD to participate in PA. Educational professionals face challenges in planning and implementing school-based PA interventions that can effectively promote PA in youth with IDD. This scoping review aimed to describe and summarize the available evidence on the structure, outcomes, and evidenced-based strategies of school-based PA interventions for youth with IDD. Searches across six databases were conducted from 1975 (the release of the Education for All Act) to the date of our search. Of the initial 601 articles identified, four met the inclusion criteria, involving 71 youth with IDD. Three interventions occurred during school hours and the majority of programs were run by a PE teacher (n = 3) with one being run by an experienced instructor. Two programs were integrated within a PE class and the other two were outside of PE course hours. Study outcomes included enjoyment, perceived exertion, and light PA (n = 1), calorie use and performance proficiency (n = 1), inclusion (n = 1), and balance (n = 1). Large-sized improvements were reported for light PA, perceived exertion, enjoyment, and inclusion; small improvements were reported for balance, and mixed results in calorie expenditure. Commonly used intervention strategies related to having an experienced instructor, training for program participants, availability of support staff, provision of peer support, and co-designed intervention plans. More unique intervention strategies included meaningful roles for participants and team celebrations to increase social cohesion. Results demonstrate the need for further testing of school-based PA interventions for youth with IDD to identify key behaviour change strategies that educational professionals can implement when instructing youth with IDD. Funding source: Special Olympics Canada Research Grant.

The negative effect of stress on physical activity is reduced for adults who have stronger habit and identity: A repeated-measures investigation

Emily Jakob, Purdue University; Steve Amireault, Purdue University; Sharon Christ, Purdue University

Behavioral maintenance frameworks posit that stress will derail people’s effort to maintain physical activity (PA), unless they have strong PA habit or PA identity. However, whether habit or identity interact with stress in predicting PA remains largely unknown. The aim of this study was to determine whether habit and identity moderate the negative impact of stress on PA maintenance among midlife and older adults. We recruited 128 volunteers aged ≥55 years (Mage = 65.79 years), without severe cognitive impairment, who reported being physically active ≥3 days/week using ResearchMatch. They completed 12 online questionnaires over 12 weeks. Stress and PA were measured weekly. We used the Short Stress Overload Scale to measure two components of stress: Event load (“I feel things kept piling up”; α/ω = .94/.94) and perceived vulnerability (“I feel inadequate”; α/ω = .92/.92). We used the mean of a 1-item PA frequency score and the Physical Activity Scale for Elderly leisure score as the PA outcome. We measured habit (Self-Report PA Automaticity Index; α/ω = .86/.87) and identity (Exercise Identity Scale, adapted for used in the context of PA; α/ω = .86/.86) every four weeks. We estimated the linear trajectories in a SEM model where the PA intercepts (starting levels) and slopes (rate of change) were outcomes of the stress trajectory components, controlling for age, education, race, and sex. The negative effect of increasing event load on PA changes was diminished for people with a stronger PA identity (b = .518, p = .072). Further, perceived vulnerability starting levels interacted with habit on both PA starting levels (b = −.78, p < .001) and PA changes (b = .09, p = .071) and with identity on the PA starting levels (b = −.42, p < .001) and PA changes (b = .041, p = .017). That is, the negative effect of perceived vulnerability starting levels on the PA starting levels and PA changes were diminished among people with stronger PA habit and PA identity. Attempts at replication are needed to assess the reliability of the reported moderation evidence.

Foundational considerations regarding the conceptualization and operationalization of performance in sport psychology research: A scoping review

Karissa Johnson, University of Saskatchewan; Philipp Roethlin, Swiss Federal Institute of Sport Magglingen; Lee Schafer, University of Saskatchewan; Leah Ferguson, University of Saskatchewan

In competitive sport, women athletes endure intense training, often with the intent of producing strong athletic performances. Despite a heavy emphasis on “optimal” performance, there is little discussion regarding what “performance” is in sport psychology research. Therefore, the purpose of this scoping review was to generate foundational considerations regarding the conceptualization and operationalization of performance in sport psychology research, and to offer recommendations for future research on performance. After searching two electronic databases for relevant terms (e.g., sport, psychology, performance), a total of 850 articles were identified. After removing duplicates and screening titles and abstracts, 77 full articles were reviewed. Studies were excluded if the sample was not competitive (n = 4) women/female athletes (n = 49) within the predetermined age range (ages 16–35 years; n = 4), if it was a review article (n = 1), or the article did not contain adequate information to determine if it was relevant (e.g., did not specify gender/sex; n = 14). A total of 11 articles were included in the final review. Two prevalent trends were found across the articles, which were (1) large gaps between vague conceptualizations and final operationalization of performance, and (2) performance being measured as a quantifiable variable. In other words, researchers generally fail to connect their measurement of performance to performance as a broader construct. In addition, research tends to measure performance as a number (e.g., time, TOPS), overlooking athlete performance perceptions. Recommendations for future researchers include (1) generating a foundational conceptualization of performance, (2) exploring performance from a qualitative, mixed method, or interdisciplinary perspective, and (3) explicitly describing performance and making clear connections to research methodology. In conclusion, performance is a nebulous concept that would benefit from further critical analysis, due to its emphasis in sport psychology literature.

How does sport impact an athlete’s psycho-social development? A systematic and scoping review to examine what we know so far

Kathryn Johnston, University of Toronto; Hannah S. Rabinovitch, York University; Joseph Baker, University of Toronto

Sport has been widely recognized for its impact on development – in both positive and negative ways. Much of the research to date focuses on the physical and physiological factors related to sport participation, but less is known about the relationship between sport participation and psycho-social development. The present reviews aim to identify, summarize, and
An exploration of junior national team athletes’ experiences of the menstrual cycle: “It’s like a double whammy of everything!”

Helene Jørgensen, University of Alberta; Margie H. Davenport, University of Alberta; Nicholas L. Holt, University of Calgary; Tara-Leigh F. McHugh, University of Alberta

Women athletes’ experiences relating to their menstrual cycle can serve as a barrier to their sport participation (Laske et al., 2022). For instance, women athletes have reported that the menstrual cycle can have negative effects on their performance and well-being (Caballero & Lafaurie, 2020). The purposes of this study were: (a) to describe athletes’ experiences of their menstrual cycle while training and competing, and (b) to describe menstrual cycle-related factors that should be considered in the development of sport policy and practice to support women athletes. A qualitative description design (Sandeforski, 2000, 2010) was used to guide this study. Ten junior national team athletes (ages 17–21) from an Olympic winter sport were purposefully selected to participate in one-on-one interviews that were audio-recorded and transcribed verbatim. The transcripts were analyzed using Elo and Kyngäs’ (2008) three-phase approach (i.e., preparing, organizing, and reporting). The findings of this study are represented by one overarching descriptive theme (i.e., perceived adverse effect of symptoms on athletes’ performance in training and competition). This overarching theme was informed by three themes: (a) caught by surprise by its timing and impact; (b) confidence and motivational drop in training; and (c) racing through discomfort and pain. Participants provided feedback on actionable items (providing free products, fair point system, and mandatory education) that could be considered in sport policy and practice. This study focused on women athletes’ experiences of their menstrual cycle in their pursuit of performing at the highest international competition level. Although there is mixed evidence on the impact of menstruation on sport performance (cf. Coleno-Semple et al., 2023), the study shed light on how women athletes’ perceive different symptoms, particularly highlighting the mental side-effects (i.e., confidence, motivation) as limiting them in their sport, which may identify priorities for future research. Funding source: Social Sciences and Humanities Research Council (SSHRC); International Biathlon Union Research Grant Programme 2023–24.

Yoda was wrong… body size does matter: Contrast effects emerge when rating body types of individuals presented with peers

April Karlinsky, California State University – San Bernardino; Shi Lu Wang, University of Toronto; Chris Pileici, University of Toronto; Madison Van, University of Toronto; Catherine Sabiston, University of Toronto; Timothy Welsh, University of Toronto

Individuals are perceived as more attractive when they are in groups compared to when they are alone; a finding known as the “Cheerleader Effect”. It is unknown, however, whether a Cheerleader Effect emerges for perceptions of body size. The current study was designed to examine: (1) if perceptions of body size are influenced by whether an individual is presented alone or in a group; (2) if perceptions of body size are influenced by the differences in body size across groupmates; and (3) if these perceptions are shaped by factors related to body image. Participants (n = 51 women; M_{age} = 22.5 years) rated the perceived body size of 15 images of women models (3 models by 5 body sizes). Models were presented alone or in groups of three. On group trials, the two models on either side of the central model could have a similar body size or a body size that was thinner or heavier. When body sizes differed, the body sizes of the central model could differ by a small, medium, or a large amount from body size of the other two models. Participants rated the body size of the central model on a continuous scale from “very thin” to “very heavy”.

FREE COMMUNICATIONS: VERBAL AND POSTERS

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A mixed methods evaluation of the AHEAD personal development intervention using a multiple-baseline across behaviors single-case design

Helene Jørgensen, University of Alberta; Tara-Leigh F. McHugh, University of Alberta; Amber D. Mosewich, University of Alberta; Yanik Koster, BSP Business & Law School; Nicholas L. Holt, University of Calgary

Personal development can be conceptualized as a continual and individualized process whereby athletes strive to improve across life contexts (Jørgensen et al., 2023), which can help high-performance athletes manage transitions, performance issues, and personal challenges (Devaney et al., 2018). However, scholars have argued that more attention must be paid to personal development in high-performance sport environments (Hauser et al., 2022). The purpose of this study was to evaluate the effectiveness of a personal development intervention for high-performance athletes (ages 18–25), called AHEAD. Sixteen high-performance athletes (8 women, 8 men, M_{age} = 19.3 years, SD = 2.2) from a biathlon training centre participated in the AHEAD intervention. The intervention was delivered in-person over 10 weeks, involving three phases: baseline (2 weeks), intervention (6 weeks), and post-intervention (2 weeks). After an introductory session, the weekly intervention workshops focused on five behaviors: self-awareness, goal setting, reflection, perspective, and evaluation. A multiple-baseline across behaviors single-case study design (Kazdin, 2021), incorporating mixed methods, was used to evaluate the intervention and examine changes in personal development across the five behaviors. Changes were assessed during the week after each workshop and post-intervention. Consideration of the findings generated from the mixed methods data led to the suggestion that perspective was the most effective workshop (10 participants reported improvements in this behavior), followed by self-awareness and evaluation (9 participants improved), goal setting (8 participants improved), and reflection (6 participants improved). Results from post-intervention interviews indicated that participants had positive experiences of the AHEAD intervention. While certain workshops were effective for some participants, overall, the evaluation showed mixed effectiveness. More research is necessary to better understand the application and long-term benefits of learning about personal development strategies. Funding source: Mitacs Accelerate.
Analysis of the ratings did not reveal an overall Cheerleader Effect because there were no differences between the ratings for a central model when presented alone or alongside groupmates of a similar body size. A contrast effect emerged, however, in which the central model was rated as thinner when presented alongside groupmates of a heavier body size ($p < .05$), and as heavier when presented alongside groupmates of a thinner body size ($p < .05$). These effects became larger as the difference in body size between the central model and the groupmates increased ($p < .05$). Finally, the magnitude of these contrast effects was related to participants’ level of physical appearance social comparison. These findings indicate that perceptions of body size are influenced by factors such as the body size of the others in a group and the individual’s own propensity for social comparisons. Funding source: Social Sciences and Humanities Research Council and the Canada Research Chair Program.

Rethinking normative referent elicitation: A randomized experiment approach

Jeemin Kim, Michigan State University; Mark Eys, Wilfrid Laurier University; Jennifer Robertson-Wilson, Wilfrid Laurier University

Research grounded within the theory of planned behavior has consistently demonstrated that subjective norms (i.e., perceived social pressures) are a weak predictor of physical activity (PA) intentions. However, recent research has identified several methodological issues that may explain the null findings surrounding subjective norms. This study investigated whether subjective norms relate to PA differently depending on the method through which salient normative referents are elicited. Specifically, through a randomized cross-over experiment, this study compared Ajzen’s (2002) original method (i.e., measuring norms from “those who approve of PA”) and a revised method (i.e., measuring norms from “those who are influential”). A sample of university students ($N = 1008$) was randomly assigned to either the “original” condition or the “revised” condition and completed an online survey. Two weeks later, the participants ($n = 383$) were assigned to the reversed condition and completed the survey again. Data were analyzed to compare the two conditions in terms of the mean score of subjective norms and the indirect effect of subjective norms on PA through intentions. A mixed ANOVA demonstrated a significant time X condition interaction ($p < .001$), suggesting that the mean score of subjective norms was lower in the revised method ($M_{T1} = 5.16, SD = 1.15$; $M_{T2} = 5.40, SD = 1.21$) compared to the original method ($M_{T1} = 5.59, SD = 1.22$; $M_{T2} = 5.57, SD = 1.06$). A moderated mediation model indicated that the indirect effect of subjective norms at time 1 on PA behavior at time 2 through intention strength was moderated by conditions, such that the indirect effect was significant under the revised condition, 95% Bootstrap CIs [.05, .23], but not in the original condition, 95% Bootstrap CIs [−.02, .10], index of moderated mediation = .10, 95% Bootstrap CIs [.02, .20]. These results indicate that the way in which normative referents are elicited has a meaningful effect on the subjective norms-PA relationship, and that the revised elicitation method should be used for future research.

Does seeing physically active others lead to being more active over time? Testing the causality between descriptive norms and physical activity

Jeemin Kim, Michigan State University

Research has consistently shown that positive descriptive social norms (DN) around physical activity (PA) (i.e., perceiving others who are active) are associated with greater PA engagement. Though some experimental evidence that supports the causal relationship between DN and PA exists, a lack of longitudinal designs in this body of literature represents an important gap that necessitates more research to examine whether DN can promote PA over time. The present study aimed to fill this gap by analyzing dynamic panel data that were collected longitudinally four times across two months from an international sample ($N_{T} = 288, N_{T2} = 242, N_{T3} = 217, N_{T4} = 195; M_{age} = 28.4$ years, $SD = 8.5$). Results from a dynamic panel model with fixed effects and bias-corrected bootstrap confidence intervals ($N = 10,000$) indicated that PA engagement (frequency and duration combined) statistically significantly caused future PA engagement from time 1 to time 2 ($b = .30, Bootstrap 95% CIs [.11, .67]$) and from time 3 to time 4 ($b = .30, Bootstrap 95% CIs [.05, .69]$), but not from time 2 to time 3 ($b = .24, Bootstrap 95% CIs [−.02, .62]$). Contrary to the hypothesis, DN did not cause future PA engagement (Time 1 to Time 2: $b = 11.88$, Bootstrap 95% CIs [−12.08, 50.08]; Time 2 to Time 3: $b = 26.72$, Bootstrap 95% CIs [−6.67, 85.88]; Time 3 to Time 4: $b = 35.65$, Bootstrap 95% CIs [−11.40, 101.96]). Given that the existing literature in this area has largely focused on PA frequency (without considering duration), a post-hoc analysis was conducted using only PA frequency as the outcome. Results indicated that DN caused greater PA frequency over time (Time 1 to Time 2: $b = .49$, Bootstrap 95% CIs [.02, .152]; Time 2 to Time 3: $b = .87$, Bootstrap 95% CIs [.21, 2.54]; Time 3 to Time 4: $b = 1.35$, Bootstrap 95% CIs [.45, 3.45]). The results suggest that DN may inform individuals how often one ought to be physically active, but not for how long one ought to be active during each bout of activity. Overall, DN offer a promising avenue through which PA frequency can be promoted.

The effectiveness of female coach mentorship programs

Mia Landry, Brock University; Phil Sullivan, Brock University

The Canadian Women and Sport organization (2022) has reported that women currently hold only 3% of head coaching roles for men’s teams, 18% of head coaching roles in mixed sport, and 26% of head coaching roles for women’s teams at the university sport level. Formal mentoring has become increasingly popular as a means of supporting female coaches in the sport domain and is now perceived to be a critical part of any coach’s development (Marshall et al, 2010). Hockey Canada established the Creating Coaches (CC) program so that female USPORT hockey athletes have the opportunity to be involved in coaching locally and receive developmental sessions and mentor-coach connections. Two coaches of the 2021 cohort of six participated in a semi-structured interview of the experiences in the CC program. This study was designed using a thematic analysis approach with two major themes emerging in the data consistent with both participants. The first theme was a network of coaches in the community. Participants felt they formed new connections with varying coach mentors that they can reach out to at any time. The second theme was overall preparation in moving forward in a career in coaching. Participants obtained coaching jobs post-program and feel they have the confidence in leading a team. However, the data produced a smaller amount of negative feedback pertaining to the effectiveness of some of the mentor coaches involved, and a lack of hockey-specific, technical, and tactical information within the developmental calls. The CC programs mentees were able to benefit from the program in pursuit of a sustainable career in coaching through the use of networking and overall preparation in leading a team. Moving forward, female coach mentorship programs such as CC, should provide more specific hockey information and adequate coach mentors for participants to get the most out of the program. Funding source: Brock University Graduate Funding.

“Have you tried yoga?” The quest for exercise strategies that actually work for women with ADHD

Heather K. Larson, University of Alberta; Nancy L. I. Spencer, University of Alberta; Wendy M. Rodgers, University of Northern British Columbia

Women are increasingly being diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD; Robison et al., 2008). While not everyone with
ADHD self-identifies as experiencing disability, living in a society designed for neurotypical people can be disabling. Many women with ADHD experience executive dysfunction, poor sleep quality, and mental health issues, all of which may be helped by exercise, but little research has examined their experiences with exercise adherence. Amid calls for more participatory research among and by people experiencing disability ( Spencer & Molnár, 2022), the first author, who has ADHD, initiated this study based on a common question asked by women with ADHD: “How do I exercise consistently?” This study involved analyzing social media posts within the ADHD Women community on Reddit to identify strategies that women with ADHD offer each other for increasing physical activity and improving exercise adherence. A keyword search for “exercise” yielded hundreds of discussion posts with lengthy comment threads. Qualitative content analysis of over 100 comments indicated there is no one-size-fits-all solution. ADHD involves different constellations of symptoms, so multiple strategies are required. While many of the themes will sound familiar—make it enjoyable, seek accountability, build it into your daily life—community participants offered various creative suggestions for implementation aligned with specific struggles and strengths associated with ADHD; for example, keeping exercise equipment in the living room next to the TV to counteract the “out of sight, out of mind” phenomenon. Another suggestion was to “trick yourself,” giving yourself permission to just put on your workout gear and then see if you feel like going on the treadmill, even for just 5 minutes. Another participant described hyper-focusing on weight training, learning enough to confidently design their own workouts. Together, our findings provide a relevant starting point for developing tailored exercise interventions for (and by) neurodivergent communities.

Trajectories of change: Social connections and physical activity among older adults during the COVID-19 pandemic

Niana Lavallée, University of Calgary; Meghan H. McDonough, University of Calgary; Katie E. Gunnell, Carleton University; Jennifer Hewson, University of Calgary; Sarah Kenny, University of Calgary; Chantelle Zimmer, University of Calgary

Few longitudinal studies have examined how change among different social connections are related to change in physical activity behaviour, particularly among older adults. Six waves of data collected between October 2021 and May 2022 (N = 890, Mage = 65 years, 75% women, 91% White, 62% retired) were analyzed to investigate how trajectories of social connections (injunctive norms, descriptive norms, social network, social participation, social connectedness, social support quality and quantity) may predict trajectories of change in physical activity (PA; moderate-to-vigorous [MVPA], light PA). It was hypothesized that greater initial values and faster increases in descriptive norms for PA, social networks, satisfaction with social participation, connectedness, quality and quantity of social support and lower initial values and slower increases in injunctive norms would be associated with greater initial values and faster increases in MVPA and light PA. Parallel process latent growth curve models all indicated good fit. Results demonstrated greater initial values among all social connections were positively associated with greater initial values of MVPA. Social participation predicted faster increases and slowing rates of decreases of MVPA. Social connectedness also predicted faster increases of MVPA. While no social variables predicted the rate of change of light PA, social support amount was positively associated with greater initial values of light PA. Findings suggest those who had greater social connectedness (e.g., feelings of belonging and meaningful interaction) and social participation (e.g., satisfaction with engagement in activities that facilitate interpersonal exchanges with others in the community) were also more likely to have faster increases or slowed decreases in MVPA during the study. Promoting social participation and social connectedness may be an effective intervention for helping increase MVPA over time among older adult populations, particularly during periods when social opportunities may be disrupted. Funding source: Brawn Family Foundation.

Does early success predict later success in figure skaters?

Michelle Lee, University of Toronto

Sport practitioners (coaches, policy makers, support staff, etc.) often use historical performance data when making decisions for athlete identification, selection, and development. Despite its use, researchers have found relatively little empirical evidence to support the relationship between early (Novice/Junior) and later (Senior) success. Interestingly, evidence to date on conversions from junior-to-senior performance tend to be over-represented by team sports and male participants. In an effort to help increase female and individual-sport representation in conversion research, the present study will use a historical prospective design to explore the relationship(s) between early (Novice/Junior) success and later (Senior) success in figure skating. Participants will include all singles skaters who entered the Novice competitive level from 2005 to 2009, in Ontario. Data will consist of all skaters’ competition results, from the entirety of their skating career. Other variables of interest include level of peak performance, career longevity, and sex differences. Using previous literature as our reference, we expect there will be a low correlation between early success as a Novice/Junior and later success as a Senior. From an applied perspective, this research may have direct, practical implications for key sport decision makers (i.e., coaches, practitioners, sport organizations) by either challenging current sport policy/practices or suggesting more research in female dominated, individual sports is necessary.

Exploring the impact of Olympic combat sports on mental health of young individuals with disabilities: A meta-review protocol with preliminary insights

Youngjun Lee, Michigan State University; Janet Hauck, Michigan State University; Laura Capranica, University of Rome “Foro Italico”; Caterina Pesce, University of Rome “Foro Italico”; Flavia Guidotti, University of Rome “Foro Italico”; Valentin Benzing, University of Bern; Simone Ciaccioni, University of Rome “Foro Italico”

Mental health is important for children and adolescents, particularly those with disabilities. Olympic combat sports may have the potential to mitigate the heightened risk of adverse mental health outcomes in this population. To outline the rationale, methodology, and preliminary results of this investigation on how participation in Olympic combat sports influences the mental health outcomes of young individuals with disabilities, a comprehensive search was conducted across academic databases, including the Cochrane Library, ERIC, PsycINFO, PubMed, Scopus, SPORTDiscus, and Web of Science. This study focused on randomized controlled trials (RCTs), and controlled trials (CTs). To assess the risk of bias of included studies, the Rob 2.0 and ROBINS-I tools were selected for RCTs and CTs, respectively. The review process was conducted using Covidence. Data not included in the meta-analysis were synthesized using the Synthesis without Meta-Analysis (SWiM) tool. Furthermore, the Consolidated Framework for Implementation Research (CFIR) provided a framework consisting of five broad domains: intervention characteristics, outer setting, inner setting, characteristics of individuals, and the process of implementation. Our review retrieved 12 studies involving karate (n = 5), judo (n = 3), karate and judo (n = 2), boxing (n = 1), and taekwondo (n = 1) delving into the role of Olympic combat sports as a rehabilitative tool. Our analysis indicates that Olympic combat sports, notably karate (p < .05) and judo (p < .001), were beneficial in enhancing social-emotional functioning in children with Autism Spectrum Disorder. Furthermore, karate and judo positively impacted aggression, and self-esteem in children with learning disabilities. The meta-analysis provides preliminary insights into the potential of Olympic combat sports to influence the mental health of young individuals with disabilities.
differences ($p < .01$). This study highlights the potential of Olympic combat sports in improving mental health for young individuals with disabilities, suggesting their value in therapeutic interventions.

### Explaining the age-moderation effects in the relation between immediate benefits and physical activity: A mediated moderation analysis

Kin-Kit Li, City University of Hong Kong; Wanying Zhao, City University of Hong Kong; Cyrus Lap Kwan Leung, The Chinese University of Hong Kong

Older adults can benefit much from participating in physical activity (PA). Ironically, they are also the least active age segment. Therefore, understanding the age differences in the PA determinants remains a priority. Older adults, who perceive future time as more limited, may find immediate benefits more motivating. Conversely, older adults are also more health conscious. As health outcomes are often distal, older adults may find immediate benefits less relevant. This study examined 1) whether age moderated the effects of immediate benefits on future PA and 2) whether future-time perspective (FTP) and health consciousness mediated the age moderation. Using a survey design, 241 older and 180 younger adults reported their perceived importance of immediate rewards of PA, FTP, and health consciousness at baseline, and reported their past 7-day PA after one week. A mediated moderation analysis with 10,000 bootstrapped samples was conducted using Mplus. The direct age moderation was significant ($\beta = -0.16$ [95% bias-corrected CI: -0.27, -0.05]), indicating that the relation between immediate benefits and PA was stronger among younger adults. The total mediated moderation was significant ($\beta = 0.05$ [0.01, 0.10]), indicating that FTP and health consciousness, together, mediated the age moderation. However, when considered separately, the mediated moderation of FTP was significant ($\beta = 0.04$ [0.02, 0.08]), while that of health consciousness was marginal ($\beta = 0.025$ [0.005, 0.059]). As expected, older adults perceived future time as more limited, and hence immediate benefits were more predictive of PA. Surprisingly, older adults were more health conscious which also made immediate benefits more predictive of PA, as compared with younger adults. Mediated moderation models are useful in explaining age moderation. The findings suggest that, while immediate health outcomes may be relevant to older adults, younger adults may find immediate benefits motivating for very different reasons that require further investigation. Funding source: Research Grants Council of the Hong Kong Special Administrative Region, China (Project no. CityU 11611020).

### The effects of time-based strategies on physical activity participation moderated by future time perspective in older adults

Kin-Kit Li, City University of Hong Kong; Chun Yiu Lam, City University of Hong Kong

Future-based strategies can promote physical activity (PA). Present-based strategies, however, have received little attention. Considering the evidence in temporal framing and construal level theory, matching the time-based strategies with one’s future-time perspective (FTP) should enhance promotion effects. As older adults perceive the future as more limited, this study examined whether present-based strategies were more effective than future-based strategies in promoting PA for older adults. This study examined whether individuals’ FTP moderated the effects of time-based strategies on PA participation. The participants were 189 older adults ($M_{age} = 69.36, SD = 5.09$; 72% women) recruited from a panel study on aging. They reported their demographic details and FTP and were randomly assigned to one of the three experimental conditions. In the future condition, they suggested long-term PA benefits and how they could resolve long-term goals competing with PA. In the present condition, they suggested immediate PA benefits and how they could overcome immediate PA barriers. In the control condition, they shared both long-term and immediate benefits of reading and how they could resolve competing goals or immediate barriers against reading. Then, they wore an accelerometer on their wrists to measure their PA levels objectively for seven days. In terms of minutes of moderate-to-vigorous PA, the participants in the present condition were more active than those in the control ($\beta = 0.17$, $p = .04$) but not than those in the future condition ($\beta = 0.07$, $p = .37$). A more expansive FTP strengthened the effects of future-based strategies compared with either present-based strategies ($\beta = 0.21$, $p = .02$) or control ($\beta = 0.18$, $p = .046$). Present-based strategies may be as effective as future-based strategies in promoting PA among older adults. In addition, the evidence provides further support for the concordance effects between dispositional and situational FTP. Tailoring messages based on individuals’ FTP may be beneficial for future interventions. Funding source: Research Grants Council of the Hong Kong Special Administrative Region, China (Project no. CityU 11611020).

### Imagery intervention on D1 women’s tennis team serving performance

Pin-Chen Lin, New Mexico State University; Phillip Post, New Mexico State University; Aiken Christopher, New Mexico State University

Prior research has shown that imagery can benefit individuals’ self-confidence, state anxiety, and motor performance (Aikawa et al., 2021). Although imagery interventions have improved novice and experienced tennis player’s performance when combined with physical training, results have been inconsistent in enhancing self-confidence and reducing state anxiety (Cherappurath et al., 2020; Guillot et al., 2012; Mamassis & Doganis, 2004). The purpose of the present study was to extend prior research by examining a theoretically based imagery intervention on six ($M = 19.38$ years) collegiate female D1 tennis players serving accuracy, state anxiety, and self-confidence. Due to the applied nature of the study, a single-subject multiple baseline design was used to evaluate the effects of the imagery intervention on serving performance. Players’ self-confidence and state anxiety were measured before the start and end of the study using the Competitive State Anxiety Inventory-2 (CSAI-2). After the completion of the study, each participant took part in an exit interview to determine the social validity of the imagery intervention. After completing the CASI-2 participants performed 16 serves twice a week until each player established a baseline. Each serve accuracy was recorded using procedures adopted by Guillot et al. (2013). After each participant’s performance baseline was established, they were given a customized imagery script to rehearse two times a week (10 to 15 minutes per session). Examination of the celeration line showed three out of six players improved their serving accuracy. The results of the CSAI-2 showed that all players showed improvements in self-confidence and state anxiety pre- to post-interventions which was also supported by their positive feedback on how the intervention benefitted their performance, self-confidence, and state anxiety in the interview. Our results extend prior imagery research by suggesting imagery interventions can benefit skilled tennis players’ motor performance and psychological variables associated with successful performance.

### Identifying conceptual attributes of physical activity maintenance among adults with physical disability: A configurative review

Tayah M. Liska, McGill University; M. Blair Evans, Western University; Kathleen A. Martin Ginis, University of British Columbia Okanagan; Jenna Gibbs, McGill University; Shane N. Sweet, McGill University

Evidence around physical activity (PA) maintenance remains limited due to the inconsistent conceptualization of the term maintenance. Also, there is limited understanding as to what supports PA maintenance specifically in a physical disability context. The purpose of this configurative review was to
Testing the moderating role of internalized weight bias in the association between weight perception and physical activity among adolescents over time

Kristen M. Lucibello, Brock University; Catherine M. Sabiston, University of Toronto; Scott T. Leatherdale, University of Waterloo; Karen A. Patte, Brock University

Body and weight-related factors have been identified as contributors to physical activity, which typically declines throughout adolescence. For example, perceiving oneself as overweight has been associated with lower physical activity. However, using weight perception measures in isolation may perpetuate weight-normative assumptions (i.e., heavier weight perceptions are ‘worse’) and does not inform on the attitudes or emotions related to the perception, which are likely important determinants of the impacts on physical activity. Internalized weight bias—applying negative societal attitudes and stereotypes about weight to oneself—is also associated with reduced physical activity, yet relevant studies have utilized cross-sectional methodologies and adult samples, despite adolescents’ vulnerability to internalization. Understanding whether internalized weight bias influences how weight perceptions relate to physical activity will provide a more nuanced understanding about what psychological aspects of weight contribute to physical activity. The present study examined the moderating role of internalized weight bias in the prospective association between weight perceptions and physical activity (resistance training, moderate-to-vigorous physical activity; MVPA) over one year. Canadian adolescents (N = 26,252, M_{\text{age}} = 15.3 ± 1.3, 51.0% girls) completed the COMPASS survey during the 2021–2022 (T1) and 2022–2023 (T2) school years. PROCESS (Model 1) tested the moderating role of internalized weight bias (T1) in the association between weight perception (T1) and physical activity (T2), after controlling for age, province, gender, and perceived financial comfort. A heavier weight perception was associated with lower MVPA (b = −4.82, p < .01) and resistance training (b = −3.30, p < .001), although significant moderating effects were noted, such that the relationships were only significant for adolescents who endorsed internalized weight bias. These findings suggest that internalizing weight bias may be an important target to promote physical activity among adolescents. Funding source: KML is supported by a SSHRC Postdoctoral Fellowship. COMPASS is supported by numerous CIHR grants, Health Canada, Ministère de la Santé et des Services sociaux, and the Direction régionale de santé publique du CIUSSS de la Capitale-Nationale.

Physical activity and mental health during COVID-19 in four African countries

Leapetswe Malete, Michigan State University; Chelsi Ricketts, Michigan State University; Dale Joachim, Sonde Health; Reginald Ocansey, University of Ghana; Rosemary C. Muomah, University of Nigeria; Joyce Ndabi, University of Dar es Salaam; Dawn Tladi, University of Botswana; JohnBosco C. Chukwuvujiri, University of Nigeria; Vida Korleki Nyawo-nota, University of Ghana; Clement Adamba, University of Ghana; Onphile Habona, University of Botswana; Sampson K. Nwonyi, Ebonyi State University; Doris A. Tay, University of Ghana; Samuel K. Donkor, University of Ghana; Oscar C. Nyanyofion, University of Ghana

Despite physical activity (PA) being associated with improved mental well-being during COVID-19, the pandemic has shown adverse effects on PA rates and mental health (MH). In African countries with ongoing public health challenges, the status of PA and MH during COVID-19 remains understudied. Understanding these dynamics is vital for informing public health efforts and resilience-building in these regions. Considering varied COVID-19 responses in Botswana, Ghana, Nigeria, and Tanzania as cases began to rise in the continent, this study examined the...
proportion of adults meeting World Health Organization (WHO) PA guidelines (≥ 150 mins. of moderate-to-vigorous intensity PA [MVPA] per week), as well as the associations between time spent in MVPA per week and symptoms of anxiety and depression. Using a cross-sectional design, 3126 adults (male = 51.5%; M_age = 27.05 years; SD = 8.91; Nigeria = 31.5%) completed measures of demographic variables, PA, and anxiety and depressive symptoms. Results from chi-square analysis indicated that significantly more Tanzanian adults met WHO PA guidelines (62.6%, p < .001) compared to adults from Botswana (42.6%), Ghana (39.2%), and Nigeria (47.8%). Controlling for age, sex, and total number of reported COVID-19 symptoms, results from country-specific regression models indicated that time spent in MVPA was not significantly associated with symptoms of anxiety or depression in the four countries. However, age, sex, and number of COVID-19 symptoms reported were significant in various country-specific models. These outcomes are plausible in light of publicly available information on pandemic responses; countries implementing stringent movement restrictions (Ghana) reported lower PA engagement compared to those with less restrictive measures (Tanzania). Future public health efforts may involve systematic approaches to promoting PA when enforcing strict movement guidelines. Though PA demonstrated less importance to MH in these regions, MH interventions should prioritize support for younger adults, females, and those manifesting COVID-19 symptoms. Funding source: National Research Foundation of South Africa.

Resistance training and body-related self-conscious emotions among women: An integrated theoretical perspective
Maryam Marashi, University of Toronto; Catherine M. Sabiston, University of Toronto

Physical activity is a promising avenue of intervention for improving women’s body image; however, resistance training (RT) as a distinct form of activity has been underexplored. Drawing from the Exercise and Self-Esteem Model, the Process Model of Self-Conscious Emotions, and the Embodiment Model of Positive Body Image, this study examined the relationships among women’s RT behavior, positive body image (functionality appreciation and body appreciation), physical self-perceptions (perceptions of physical strength and confidence in physical ability), and body-related self-conscious emotions (appearance- and fitness-related shame, guilt, envy, embarrassment, authentic and hubristic pride). A total of 400 women (M_age = 25.6 ± 5.3 years) completed an online survey via Prolific. Two path models (one for fitness-related emotions and one for appearance-related emotions) employing maximum likelihood robust estimation were tested in MPlus to explore the direct effects of RT on women’s body-related self-conscious emotions, controlling for moderate-to-vigorous physical activity. The indirect effects of RT on body-related self-conscious emotions through positive body image and physical self-perceptions were also examined. R² values ranged from 35.3% to 58% for appearance-related emotions and 22.5% to 47.2% for fitness-related emotions. RT had no direct effects on appearance-related emotions; however, higher RT engagement was directly associated with lower fitness-related guilt and higher fitness-related authentic and hubristic pride. For both appearance and fitness-related emotions, higher RT engagement was indirectly associated with lower levels of shame, guilt, envy, and embarrassment and higher levels of authentic and hubristic pride through higher positive body image and/or physical self-perceptions. Beyond its physical benefits, RT may also enhance women’s positive body image, self-perceptions, and body-related self-conscious emotions. These findings have implications for the development of interventions aimed at promoting women’s body image through physical activity. Funding source: SSHRC.

Personality traits among Canadian high performance youth athletes
Alia Mazhar, University of Toronto; Gillian Ramsay, University of Toronto; Kathleen Johnston, University of Toronto; Magdalena Wojtowicz, York University; Nick Watte, Ontario Tech University; Joseph Baker, University of Toronto

Research on personality and sport performance has indicated that certain traits are related to athletic performance. For example, athletes competing at a higher level of competition tend to be more conscientious and less neurotic compared to their counterparts competing at lower levels (Allen et al., 2011). Researchers have devoted considerable attention to studying personality across sport and gender, the differences in personality between athletes and non-athletes, and personality profiles of successful athletes. However, few studies have examined these relationships among youth in high performance sport. Given the increased interest in early phases of athlete development, it is important to understand how personality traits operate in this demographic. The current exploratory study aims to patterns in the personality traits of youth participating in high performance sport in Canada. Between 2021–2024, youth athletes involved in high performance sport completed personality testing that produced a score on each of the Big Five personality traits (agreeableness, conscientiousness, extraversion, neuroticism, and openness to experience). In total, 249 individuals (M_age = 17.12 years ± 2.48, 104 male and 145 female) participated. Sports were separated into three categories: team sport, speed/strength sports, and skill/precision sports. Results indicate that males and females differ on agreeableness (t[247] = −3.22, p < .01), conscientiousness (t[247] = −2.70, p < .01), and neuroticism (t[247] = 4.57, p < .01). Moreover, speed and strength sports differ from skill and precision sports on neuroticism (F[2, 246] = 3.38, p < 0.05). Findings from this study suggest some differences between males and females regardless of sport, but relatively stable personality traits across different sport types. This work adds to the limited research base examining personality in the context of high-performance youth sport. Future work comparing this population to athletes competing at lower levels and non-athletes would be beneficial.

Transitioning out of elite sport: The experience of Integrated Support Team members
Paula Mazur, University of Alberta; Jimena Lopez Lamas, University of Alberta; Marni Wesser, University of Alberta; Brea McLauglin, University of Alberta; Taran Schubert, University of Alberta; Amber Mosewich, University of Alberta

Integrated Support Teams (IST) are composed of multidisciplinary professionals dedicated to enhancing the performance of elite sport teams (Davis, 2008), and commonly include psychologists, athletic trainers, strength and conditioning coaches, physiotherapists, and physicians. IST membership is often perceived as the pinnacle of one’s career, yet the opportunity also comes with substantial demands, drawbacks, and career-defining decisions (Keri et al., 2019). Therefore, understanding IST members’ experiences is warranted, especially the culmination of their careers in elite sport. Our study explored transitions out of an IST with an emphasis on barriers and facilitators to a successful transition. Guided by an interpretive description framework (Thorne, 2016), six former IST members (4 physicians, 2 physiotherapists; 4 women, 2 men) completed semi-structured interviews. All participants supported international-level teams and transitioned within the past 5 years. The six recursive phases for data analysis (Thorne, 2016) resulted in 4 pre-transition themes (managing time demands, feeling undervalued/underappreciated, navigating evolving role expectations, preparing a transition plan), 4 during-transition themes (service continuity, variation in communication, lack of support, seeking mentorship), and 3 post-transition themes (managing identity, reconciling a hope to remain in
sport, coping with post-transition emotions) and illustrated barriers and facilitators to successful transition. Key barriers included poor organizational oversight of ISTs, role instability, and members’ ego-involvement, while key facilitators were social support, involvement in the transition, and continuation of meaningful work. Overall, the lack of organizational responsibility resulted in inconsistent processes and inadequate support for IST members transitioning from elite sport. Clarifying organizational responsibility, formalizing transition processes, providing support resources, and implementing mentoring schemes appear crucial in supporting IST transitions and service provision.

Leisure time physical activity is associated with greater post-error accuracy during a cognitive control task
Emma McCabe, University of Illinois Urbana-Champaign; Shreya Verma, University of Illinois Urbana-Champaign; Tori Holthaus, University of Illinois Urbana-Champaign; Shelly Martell, University of Illinois Urbana-Champaign; Jeongwoon Kim, University of Illinois Urbana-Champaign; Christopher Kinder, University of Illinois Urbana-Champaign; Naiman Khan, University of Illinois Urbana-Champaign

The ability to detect and recover from execution errors is beneficial to task performance and goal-directed behavior. Research on the relationship between physical activity and error recovery is limited. The goal of these analyses was to examine the relationship between self-reported physical activity and performance on a selective attention task. Secondary data from N = 72 healthy adults (M_age = 47.7 ± 16.9, 67% Female) were used for cross-sectional analyses. Participants reported their typical 7-day physical activity frequency using the Godin Leisure-Time Physical Activity Questionnaire (GLTEQ). Participants completed the modified Erikson Flanker Task, in which they responded to the direction of a central target stimulus while ignoring flanking stimuli. In addition to mean accuracy and reaction time, accuracy and reaction time after an error (post-ER) were calculated. Multiple linear regressions controlling for age, sex, race, level of education, and annual household income were performed to examine the relationships between GLTEQ and Flanker performance. Total GLTEQ scores were unrelated to mean accuracy or reaction time across either congruent or incongruent trial types (p > .05). Participants’ total GLTEQ scores were positively related to post-ER accuracy for incongruent (b = 0.336, 95% CI = 0.045, 0.289, p = 0.008) but not congruent trials (b = 0.128, 95% CI = −0.113, 0.346, p = 0.315), nor post-ER reaction times (p > .05). These results suggest that participants who report engaging in more frequent leisure-time physical activity exhibit greater recovery immediately following an error on the Flanker Task in trials requiring greater up-regulation of cognitive control. Future intervention work should explore physical activity as a predictor of error recovery and factors that may influence the relationship between activity and post-error cognitive processes. Funding source: University of Illinois Urbana-Champaign and Tate and Lyle Ingredients.

Expert dancers have higher motivation states for physical activity but not sedentarism compared to controls when exposed to dancing stimuli
Paul McKee, Duke University; Nia Fogelman, Yale University; Matthew Stults-Kolehmainen, Yale New Haven Hospital; Sienna Strachan, University of Otago; Rebekah Blakemore, University of Otago

Motivation states to move and be sedentary likely vary in response to physically active stimuli, but there are no published data to demonstrate this. Furthermore, it is not known if this would be impacted by familiarity of the movement stimulus. The purpose of this study is to determine if dancing stimuli influence motivation states to move and be sedentary and if that varies by: a) familiarity of the respondent with the movement stimulus, and also b) the pleasantness of the stimulus. Participants were 16 expert dancers and 15 controls. Participants watched positive, negative, and neutral emotive ballet videos (5–6s). Each participant completed 96 trials in total (3 blocks of 32 trials). The CRAVE scale (Stults-Kolehmainen et al., 2021), which has two subscales (Move and Rest), was completed at four timepoints; prior to the first block (baseline) and following each block thereafter. Every block contained images of the same condition (i.e., all positive, all negative, or all neutral) and block order was pseudo-randomized and counterbalanced across participants. When analyzing Model 1 (without baseline data), main effects of group (i.e., dancer or not) and condition (i.e., positive, negative, and neutral) emerged (p’s < .047). Expert dancers had a higher desire to move than controls across conditions (p < .025), and the positive condition was significantly lower for Move relative to the neutral condition across both dance groups (p < .015). Including baseline in the model (Model 2) yielded only the same significant main effect of group (p < .018). A change score to examine differences from baseline (Model 3) yielded the same significant main effect of condition (p = .12; Models 4–6). Dancers had greater motivation states to move than controls across all conditions, and the difference was over 1 SD. Why neutral dancing visual stimuli trended higher for Move motivation, particularly compared to positive emotive stimuli, is not clear.

Comparing mental performance and mental health support role titles in the NHL, NBA, and MLB
Bryan McLaughlin, Ontario Tech University; Magdalena Wojtowicz, York University; Ashwin Patel, Humber College; Nick Wattie, Ontario Tech University

Navigating the lexicon of psychological terms is an ongoing challenge in sport science and sport psychology (Bringmann et al. 2022; Dohme et al., 2019; Johnston et al., 2023). Although psychological support for athletes has received greater attention (i.e., mental health and mental performance), ‘language games’ may be a barrier to navigating appropriate athlete development and performance supports. The purpose of this study was to explore the different mental health and mental performance roles in the National Hockey League (NHL), National Basketball Association (NBA), and Major League Baseball (MLB). We used quantitative text analyses to develop a document feature matrix of n-grams to identify job titles for each professional organization from their publicly available websites. There were a number of teams in each league that did not have any positions listed (MLB = 6, NHL = 19, NBA = 16). Overall, 99 unique titles were observed, and quantitative text analyses was used to create a document feature matrix of 6 unigrams (i.e., mental health, mental performance, mental well*, mental skills, and organization performance) for analyses. Within MLB and NHL, titles with the ‘mental performance’ n-gram were the most frequently observed (MLB: \( \chi^2 [8] = 47.4, p < .001 \); NHL: \( \chi^2 [5] = 9.6, p = .09 \)). Within the NBA, titles with the ‘psychologist’ n-gram were the most frequently observed (NBA: \( \chi^2 [7] = 15.9, p < .05 \)). While there are limitations to the accuracy and generalizability of these findings, there appears to be considerable variability in mental performance and health titles within and between leagues. Not all supports are equivalent given differences in educational background, certification(s), and/or scope of practice. As such, there may be a need to build awareness of the services provided to organizations and the scope of practice of each practitioner(s), to inform decision-making when it comes to mental health and performance supports.
Understanding how Ontario travel coaches maintained their coach-athlete relationships during the COVID-19 pandemic

Keith McShan, Missouri State University; E. Whitney G. Moore, East Carolina University

The coach-athlete relationship has been associated with increased sports satisfaction and the teaching of life skills. However, in March 2020, sports organizations in Ontario, Canada, had their coach-athlete relationships altered due to COVID-19 pandemic restrictions. Coaches had to adhere to vaccination requirements, limited facility space, and limited practice and competition schedules. Due to these circumstances, coaches were not able to have traditional coach-athlete relationships. Therefore, this transdisciplinary phenomenological study explored how Ontario coaches maintained coach-athlete relationships during the COVID-19 pandemic. Participants were 14 (8 male) travel sport coaches of adolescent athletes. Coaches came from team sports (e.g., volleyball) and individual sports (e.g., diving). Coaches who coached prior to and during the COVID-19 pandemic were interviewed using a semi-structured interview protocol. Interviews lasted 60–90 minutes and were completed on Zoom. The interview protocol was based on Jowett and colleagues’ 3C model of the coach-athlete relationship and the strategies coaches used during COVID to facilitate quality coach-athlete relationships. Results highlight two main themes of creating a positive psychosocial climate and facilitators. There were 14 subthemes for positive psychosocial climate (e.g., creating task-involving and caring climates). The second theme of facilitator had one subtheme of technology (e.g., the use of virtual training sessions). Coaches reported that their approach changed due to a lack of knowledge of when sports competition would resume and the pressure the COVID-19 pandemic placed on athletes. Specifically, coaches reported focusing more on individualized and fun approaches. Transitioning out of the COVID-19 pandemic, results from this research highlight the need to train coaches in aspects of relationship building. Giving coaches resources to move past the X’s and O’s of coaching and transitioning into a more relational coaching style may help adolescent athletes have sustained and enjoyable sport experiences. Funding source: Wayne State University.

Designing sport and physical activity interventions for children and adolescents with ADHD

Jennifer Meggs, Heriot-Watt University

Attention deficit Hyperactivity Disorder (ADHD) is a complex neurodevelopmental condition that begins in childhood and often persists into adulthood. Individuals with ADHD present with various cognitive, emotional and social challenges including reduced working memory, response inhibition challenges, attentional difficulties and the quality of their social relationships. These challenges can undermine achievement in various contexts including academic, vocational and relational contexts. Research has suggested that sport and exercise is a safe adjunctive therapy alternative to medical treatment, and there is an increasing number of studies that provide evidence for this claim. However, the quality and strength of conclusions from this body of research has been undermined by a lack of methodological quality and clarity in these studies. One criticism has been the lack of an evidence based, transparent and consistent approach to the design of physical activity and sport interventions and selection of outcome measures. Therefore, we present a theoretical framework and underpinning evidence to support researchers and practitioners to systematically design sport and exercise interventions. The framework highlights the theoretical underpinnings and practical feasibility considerations that are important when designing sport and exercise interventions for children and adolescents with ADHD. Future research may wish to apply and evaluate the utility of this framework and research and practice and make recommendations for further refinement.

Home court advantage during the pandemic

Sarah Mitchell, Texas A&M University-Commerce; Dean Culpepper, Texas A&M University-Commerce; Dempsey Horton, Texas A&M University-Commerce

The COVID-19 pandemic brought about substantial changes in the world of sports, leading researchers to question the effects of these modifications on the home advantage. For many teams, this meant playing in empty or near-empty stadiums. Some teams even had to complete their seasons without any home games due to city restrictions or by participating in a “bubble” environment (ESPN Internet Ventures, 2021). Various safety measures were put in place, fundamentally altering the game’s ambiance and the athletes’ experience. Research examining how these changes have impacted the home court advantage in men’s and women’s collegiate basketball has not yet been conducted. This study aimed to explore how the consequences of COVID-19 have modified the influence of the home court advantage and to scrutinize the role of each determinant in men’s and women’s collegiate basketball. A logistic regression was run to determine the impact that home and away had on wins and losses over the prior three seasons. A game at home was significant (p<.0001), B=.956, R²=.072. Equation predicted Win/Loss = .647 + 2.6(H/A). Pythagorean Expectation Results for specific women’s and men’s teams. The results of this study show that there is a significant home court advantage for the teams of the Lonestar Conference. However, Covid-19 did not affect the home court advantage in any significant way. Additionally, there was no gender effect for the home court advantage regarding wins and losses. Determinants such as the crowd size and travel distance did not play a significant role in the winning percentage. While it is clear that there is a noticeable relationship between the winning percentage and the location of the game (home/away), it is still unclear what factors are determining this home advantage. Further research can provide more insight into what specific factors alter the home advantage significantly.

Exploring physical activity motivators and barriers: A comparison of university students and faculty/staff

Irene Muir, Pennsylvania State University Altoona; Eemonie Moore, Pennsylvania State University Altoona; Nicole Gilbertson, Lebanon Valley College

Previous research suggests parallels in motivators and barriers to physical activity (PA) among university students and faculty/staff (e.g., Ebben & Brudzynski, 2008; Whipple et al., 2008). However, no study has yet to evaluate this. Therefore, the current study compared PA barriers and motivators in university students and faculty/staff at the Pennsylvania State University. Ninety-seven students and 69 faculty/staff completed an online survey package via Qualtrics. Demographics, PA levels, and recreational use on and off campus were collected. Additionally, external and internal barriers to PA were assessed using the Barriers to Being Active (BBA) Questionnaire (CDC, 1999), while motivators were assessed using the Motivations for Physical Activities Measure Revised (MPAM-R; Ryan et al., 1997). Additionally, the Behavioral Regulation in Exercise Questionnaire-3 (BREQ-3; Markland & Tobin, 2004) measured levels of self-determined motivation. Mann-Whitney U tests were computed to detect differences between the two groups for all variables. Consequently, faculty/staff had a significantly higher BMI (28.8 ± 0.9) than students (25.5 ± 0.6, p<.001), while students used campus facilities significantly more than faculty (p=.04). No differences were found regarding the number of minutes spent sitting (students = 919 ± 60; faculty/staff = 1013.4 ± 75.9), walking (students = 33.3 ± 3.0; faculty/staff= 30.7 ± 2.7) and engaging in moderate (students=17.3 ± 1.7; faculty=16.4 ± 1.8) and vigorous (students = 16.6 ± 1.8, faculty=15.2 ± 2.3) intensity PA per week.
Compared to students, faculty/staff reported social influences to be a significantly greater barrier ($p = .02$). No differences in motivators were found between the groups, with both students (9.1 ± 0.8) and faculty/staff (10.1 ± 0.8) reporting moderate self-determined motivation. Taken together, the findings can guide program implementation and enhance recreational facilities to increase PA in a university setting.

**Exercise identity as a mediator of the relationship between physical activity and depressive symptoms**

**Ross Murray, University of Toronto; Catherine Sabiston, University of Toronto; Isabelle Doré, University of Montreal; Jennifer O’Loughlin, University of Montreal**

Physical activity is a well-established strategy to support mental health/ prevent or reduce mental disorder symptoms. One mechanism that may explain this relationship is the identity individuals often develop when engaged in physical activity and exercise. Individuals who engage in more physical activity often internalize this behaviour into their identity, which in turn supports mental health. This study aimed to examine whether higher physical activity levels relate to developing an exercise identity, and whether this process relates to levels of depressive symptoms. Data were drawn from Cycles 22 ($M_{age} = 24$ years) and 23 ($M_{age} = 30$ years) of the NDIT longitudinal study (Canada). Participants completed self-report measures of moderate-to-vigorous physical activity and depressive symptoms at Cycle 22 and measures of exercise identity and depressive symptoms at Cycle 23. Complete data were available for 696 individuals. Mediation analysis controlling for sex and depressive symptoms at age 24 indicated that the association between MVPA at age 24 and depressive symptoms at age 30 was fully mediated via exercise identity at age 30. The bootstrapped unstandardized indirect effect was −0.001 (95%CI = −0.002, .000), $p = .026$. The total effect was −0.001 (95%CI = −0.01466, .000) $p = 0.022$. These results indicate that a relationship between MVPA and depressive symptoms over time may be mediated by exercise identity. This research supports social identity theory, indicating that the meaning individuals gain from developing identity processes is supportive of mental health. As such, strategies to facilitate an exercise identity (e.g., identity leadership in group settings) should be employed to support mental health/ prevent or reduce mental disorder symptoms in those who are physically active.

**A sports psychologist’s perspective of the mental preparation required when climbing at altitude**

**Adele Muscat, University of Malta**

The adventure tourism industry has been growing fast and many individuals seem to be seeking lifetime and meaningful experiences by challenging themselves in outdoor adventure activities across the globe. However, for such experiences to be positive, individuals need to be adequately prepared for the challenges they will face. Literature on the use of psychological skills for adventure travel and preparation is very limited. Thus, this study sought to examine autoethnographic data from an adventure tourism mountaineering experience the author participated in on Mount Kilimanjaro, in Tanzania, East Africa. It attempts to give a thorough understanding of outdoor adventure travel experiences from a sports psychologist’s perspective. Data was analyzed within a sports psychological framework. The importance of understanding what would make the adventure traveler feel better prepared and the challenging adventure experience more enjoyable was identified. This study brings out the need for adapting psychological skills training through specific skills used in elite sports such as visualization, self-talk, and relaxation techniques to the adventure setting. The need to work on team aspects and mental toughness before such an expedition is emphasized.

Life lessons, including the development of resilience, experienced through such adventure travel are also implicated.

**Factor analysis with ordered categorical indicators and measurement of self-efficacy in physical activity: A substantive-methodological synergy**

**Nicholas D. Myers, Michigan State University; Christine E. Pacewicz, Miami University; Christopher R. Hill, California State University, San Bernardino; Haeyong Chun, Michigan State University**

Factor analysis of ordered categorical indicators (e.g., responses to a Likert scale) in sport and exercise psychology is pervasive – though a suboptimal methodological approach often is used to analyze these data. Specifically, some assumptions made regarding the indicators within methods commonly used may increase analytic errors. Methods that relax these assumptions have been available for decades, but uptake has been slow. Therefore, the methodological focus of this study was factor analysis of ordered categorical indicators. Self-efficacy has been one of the most important psychosocial constructs in physical activity research for decades. Unfortunately, sub-optimal practices in constructing self-efficacy scales in physical activity contexts are frequently observed and decrease validity for scores produced from these instruments. Guidelines for constructing self-efficacy scales have been available for decades, but adherence remains inconsistent. Therefore, the substantive focus of this study was measurement of self-efficacy in physical activity contexts. Rather than detail sub-optimal approaches in the measurement of self-efficacy in physical activity contexts, the authors present guidelines for constructing and validating self-efficacy scales in physical activity contexts. The synergy within this study was factor analysis of simulated ordered categorical responses to self-efficacy indicators. This purpose is important because it provides a didactic treatment of how to perform factor analysis of ordered categorical responses to self-efficacy indicators. Two datasets – one a fictitious array of population values, the other a simulated sample dataset ($N = 500$) generated via Monte Carlo methods – of responses to the leisure-related moderate intensity physical activity self-efficacy scale were analyzed using categorical variable methodology. Annotated files from Mplus and R are provided to increase uptake of these methods in sport and exercise psychology.

**The acute effect of resistance exercise and chronotype on memory consolidation in young and middle-aged adults**

**Mark Naguib, Purdue University; Nicholas Baumgartner, Purdue University; Shuh-Chun Kao, Purdue University**

Past research has shown the benefits of a single bout of acute aerobic exercise on memory; however, such memory-enhancing effects in response to resistance exercise (RE) remain understudied, despite the robust effect of RE on increasing lactate that is thought to play a mechanistic role in enhanced memory function. The present study employed a randomized control trial design and aimed to investigate the acute effect of RE on the consolidation process of object-based and relation-based memory in 103 healthy 18–50 year-old adults (male $= 59$, mean age $= 26.78 ± 7.91$ years) who completed aerobic and muscular fitness tests on Day 1, and were then randomly assigned into two groups to complete a 42-min session of either moderate intensity RE ($n = 51$) or seated rest ($n = 52$) that were performed after studying 60 paired objects and an immediate object/relation recognition test before a 120-min delayed object/relation recognition test. Although RE successfully increased the blood lactate level ($t = 17.18$, $p < .01$,
Explain the impact of mobile apps for adolescents physical activity

Markus Nyström, Luleå University of Technology; Paul Davis, Umeå University; Angelica Olander, Umeå University; Jenny Wilhelmsson, Umeå University

Current research on physical activity among adolescents reveals that approximately 80% do not meet the recommended levels set by the World Health Organization. Recognizing childhood as a crucial developmental phase, it becomes imperative to prioritize health promotion during this period of the lifespan. Studies suggest that integrating gamification into mobile apps has a positive impact on adolescents’ physical activity levels. Furthermore, the incorporation of behavior change techniques (BCTs) has been recognized as a means to enhance the effectiveness of health-promoting interventions. Previous research indicates adolescents’ interest in BCTs such as goal setting/planing, feedback, reward, self-monitoring, social comparison, and social support. The objective of this particular study was to investigate the experiences of Swedish adolescents regarding physical activity and apps, with a specific focus on the influence of BCTs. The study involved three focus group interviews with a total of 18 participants aged 11–15 years. Data analysis was conducted using reflective thematic analysis. Participants in the study expressed positivity towards mobile apps that provide instructions, demonstrate behaviors, and explore the impact of removing rewards. Additionally, other appealing features of physical activity apps included the development of streaks, competition, and the provision of an appropriate level of challenge. This study significantly contributes to a deeper understanding of how BCTs and other features can be integrated into physical activity apps. It emphasizes that individualization and renewal may hold greater importance than the actual content features. These findings are pivotal for future efforts to develop interventions aimed at increasing physical activity levels among adolescents, not only in Sweden but also on a broader scale.

The independent and combined associations of perceived competence and control with feelings of efficacy in youth sport

Liam O’Neil, Utah State University; Alan L. Smith, Utah State University

In competence motivation theory, the psychological experience of competence is proposed to be both cognitive (i.e., perceived competence and control) and affective (i.e., feelings of efficacy) in nature (Harter, 1978). To date, however, sport psychology researchers have largely ignored the affective experience of competence. The purpose of the present study was to examine the independent and combined associations of perceived competence and control with feelings of efficacy in youth sport. We expected that perceived competence would positively associate with positive feelings of efficacy and negatively associate with negative feelings of efficacy. Moreover, we expected that perceived controllability would strengthen, and perceived uncontrollability would weaken, the associations of perceived competence with feelings of efficacy. In total, 184 adolescent athletes \( (M_{age} = 15.48 \pm 0.99 \text{ years}) \) completed measures of perceived sport competence (i.e., perceived competence), implicit beliefs about athletic ability (i.e., perceived control), and competence-related pride, guilt, and shame (i.e., feelings of efficacy). After controlling for gender, a series of hierarchical multiple regression analyses found independent associations of perceived competence \( (b = .54, p < .001) \) and perceived controllability \( (b = .17, p < .01) \) with competence-related authentic pride \( (R^2 = .38) \); perceived competence \( (b = .58, p < .001) \) with competence-related hubristic pride \( (R^2 = .38) \); perceived competence \( (b = .38, p < .001) \) with competence-related guilt \( (R^2 = .14) \); and perceived competence \( (b = .45, p < .001) \) with competence-related shame \( (R^2 = .25) \). All combined associations of perceived competence and control with feelings of efficacy were non-significant. These findings showcase the psychological experience of sport competence as cognitive and affective, with perceived competence most meaningfully related to feelings of efficacy among adolescents in youth sport. In future research, a broader perspective on the psychological experience of sport competence is warranted.

Effects of immersion-plus-exercise on state stress, connectedness to nature and mood state in middle-aged adults

Elexis Orozo, Vanguard University; Victoria Rose, Vanguard University; Diana Avans, Vanguard University

Green exercise can be defined as physical activity or exercise performed in an environment that has a greater ratio of natural elements than artificial elements (Han & Wang, 2018). Since green exercise is not uniformly structured, scholars have distinguished green exercise into three main categories based on the activity’s level of engagement with nature. Current research has shown that there are several types of exercises that can be effective, however, it is still unknown if there is a type of exercise or duration of green exercise that would be most effective. This study sought to understand how immersion-plus-exercise in a natural beach environment influences state stress, connectedness to nature, and mood state within the middle-aged population. Twenty male and females, ages 40 to 65, underwent a series of three states: pre-immersion, post-immersion, and post-walk where they were asked to complete three sets of surveys: The Brunel Mood Scale (BRUMS), Short Stress State Questionnaire (SSSQ), Love and Care of Nature Scale (LCNS), and Salatto-Love and Care of Nature Direct Indication Scale (SLCNDIS). The data was analyzed using repeated measures ANOVA. The dependent variables of stress, connectedness to nature, and mood were analyzed by time and measurement. The alpha level was set at \( p < .05 \). Significant main effects were followed with pairwise comparisons. The results showed significant decreases in confusion, worry, and distress along with significant increases in engagement and connectedness to nature. Theses changes were observed pre-immersion to post-immersion and post exercise. It was concluded that immersion-plus-exercise in a beach environment decreased stress, improved overall mood, and increased connectedness to nature within middle-aged adults. Further research is needed with a larger sample size to allow comparisons between genders, age groups, and/or different environments. Furthermore, previous research has demonstrated the effectiveness of green exercise in many acute studies, but a lack of chronic studies remains.

Optic flow and cycling effort: Where to look to go faster

Sem Otten, University of Montpellier and IMT Mines Alès and University of Groningen; Ruud J. R. Den Hartigh, University of Groningen; Frank T. J. M. Zaal, University of Groningen and University Medical Center Groningen; Benoît G. Bardy, University of Montpellier and IMT Mines Alès; Christophe Gernigon, University of Montpellier and IMT Mines Alès

Previous research on motor behavior has tested the effects of manipulating the flow velocity of the entire optic field on perceived and/or exerted effort.
(Bardy et al., 1992; Baumberger et al., 2000; Mohler et al., 2007; Parry et al., 2012). However, no study has yet investigated the effects of gazing at specific parts of the optic field. In this study, we aimed to investigate the effects of gazing at proximal regions (where optical velocities are high) vs. distal regions (where velocities are low) in the optic flow on exerted and perceived cycling effort, as well on the perception of psychological momentum. Thirty-one cyclists performed a baseline and two “windowed” individual 20-minute races on a home-trainer bicycle within a VR environment (a straight road running through a landscape displayed through a VR headset). For the windowed trials, cyclists viewed the VR environment limited by a proximal or distal window, in a counterbalanced order, and had the goal of surpassing their baseline power. Cyclists’ exerted effort was continuously measured, and their verbal responses to Borg’s (1998) Rating of Perceived Exertion scale and one perceived psychological momentum item were recorded every 2 minutes. A one-way repeated measures ANCOVA, with average baseline exerted effort as a covariate, and follow-up post-hoc tests revealed that average exerted effort was significantly higher in the proximal condition than in the distal condition, with a large effect size. However, one-way repeated measures ANOVAs showed no significant effect of gazing conditions on average perceived effort nor on perceived psychological momentum. Moreover, the repeated measures correlation between exerted effort and perceived psychological momentum was not significant. These findings provide support for the beneficial effect of proximal gazing on effort exertion during maximal performance and call for future investigations to clarify the underlying mechanisms.

Affective experiences at recess: A sub-group analysis
Nazlı Özkoca, Oregon State University; Danielle Belcher, University of Northern Colorado; James Arnold, Oregon State University; Megan B. Stellino, University of Northern Colorado; William V. Massey, Oregon State University

While research has indicated recess can facilitate physical activity (Ridgers et al., 2012), cultivate social skills, nurture positive relationships (Massey et al., 2019), and enhance classroom behaviors (Barros et al., 2009), results of randomized controlled trials have, at times, failed to substantiate these claims. This may be due to high baseline scores associated with prominent recess outcomes (e.g., Bundy et al., 2017; Nigg et al., 2019), as well as research that has shown age, gender, type of intervention, and recess duration have a significant impact on the benefits students receive from recess interventions (Erwin et al., 2014). The objective of the current study was to examine changes in positive and negative affect at recess across various sub-groups of elementary school students. All participants were enrolled in schools within a district collaborating with Playworks, an organization in the US that provides services to enhance recess quality. Data were collected from a total of 1,022 students in grades third through fifth from 9 elementary schools in a large, diverse, school district in the Mountain West region of the United States. Participants completed a shortened version of the Positive and Negative Affect Schedule (PANAS) at four time points. Latent growth curve modeling was conducted for the total sample and sub-group (gender, grade, race, and baseline response) analyses using Mplus v8.9. A significant growth trajectory was observed in positive affect for the overall sample ($b = .170, p < .020$) as well as fifth-grade students ($b = .215, p = .031$) and students with low positive affect at baseline ($b = .340, p < .001$). Similarly, a significant decrease in negative effect was observed for the overall sample ($b = -.040, p < .001$), along with students who identified as girls ($b = -.497, p = .040$) and students who indicated high negative affect at baseline ($b = -.253, p < .001$). The findings contribute to a deeper understanding of the importance of individual differences when considering the effectiveness of recess interventions. Funding source: Playworks.

The toll of the scroll: A path toward burnout
Christine E. Pacewicz, Miami University; Kathleen T. Mellano, Springfield College

Burnout research has indicated that pressure from the media and the public contribute to heightened burnout perceptions in athletes. In the last 20 years, the media’s presence, as well as sources of public pressure, have changed with the increase in social media usage. While using social media platforms, individuals, including athletes, have the opportunity to socially compare themselves to others. Upward or downward comparison may contribute to higher burnout perceptions. Yet, it is unknown if and how social media use and social comparison contribute to burnout perceptions of athletes. Thus, the purpose of the current study was to (a) examine if use of social media contributed to burnout perceptions and (b) if social comparison rating mediated these relationships. Male and female collegiate athletes ($N = 162$) completed measures of social media usage (i.e., Instagram), social comparison, and burnout during their sport season. Latent path analysis using robust maximum likelihood estimation was used to examine the model. The model had acceptable fit: $\chi^2$ (472) = 861.00, $p < .001$, RMSEA = .071 (.064,.079), SRMR = .08, CFI = .083. Total weekly time spent on Instagram as well as browsing while using Instagram were directly associated with exhaustion ($\beta = -.31$, $\beta = .39$, respectively) and reduced accomplishment ($\beta = -.20$, $\beta = .39$, respectively). Social comparison while using social media was directly associated with reduced accomplishment ($\beta = -.34$) and devaluation ($\beta = -.35$). Type of activity on Instagram mediated the relationship between time spent on Instagram and burnout. Specifically, browsing the relationship between time spent on Instagram and exhaustion ($\beta = .13$) and reduced accomplishment ($\beta = .13$). Social comparison was not a mediator. Results suggest that scrolling through posts on Instagram explains why time spent on the platform may contribute to burnout perceptions. Comparing oneself favorably to others while using social media may reduce burnout while comparing oneself unfavorably may enhance burnout perceptions.

“Run for something bigger than yourself”: Collegiate athlete experiences of group dynamics differ from cross country to track and field
Seth Papineau, Wilfrid Laurier University; Svenja Wolf, Florida State University; David W. Eccles, Florida State University; Megan M. Buning, Florida State University; Michael D. Giardina, Florida State University

Drawing on aspects of social interdependence theory (Deutsch, 1949), the structures of cross country and track and field dictate how teammates compete and cooperate with each other. However, it is unknown how these differences influence the intragroup relations of teammates competing in two sports. The present study explored collegiate athletes’ experiences of group dynamics within their cross country and track and field teams. Twenty-seven collegiate athletes, all of whom participated in both sports, comprised five focus group interviews across two NCAA D-II men’s teams, two NCAA D-II women’s teams, and one NCAA D-III women’s team. We used a reflexive thematic analysis (Braun & Clarke, 2022) grounded in critical realism (Willig, 2013) to interpret the data and three overarching themes were developed. Theme 1 My contributions to these teams. We always the same represents the athletes' contrasting perceptions of each sport. Specifically, cross country was viewed in terms of the team collective outcome, yet greater emphasis was placed on the individual in track and field. Theme 2 We’re all in this together… until the end highlights the team orientation in cross country while acknowledging the adjustment to an individual outcome orientation for championship race selection. Theme 3 We are not all we have, but we are all we really need highlights the overwhelming complexity of track and field teams.
Specifically, participants suggested the unique structure of track and field (e.g., diversity of event types) creates several barriers between subgroups. Additionally, participants perceived their prior experiences of competing in cross country as a social barrier for members of other event groups in track and field. These results extend our understanding of social interdependence theory by emphasizing the significance of sport structure on teammates’ perceptions of group dynamics. Moreover, the findings may be reinforced by the experiences represented in non-sport settings (e.g., company mergers, tactical units) in which group membership varies across contexts.

The role of family on promoting physical activity behaviors in youth with Autism Spectrum Disorder: A systematic review

Andrew C. Parks, Louisiana Tech University; Jordan A. Blazo, Louisiana Tech University; Alison Phillips Reichter, Louisiana Tech University

Throughout childhood and adolescence, physical activity participation and healthy behaviors decline in individuals with Autism Spectrum Disorder (ASD; Dahlgren et al., 2021). While parents often seek intervention programs outside of the home, it has been suggested that the family may play an integral role in the promotion, perception, and development of physical activity (PA) behaviors in youth with ASD (Ku et al., 2020). Family system theory (Barnhill, 1979; Cox & Paley, 2003) posits that parents and siblings influence PA behaviors in those without developmental disabilities; however, the extent to which these same social relationships influence the behaviors of an individual with ASD has been examined sporadically through a wide range of methodologies. Therefore, the purpose of this study was to conduct a systematic review to synthesize the current body of evidence on the role of family on physical activity behaviors in youth with Autism Spectrum Disorder. Five electronic databases were searched (e.g., Google Scholar, Ebscohost, PubMed) utilizing the search terms (Autism, Asperger’s, PDD-NOS), (Family, Parent, Mother, Father, Sibling, Brother, Sister, Guardian), (Youth, Child, Adolescent, Athlete, Teen), and (“Physical Activity”, Exercise, Sport, Fitness, Health). Article inclusion criteria were 1) No reviews or meta-analyses, 2) Youth participants must be 5–18 years old, 3) Youth participants must have ASD diagnosis, and 4) Must include report/measure of PA for the parent and child. Present findings from all studies meeting the inclusion criteria indicate that parental support, parental engagement in PA, and parental value of PA all contribute to positive engagement in PA for youth with ASD. This review is the first to consolidate work relative to the relationships in families with a child diagnosed with ASD. We aim to provide additional support highlighting the family as an instrumental component of PA behavior development and a key target for intervention development for youth with ASD.

Experiences with physical activity in venous thromboembolism (VTE) survivors following diagnosis: An elicitation study

Julie Partridge, Southern Illinois University Carbondale; Philip Anton, Southern Illinois University Carbondale; Juliane Wallace, Southern Illinois University Carbondale; Leslie Lake, National Blood Clot Alliance

Venous Thromboembolism (VTE) is a term that includes both deep vein thrombosis (DVT; blood clots formed in deep veins of the body), and pulmonary embolism (PE; potentially life-threatening condition when a blood clot forms in or moves to the lungs). VTE accounts for the third-highest number of cardiovascular deaths worldwide each year (Noack et al., 2015). Approximately 100,000 Americans die of VTE annually, while another 800,000 survivors are diagnosed and must learn to navigate life post-diagnosis. Prescribed treatments typically include taking anticoagulants and lifestyle changes (e.g., maintaining adequate hydration and engaging in exercise). However, little is known about survivors’ psychosocial experiences relating to either initiating or re-starting an exercise program post-diagnosis. The Theory of Planned Behavior (TPB; Fishbein & Ajzen, 2010) was utilized as a theoretical framework for this study due to the lack of information on the psychosocial variables impacting both intentions and behaviors surrounding volitional exercise post-VTE. The specific research goals were: 1) to identify the behavioral, normative, and control beliefs about engaging in exercise after VTE, and 2) to explore the concepts of physical/psychological readiness to exercise after diagnosis. Participants included 26 (21 female; 5 male) VTE survivors who were currently engaged in regular exercise. The interview consisted of questions about participants’ backgrounds and diagnosis experiences as well as open-ended probe questions relating to their experiences with post-diagnosis exercise. Content analysis guided by grounded theory procedures (Hsieh & Shannon, 2005) was utilized and the following themes emerged from the inductive content analysis of data: 1) Behavioral Beliefs/Attitudes, 2) Subjective Norms/Normative Beliefs, 3) Perceived Behavioral Control, and 4) Readiness to Engage in Exercise. These results will be discussed within the context of existing literature and how this knowledge can better serve this population to encourage post-diagnosis exercise.

Motivation states for physical activity and sedentarism change in response to stressful and pleasant stimuli in the laboratory: ANTREC analysis 1

Maddie Pascoe, University of Otago; Matthew Stults-Kolehmainen, Yale New Haven Hospital; Nia Fogelman, Yale University; Paul Mc Kee, Duke University; Rajita Sinha, Yale University; Markus Gerber, University of Basel; Rebekah Blakemore, University of Otago

Psychological stress is known to impact physically active behaviors, but mechanisms behind these associations are still unclear. Changes in motivation states may partially account for the effects. The purpose of this study was to determine the effects of pleasant (PL) versus unpleasant (UP) stimulus exposures on motivation states to move the body and/or be sedentary. 30 participants in New Zealand ($M_{age} = 27.7$y, $SD = 13.4$; 20 females) completed one experimental session with 2 pseudo-randomized and counterbalanced conditions: PL and UP visual stimuli selected from the International Affective Picture System (IAPS) database matched for arousal. Each condition contained 10 blocks of trials: ‘anticipation’ period (first 3 runs), ‘stress/non-stress’ period (middle 4 runs), and ‘recovery’ period (last 3 runs). VAS scales to measure stress and anxiety as well as CRAVE scales (Stults-Kolehmainen et al., 2021) to measure desires for activity and sedentarism (Move and Rest subscales, 5 scored items each) were given before the task start (baseline) and after each run. Linear mixed effects models with random intercepts were used to assess condition and timepoint effects on motivation states. Condition x timepoint effects emerged for Move ($p = .07$). Specifically, in the UP condition, Move was higher in the stress phase relative to the anticipation phase ($p = .08$). However, baseline stress x condition x timepoint effects were present for both subscales ($p’s < .001$). The relationship between baseline stress and Move was significantly more negative in the PL condition relative to the UP condition in the stress phase ($p < .023$), with the opposite pattern for Rest ($p < .017$). In conclusion, pleasantness of stimuli moderated the stress and motivation relationship. Exposure to stressful and unpleasant stimuli increased the desire to be physically active, which may make sense in terms of the “fight and flight” model.

The psychosocial assets scale: A preliminary instrument to measure psychosocial development in older adults

Shruti Patelia, University of Toronto; Joseph Baker, University of Toronto

The development of psychosocial assets through sport has been extensively studied in young persons but largely overlooked in older adults.
While research in this area has been clear that development continues across the lifespan, there are few instruments that can measure the presence and development of psychosocial assets in older adults. The present study conceptualized and tested the Psychosocial Assets Scale (PAS). The PAS drew from existing items from youth samples (e.g., from the Developmental Assets Profile) that were relevant to older adults, and created new items based on research in this population. In addition, the authors and a group of experts in the field reviewed each item and approved a list of 71 potential items. A sample of N = 437 older adults (Mage = 64.6 ± 8.1 years) completed the PAS to explore the factor structure of the instrument. The sample was largely comprised of athletes who reported as: male (62.7%), married (82.6%), white (92%), working full-time (40.5%), having completed higher education (44.6%) and residing in Canada (47.8%). Results from an exploratory factor analysis with oblique rotation suggested extraction of 14 factors with eigenvalues greater than 1, explaining 63.5% of the variance. Further testing resulted in nine factors which explain 65.5% of the variance: social support, integrity, contribution, continued learning, general well-being, family support, healthy habits, perceived safety and drive. In addition, there were relationships between: 1) social support and service, 2) integrity and perceived safety, and 3), general well-being and perceived safety. These results provide an initial step to the development and validation of the PAS, which may be useful in capturing psychosocial assets and the value of sport in older adults. More work in needed to establish the validity and reliability of the PAS, as well as to understand the nuances of asset development in older adults.

**Sports and recreation-related concussions in children, Centers for Disease Control and Prevention’s national concussion surveillance system**

Alexis Peterson, Centers for Disease Control and Prevention; Dana Waltzman, Centers for Disease Control and Prevention; Jill Daugherty, Centers for Disease Control and Prevention; Jufu Chen, Centers for Disease Control and Prevention; Matthew Breiding, Centers for Disease Control and Prevention

Concussion sustained during sport and recreational activities are a concern for young athletes. The present study sought to estimate past 12-month sport and recreation-related (SRR) traumatic brain injuries (TBIs) among a sample of children in the United States (U.S.). Pilot data from the Centers for Disease Control and Prevention (CDC)’s National Concussion Surveillance System (NCSS) were analyzed. NCSS utilized a cross-sectional random-digit-dial telephone survey using computer-assisted telephone interviewing to collect self/proxy-reported data. Over 10,000 U.S. adults and over 3,500 children via adult/parent-proxy reporting completed surveys with an overall response rate of 8.4%. Adults with children aged 5–17 years in the household were asked about head injuries sustained by their children. Estimates were stratified by sociodemographic and injury circumstance characteristics. Utilizing a tiered case definition previously developed by CDC, an estimated 6.9% (95% CI, 6.0%–7.8%) of the sample’s 5–17-year-old children sustained at least one probable or possible SRR-TBI in the previous 12 months; 3.3% (95% CI, 2.7%–4.0%) of the children sustained at least one probable SRR-TBI. Of the SRR-TBIs reported, 41.1% (95% CI, 33.0%–49.2%) were experienced while playing contact sports. Symptoms did not resolve for 8 or more days or had not resolved at the time of the interview for 18.1% (95% CI, 13.0%–23.1%) of the children’s most recent SRR-TBI. For approximately 10% the most recent SRR-TBIs, parents reported moderate to extreme effects on school and social functioning. Many proxy-reported TBIs among children aged 5–17 years were due to sport and recreational activities. CDC’s prevention and identification strategies for youth SRR-TBI will be discussed along with NCSS findings.

**Exploration of professional development in a health coaching experiential learning program**

Alison Phillips Reichter, Louisiana Tech University; Lauren Steinke, University of Iowa

Health coaching is an effective intervention strategy to promote healthy lifestyle behavior change, e.g., increase physical activity, decrease chronic disease (Sforzo et al., 2019). Training to become a health coach includes learning psychological theories, behavior change models, and communication skills to promote healthy behaviors. While literature on health coaching intervention effectiveness has increased substantially, the known outcomes of training as a health coach, especially during college years, are limited. College students can gain various skills through participation in experiential learning to better prepare them for their career upon graduation (Kolb, 2014). The purpose of this study was to explore the impact of participation in a health coaching internship on professional development outcomes among program alumni. Participants were nine health coaching intern alumni (Mage = 24.2, SD = 1.6) who completed the program between 6 months and 5 years ago (M = 2.4). Participants responded to open-ended questions about their expectations, benefits, limitations, and value of the experience. Data were analyzed using a reflexive thematic analysis (Braun & Clarke, 2021). Results indicate four main themes: (1) development of health coaching/communication-specific skills, (2) development of professional skills, (3) increased confidence, and (4) employability and professional opportunities. Most participants benefited from direct client experience in preparation for a health-related career, specifically working independently with real clients in a supervised setting. Results indicated that alumni benefited from developing health coaching-specific skills and general professional skills. Health coaching-specific skills, such as motivational interviewing, were valuable to participants currently in many professions. This study suggests that experiential learning in health coaching has personal and professional benefits, even for those who pursue diverse career paths.

**A qualitative exploration of athletic partnership dissolutions in high-performance dyadic sport**

Emily V. Pike, McGill University; Lindsay R. Duncan, McGill University

Athletic partnership dissolutions are meaningful transitions for dyadic sport athletes that may adversely affect their mental health. Dyadic sport relationships are unique because athletes’ ability to train and compete relies on concordant goals. Thus, athletes whose individual goals diverge from the dyad face significant challenges. Previous research has explored transitional experiences of individual and team sport athletes; however, little research has been conducted on dyadic sports. Therefore, the purpose of this study was to explore athletes’ experiences following partnership dissolutions in high-performance dyadic sports. We were interested in how athletes navigate transitions within and out of sport, and in what ways athletes use adaptive or maladaptive coping strategies when faced with transitions. Ten high-performance figure skating (n = 5) synchronized diving (n = 1) and beach volleyball athletes (n = 4) participated in one semi-structured interview where they described their experiences leading up, during, and after partnership dissolutions. Reflexive thematic analysis generated 3 overarching themes: power dynamics, fear of the unknown, and experiential learning. Power dynamics describes how power imbalances related to gender, ability, position, age, and organizational politics affect individuals’ identity, their partnership, and their ability to cope with transitions. Fear of the unknown depicts athletes’ perceived lack of control when faced with transitions, leading to persistence in partnerships and in sport to avoid transitions. Experiential learning includes the athlete’s takeaways from different athletic partnerships and how this informs both future partnerships and their broader goals.
in life. This study is the first to explore the dissolution of dyadic sports teams and the challenges athletes face from resulting transition periods. The results of this study could inform future resources and interventions aimed at promoting more adaptive transitions for dyadic sport athletes, ultimately fostering their mental health and athletic success. Funding source: SSHRC.

Comparing the effects of exercise on psychosocial outcomes between persons with multiple sclerosis and spinal cord injury: A secondary meta-analysis

Matteo Ponzano, University of British Columbia; Kierstyn Palmer, University of British Columbia; Robert Buren, University of British Columbia; Lara Bressy, University of Turin; Luca Beratto, University of Turin; Nathan T. Adams, University of British Columbia; Kathleen A. Martin Ginis, University of British Columbia

Exercise can improve psychosocial outcomes in people with neurological disabilities. People with multiple sclerosis (PwMS) and with spinal cord injury (PwSCI) present similar functional impairments but, while MS is a neurodegenerative disease, neurological consequences of SCI remain relatively stable. Hence, the psychosocial effects of exercise may differ between PwMS and PwSCI. The aim of this meta-analysis was to compare the magnitude of the effects of exercise on subjective (SWB), psychological (PWB) and social well-being (SoWB), and HRQoL between PwMS and PwSCI. We performed literature searches in four databases, and included randomized controlled trials that: 1) included PwMS or PwSCI ≥ 18 years old; 2) delivered an exercise intervention; 3) had one comparator group that received no intervention; 4) had SWB, PWB, SoWB, or HRQoL as outcomes. Two authors 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-effects meta-analyses, assessed heterogeneity between trials using the I² statistics, and compared the mean effect sizes for PwMS versus PwSCI with the Q statistics. We included 68 studies (2,854 participants, mean age < 65 years in every study). Most studies combined different types of exercise, with an average intervention duration of 3.4 ± 1.8 months, for 3.0 ± 1.5 days per week. Exercise improved SWB (d = 0.61; 95%CI [.42, .80]; 35 studies; I² = 70%), PWB (d = .41; 95%CI [.15, .68]; 7 studies; I² = 0%), SoWB (d = .57; 95%CI [.30, .84]; 12 studies; I² = 79%), and HRQoL (d = .38; 95%CI [.25, .50]; 29 studies; I² = 12%). The Q statistics did not show any statistically significant differences in the mean effect sizes between PwMS and PwSCI for any of the outcomes (SWB: Q = .41, p = .52; PWB: Q = 1.161, p = .28; SoWB: Q = 2.87, p = .09; HRQoL: Q = 21, p = .65). We observed small- and medium-sized effects of exercise on psychosocial outcomes in both PwMS and PwSCI. Exercise can improve psychosocial outcomes regardless of the neurological prognosis. Funding source: Craig H. Neilsen Foundation.

Tailoring over quantity: The number of behavior change techniques is not associated with the effectiveness of interventions in people with MS

Matteo Ponzano, University of British Columbia; Lara Bressy, University of Turin; Luca Beratto, University of Turin

Interventions informed by behavior change theories are more effective than those non-theory based. The use of behavior change techniques (BCTs) has shown effectiveness on physical activity (PA) and psychosocial outcomes in different populations, but it is unclear whether delivering a higher number of BCTs is associated with greater effectiveness of behavioral interventions. Therefore, the aim of this work was to explore whether the number of BCTs used in behavioral interventions is associated with improvements in PA, well-being (WB), and health-related quality of life (HRQoL) among people living with multiple sclerosis (PwMS). This study reports on a secondary analysis from a systematic review of randomized controlled trials that: 1) involved PwMS ≥ 18 years old; 2) delivered a behavioral intervention to increase PA; 3) had one comparator group that received no intervention; 4) had PA, well-being (WB), or HRQoL as outcomes. Two authors screened titles and abstracts, full texts, and extracted the BCTs used in each study according to the BCT taxonomy (v.1). We reported descriptive statistics (mean ± standard deviation, count and percentage) for demographic and intervention characteristics, calculated a Hedge’s g as a measure of effectiveness of the interventions, and performed Pearson correlations to determine the relationships between the number of BCTs used in each study and the effects of the interventions on PA, WB, and HRQoL. We included 11 studies (n = 1,227 participants, 61% females), with an average intervention duration of 3.6 ± 1.6 months, and that delivered 12 ± 3 BCTs (range 7–16). We did not detect any statistically significant associations between the number of BCT delivered in each study and the effects of the interventions on PA (r = −.01; p = .98), WB (r = −.52; p = .15), and HRQoL (r = .06; p = .91). The number of BCTs delivered is not associated with the effectiveness of the intervention. BCTs should be chosen based on the contents of the intervention and tailored to individual participants’ characteristics.

Physical activity, approach bias, and inhibitory control in young adults who binge drink

Lake Poole, Rutgers University; Jonathon Bourque, Rutgers University; Hannah Perdue, Rutgers University; Amber Sarwani, Rutgers University; Andrew Ude, Rutgers University; Marsha Bates, Rutgers University

Brain health and cognitive benefits of physical activity (PA) have been studied using event-related potentials (ERPs), which provide insight into latent processes such as inhibitory control (N2), attention (P3), and emotional reactivity (LPP). These benefits may be particularly meaningful to those at risk of developing substance use disorder, e.g., young adult binge drinkers. Within dual-process theories of addiction, binge drinkers are characterized by motivated attention towards alcohol cues coupled with compromised inhibitory control, which portend heightened risk for alcohol misuse. Yet, whether PA covaries with motivated attention and inhibitory control in binge drinkers is unclear. Eighty-two young adults who endorse binge drinking (57 females; M_age = 20.7 years) recruited as part of a larger study completed two alcohol-cued tasks while electroencephalography was recorded. The N2 and P3 difference waveforms isolated during an alcohol-cued Go/No-Go task were used to index inhibitory control and selective attention. The context updating P3 and LPP components were isolated during an alcohol-cued Go/No-Go task. Regardless of PA in the Oddball task, P3 amplitude to alcohol cues was largest in neutral relative to positive contexts (η²p = .07, p < .01), and LPP amplitude to alcohol cues was larger in neutral relative to positive contexts (η²p = .05, p < .01). Findings suggest that young adult binge drinkers exhibit a stronger approach bias towards alcohol cues in emotionally neutral contexts, and those who engage in more PA exhibit less inhibitory control conflict in the context of alcohol cues, and together support a relationship between physical activity and inhibitory control in a population at risk for developing alcohol use disorder. Funding source: NIH (NIAAA).
Meeting their needs: Acceptability outcomes of a co-created yoga program for adults diagnosed with gynecologic cancer

Jenson Price, University of Ottawa; Brooklyn Westlake, University of Ottawa; Jennifer Brunet, University of Ottawa

Yoga has the potential to improve quality of life for adults diagnosed with gynecologic cancer but programs often do not meet their needs. We implemented and assessed a co-created 12-week bi-modal Hatha-based yoga program for adults diagnosed with gynecologic cancer in the community. Two programs were delivered concurrently by one yoga instructor with the assistance of volunteer undergraduate students. Participants were recruited from The Ottawa Hospital and self-selected the morning (n=10) or evening (n=10) program. Following a mixed methods series N-of-1 multiple baseline ABA research design, participants completed surveys 9–11 times and an interview post-program about acceptability outcomes (i.e., program relevance, suitability and perceived benefits, concerns with the program and the study methods) to determine whether study methods and program features were congruent with their values, expectations, and preferences. Interviews with 18 participants were conducted, transcribed, and analyzed using thematic analysis. Participants were engaged in the program and appreciated the many benefits it provided them. Four main themes were identified: (1) reasons for enrolling in the study (e.g., in-person group-based programming post-Covid, giving back, coping with side-effects), (2) factors impacting data collection (e.g., online convenience, altruism, unlikeable survey questions), (3) reasons for attending classes (e.g., lifestyle fit, connection with peers, instructor, mind-body content), and (4) value and use of optional program features (e.g., at-home videos did not add value, journaling fit different needs, group discussions were motivating and prompte...
Physical activity for anxiety for autistic people: A systematic review

Kathryn Riis, Auburn University; Brittany Samulski, Old Dominion University; Kristina A. Neely, Auburn University; Patricia Laverdure, Old Dominion University

Clinical anxiety is a common comorbidity in autistic people. Due to the prevalence of anxiety in the autism population and the adverse effects it causes, there is a critical need to develop effective interventions that address anxiety symptoms for autistic people. Therefore, the purpose of this systematic review was to examine the effectiveness of the use of physical activity as an intervention to reduce anxiety in autistic people. Three databases PubMed, PsychINFO, and Cochrane RCTs, were searched utilizing key terms. PRISMA systematic search procedures identified 44 studies meeting predetermined inclusion criteria. Participant characteristics, the type of physical activity performed, the nature of the physical activity program/delivery, anxiety-related outcomes, and research methodology was evaluated for each study. Each paper included in the review was appraised and scored for risk of bias using Cochrane Handbook for Systematic Reviews of Interventions risk of bias tool. Titles and abstracts of 44 articles were reviewed and 8 articles met inclusion criteria which evaluated interventions. Evidence from studies suggests that yoga, a community-based football program, an app-assisted walking program, group exercise programs, and a horseback riding intervention reduced anxiety for autistic people. The studies included in this systematic review provide strong-to-moderate evidence that physical activity can reduce anxiety for autistic children and adults. However, additional research is needed to identify which mode of physical activity is most beneficial for anxiety reduction. Future research should evaluate frequency, duration, and intensity and their effects on anxiety for autistic people.

Hatha yoga improves anxiety and stress for middle-aged women

Kathryn Riis, Auburn University; Janki J. Patel, Auburn University; Jackson Gaddy, Auburn University; Danielle D. Wadsworth, Auburn University; Kristina A. Neely, Auburn University

Studies show hatha yoga may improve mental health (Klatte et al., 2016). Eighteen women, ages 25–55, completed 8 weeks of group hatha yoga, twice a week for one hour (total of 16 sessions). All participants were not participating in yoga prior to the intervention. Prior to the first session and after the last session, participants completed questionnaires related to mental health, mindfulness, and sensory perception. Dispositional mindfulness was measured with the Mindful Attention Awareness Scale (MAAS), which has one outcome score (range 1–6). Tendency to regulate emotion was assessed with the emotion regulation questionnaire (ERQ), which has two subscales, cognitive reappraisal (score range 6–42), and expressive suppression (score range 4–28). Depression Anxiety Stress Scale-21 (DASS-21) has subscales for depression, anxiety, and stress (scores range 0–54). Fourteen participants completed the intervention and post-test. Change over time was evaluated by six repeated measures t-tests. Dispositional mindfulness at post-test (3.72 + 1.03) did not differ from baseline (3.74 + 0.84), p > .05. ERQ-cognitive reappraisal at post-test (4.79 + 1.19) did not differ from baseline (5.14 + 1.10), and ERQ-expressive suppression at post-test (3.21 + 1.55) did not differ from baseline (3.16 + 1.27), p > .05. All subscales of the DASS-21 demonstrated improvement; however, the depression subscale did not reach traditional levels of significance. DASS-21-depression at post-test (17.71 + 4.29) was not different than baseline (18.86 + 3.82), p > .05. DASS-21-anxiety at post-test (17.57 + 3.61) was less than at baseline (21.14 + 5.48), p = .025. DASS-21-stress at post-test (23.00 + 6.55) was less than at baseline (27.00 + 7.09), p = .017. The results suggest that participation hatha yoga may have a positive impact on mental health for women ages 25–55. This is important because hatha yoga is an accessible and enjoyable style of yoga. Future work is required to determine how mental health outcomes may differentially be affected by the frequency, duration, and style of yoga.

The feelings of having meaningful goals and a sense of directedness in life are related physical activity among midlife and older adults

Heesoo Roh, Purdue University; Steve Amireault, Purdue University; Elliot Friedman, Purdue University; Shih-Chun Kao, Purdue University; Haocen Wang, Purdue University

Theoretical frameworks on purpose in life posit that having a strong sense of purpose can drive people to initiate and maintain health-promoting behaviors, such as physical activity (PA). However, many prior PA studies are limited by using a one-time PA measure, and purpose of life was often measured by a single item. Moreover, many prior models excluded theory-based PA correlates, such as autonomous and controlled motivations. Hence, whether purpose in life influences PA when conditioning on such covariates to improve precision remains largely unknown. Therefore, the aim of this study was to examine the association between purpose in life and PA behavior among midlife and older adults. We recruited participants aged ≥ 55 years and without severe cognitive impairment through the Indiana Volunteer Participant Registry. At baseline, 430 participants (Mage = 64.65 years) reported their PA frequency in the past month, levels of controlled (a/o = .76/.69) and autonomous (a/o = .91/.91) motivations by the Behavioral Regulation in Exercise Questionnaire-2, and demographic variables. Purpose in life was measured at 4-week follow-up using a 7-item subscale from Ryff’s scales of psychological wellbeing (a/o = .86/.86). To minimize the magnitude of reporting error and maximize the reliability of the PA estimate, participants’ PA was assessed using the average score of four weekly consecutive administrations of the Physical Activity Likert Scale (PAL).
Fostering physical literacy: A cross-sectional cohort study on new-use of a pre-performance routine before a match may have an impact on
Amanda Koyama, Calgary Catholic Immigration Society; Matthew Kwan, dimensional concept that includes the domains of movement compe-
programs designed to promote physical literacy (PL). PL is a multidi-
these challenges can be through participation in sports and PA
comprehensive social support that includes physiological, performance
analysis, psychology and strength and conditioning (Pazo et al. 2012).
Furthermore, there is an increase in pressure to identify promising talent, and
to create an optimal learning environment for these individuals (Baker et al,
2013). Moreover, athletes can perceive a sporting situation, such as a
football match, as a challenge or threat (Jones et al, 2009). Challenge can
be seen as facilitative to performance, whereas threat can be seen as
defeatistic (Moore et al. 2012). Therefore, a challenge state could be seen
as desirable for performance (Rossato et al., 2018). The present study
examined the use of a psychological skills including a pre-performance
routine development and implemented with academy footballers before
competition. This was to try to promote a challenge rather than a threat state.
Male footballers within an academy environment in the UK (N=20,
Mage = 18.1 ± 0.5 years) completed the Challenge and Threat in Sport Scale
(CAT-Sport; Rossato et al., 2018) pre-season and before attending a series
of workshops focusing on various psychological skills such as self-talk,
imagery, and basic breathing routines to then build into a pre-performance
routine. These skills were developed over the season into a pre-performance
routine. The CAT-Sport was then completed at the end of the season after
pre-performance routines had been implemented. Mean and standard
deviation (SD) were calculated for difference regarding pre and post season
analyses yielded similar findings. These findings are consistent with the
hypothesis linking purpose in life to PA and point to further examination of
the potential pathways through which purpose in life relates to PA.

Challenge and threat: The football academy environment
Claire Joanne Louise Rossato, University of Greenwich

Working within youth sport, specifically football academies, typically
demonstrate a clear support structure including physiology, performance
analysis, psychology and strength and conditioning (Pazo et al. 2012).
Furthermore, there is an increase in pressure to identify promising talent, and
to create an optimal learning environment for these individuals (Baker et al,
2013). Moreover, athletes can perceive a sporting situation, such as a
football match, as a challenge or threat (Jones et al, 2009). Challenge can
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the potential pathways through which purpose in life relates to PA.

Fostering physical literacy: A cross-sectional cohort study on new-
comer youth’s participation in multi-sport physical activity programs
Taylor Rowe, Brock University; Sujane Kandasamy, Brock University; Amanda Koyama, Calgary Catholic Immigration Society; Matthew Kwan, Brock University

Refugees arriving in Canada often witness a decline in their health shortly after they arrive, possibly due to limited engagement in physical activity (PA), attributed to insufficient social support for participation in PA and sports programs. One approach to address these challenges can be through participation in sports and PA programs designed to promote physical literacy (PL). PL is a multidimensional concept that includes the domains of movement competence, confidence, motivation, and the knowledge and understanding, necessary for engagement in regular PA. The current study aims to understand refugee youths’ PL when first migrating to Canada and their perceptions of PA and its consequences. Participants include 16 refugee youth (Mage = 16.00 ± 1.75, n =14 males) having just moved into temporary transition housing (M = 1.19 months on arrival).

Assessments of PL were administered using the PLAYbasic (movement competence) and PLAYself (other domains of PL) tools, and focus groups were conducted to elicit perceptions around PA, mental health and social belonging. Findings indicated fairly high perceived levels of confidence (M = 3.25 ± .68), motivation (M = 3.35 ± .28), and knowledge and understanding (M = 3.71 ± .40) in relation to PA, with moderate levels of perceived competence (M = 2.90 ± .73) and movement competence (M = 58.48 ± 3.54). Focus groups highlighted an understanding of the positive impacts of PA on overall well-being, personal growth, skill development, and social connections. The caveat is that mental health perceptions were influenced by cultural backgrounds, shaping discussions on good vs bad mental health and coping mechanisms, and that parental perceptions around their participation in PA varied. Overall, many youths expressed interest in participating in structured programs. Follow-up assessments with these participants are planned for Spring 2024; however, implications from these findings suggest there are great opportunities to develop programs aimed at further developing PL among new refugees migrating to Canada.

Exploring adolescent girls’ body-related emotions and psychosocial contexts in sport: A mixed methods study
Sarah E. Ryan, University of Toronto; Catherine M. Sabinson, University of Toronto

Body image concerns contribute to alarmingly high rates of sport dropout among adolescent girls. During adolescence, body-related negative self-conscious emotions (e.g., shame, guilt, embarrassment, and envy) play a critical role in adolescents’ well-being, identity, and self-processes. The interpersonal context of sport, including feeling supported and encouraged by others, may help mitigate negative body image experiences. The current sequential mixed methods study explored the experiences of negative self-conscious emotions, self-perceptions, and supportive contexts in sport among adolescent athletes. In Phase 1, semi-structured interviews were completed with seven adolescent girls (Mage = 16.4 years) actively participating in a variety of recreational and competitive sports to explore their experiences of body image, self-processes, and identity. Data were analyzed using reflexive thematic analysis. Recurring narratives highlighted (i) constant social comparison resulted in feelings of embarrassment, guilt, shame, and envy, (ii) poor self-perceptions and mental well-being were linked to body-related emotions and described as a barrier to sport, and (iii) the importance of peers for reducing isolating experiences within sport and physical activity. Based on Phase 1 themes, Phase 2 tested the protective effect of the interpersonal sport context (e.g., support/encouragement) for the effects of negative self-conscious emotions on physical self-worth among adolescent girls involved in sport (N = 209). In the final models, the negative emotions and support/encouragement were significant (p < .001) independent negative and positive correlates of physical self-worth (R² = .40 to .57), respectively. The interpersonal context did not moderate the association. Gaining knowledge of the emotional experiences of adolescent athletes is essential for understanding the nexus of body image and sport experiences.

The effects of strategic self-talk with consideration of attentional focus on discrete motor task performance
Jack Sampson, University of Texas at Austin; Phillip Post, New Mexico State University

The self-talk matching hypothesis predicts that instructional self-talk is more effective for tasks involving precision and accuracy, and that motivational self-talk is more effective for tasks involving endurance, strength, and power (Theodorakis et al., 2000). To date, only around 60%
of self-talk interventions support the differential effects prediction of the matching hypothesis (Hardy et al., 2018). Attentional focus research may strengthen the matching hypothesis’ predictions, where it has been established that an external focus is superior to an internal focus for motor performance across various tasks (Chua et al., 2021). Infusing internal and external attentional focus into instructional self-talk may allow more consistent performance differences to emerge between instructional and motivational self-talk. The purpose of the present study was to combine instructional self-talk with internal and external foci and compare them to motivational self-talk to determine if different types of self-talk serve different functions. 36 participants (Male = 10, Female = 26; M = 20.65 years) completed 60 dart throws in a counterbalanced order, with 15 occurring under each of the four conditions: control (CON), internal instructional self-talk (IIST), external instructional self-talk (EIST), and motivational self-talk (MST). Performance was measured through radial error (RE) for accuracy and bivariate variable error (BVE) for consistency. Data were analyzed with a 1 (group) x 4 (condition) one-way ANOVA with repeated measures. The ANOVA revealed a significant main effect for RE, p = .031. Follow-up planned comparisons revealed significant differences between the IIST and EIST conditions, p = .009, and the IIST and MST conditions for RE, p = .021. No other significant findings emerged. Results suggest that incorporating external focus into instructional self-talk may benefit discrete motor task performance. More self-talk research infusing attentional focus into instructional self-talk is needed to examine further the potential benefit of EIST on motor task performance.

Walk a mile: Behavioral economics perspectives on a charity-based physical activity intervention

Andrey A. Sanko Posada, Appalachian State University; Kimberly Faszcweski, Appalachian State University; Megan Hopkins, Appalachian State University; Maya Ristanovic, Appalachian State University

Behavioral economics posits that cognitive, emotional and social factors influence decision making in a manner that often deviates from rational choice. When applying this theoretical framework to physical activity, adherence to an exercise program may be sustained for longer periods of time when it is tied to a fundraising charity event where the individual feels they are making a difference for a cause, even though the funds or awareness they raise is negligible in the big picture. Previous research has demonstrated that framing disease-based fundraising events as “helping a cause” improved motivation and adherence for a 5K program completion. The purpose of this study was to evaluate if the constructs of behavioral economics are present in individuals participating in a cause-based charity event. Data were collected during an in-person one-mile walking event, with approximately 400 total participants, directed at raising awareness about domestic violence. A total of 44 participants (female, n = 30; male, n = 14), age 39.26 ± 9.45 years, completed the survey, which included both quantitative and open-ended responses. Results indicated a correlation between feeling there was a direct benefit from the money raised (personally or for a loved one) and motivation to participate (r = .649, p < .001). Sex differences were found, with female respondents reporting a greater desire to support the local community (t[41] = −2.845, p = .007). In the open-ended responses, over half of participants reported raising awareness about domestic violence as the most important reason they had participated in past charity events (N = 23, 52.3%). These results suggest that cause-based charity events appear to elicit emotional ties that influence participation and could be used as a strategy to promote long term physical activity. Future research on physical activity promotion and behavior change should explore using charity events of all types and a catalyst to increase motivation for participation.

A student perspective: The need for inclusion of social justice-based courses in kinesiology curriculums

Andrey A. Sanko Posada, Appalachian State University; Kimberly Faszcweski, Appalachian State University; Sarah Powell, California State University Monterey Bay; Caitlyn Hauff, South Alabama University

Professionals who work with special populations should promote equitable, respectful, and just health care and exercise settings. Unfortunately, there is little focus on social justice, diversity, and inclusion of special populations in most current Kinesiology undergraduate curriculum. Previous research characterized these gaps in Exercise Science/Kinesiology undergraduate students, demonstrating that students did not feel adequately prepared by their education to effectively interact with individuals in special populations (Powell et al., 2023). In consideration of these findings, this study qualitatively examined the nuances of student experiences in the classroom to ascertain the strengths and weaknesses of their current Exercise Science/Kinesiology program. Seven college students (5 undergraduate, 2 graduate) participated in semi-structured interviews to discuss ways in which their current program does, or does not, utilize a social justice-based approach when discussing how to work with special populations in a physical activity setting. Participants defined special populations as those who might need special consideration given a physical or cognitive limitation. Additionally, participants discussed that while their Exercise Science/Kinesiology courses introduced them to special population-related terms, they gained the most knowledge about working with special populations through applied experiences outside the classroom. Furthermore, participants expressed a need for more education on special populations as they felt this would positively complement their future practice. These findings reveal that current curriculums may be lacking social-justice content specific to assisting individuals in special populations, which could influence how future professionals approach situations. Future curricula should consider implementing social justice-based content specific to working with individuals in special populations before applied coursework experiences (i.e., internships) to ensure knowledge attainment prior to interacting with clients.

Intuitive decision-making in the evaluation and prediction of athletic success: A systematic review

Ari Joseph Sapinsley, West Virginia University; Adrianna Wood, West Virginia University; Johannes Raabe, Raabe Performance Consulting LLC

In today’s rapidly evolving world, sport organizations face a persistent challenge to identify and select athletes with the greatest perceived potential for future competitive success. Previous evidence reveals that the assessment of talent and the selection of athletes heavily relies upon intuitive, gut-feeling decisions made by coaches and scouts (Roberts et al., 2020). However, research in this area is extremely limited in the sport setting, particularly regarding the mechanisms of intuitive decision-making. In contrast, studies in business, health care, and education settings appear to be more prevalent. Accordingly, the purpose of the current study was to systematically review the existing research on intuitive decision-making in personnel selection in business, health care, education, and sport. This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). After searching relevant databases and removing duplicates, 4,612 potentially pertinent articles were found. Based on predefined inclusion criteria, these studies were screened by two independent reviewers in three steps: title, abstract, full-text. This systematic process helped to identify 27 articles that were retained for further analysis. In the included studies, researchers provided information on
antecedents related to using intuitive decision-making in assessing and selecting personnel. Specifically, task demands, individual differences, and environmental factors seem to influence the decision-making style of key stakeholders when selecting candidates for roles within their organizations. Despite the helpful contribution of previous studies, the current review also highlighted limitations (e.g., only one of the 27 included studies was conducted using an experimental design) that should be addressed in future research to gain a more comprehensive understanding of these psychological constructs. This presentation will provide empirical evidence to support those tasks with personnel selection in sport.

Older adults’ experiences of engaging in physical activity throughout the COVID-19 pandemic: Implications for social connections

Kaitlyn Sawford, University of Calgary; Niana Lavallée, University of Calgary; Meghan H McDonough, University of Calgary

Physical inactivity and social isolation are pressing public health concerns among older adults in Canada. Group physical activity programs may be a promising solution to address these issues as they provide opportunities for meaningful social connections and social support. However, social support is not inherent in group settings and restrictions on recreational facilities and social gatherings during the COVID-19 pandemic may have heightened older adults’ vulnerability to physical inactivity and social isolation. The purpose of this study was to explore older adults (≥ 55 years old) experiences of shifts in physical activity behaviours, program participation, and social outcomes as opportunities for engaging in physical activity changed throughout the COVID-19 pandemic. Guided by a reflexive thematic analysis methodology, qualitative interviews were conducted to explore the lived experiences of older adults (N = 29; Mage = 68.14 years). Three themes were identified: (a) navigating uncertainty and loss, (b) emotional ambivalence about reconnecting, and (c) heightened self-awareness of the body and social activity. Older adults varied in their approaches to coping with restrictions on physical activity programs and access to recreational facilities, which severed an invaluable source of social connection and contributed to a sense of loss among many older adults. Despite being eager to resume participation in physical activity programs, the enthusiasm of many older adults was often accompanied by apprehension and hesitancy to re-engage in social settings. Resuming physical activity following post-COVID closures, coupled with physical experiences of aging, heightened older adults’ self-awareness of how their physical capabilities affect their physical and social activity. These findings will be disseminated through educational initiatives for fitness professionals to inform them of the social implications of group physical activity programs and support them in fulfilling the social needs of older adults within these programs. Funding source: The Brawn Family Foundation.

Life skills as a resource in physical activity-related health competence among university physical education students

Nadja Schott, University of Stuttgart

Life skills can positively impact physical and mental health, academic and motor performance, and the general well-being of young people. According to the WHO, life skills are personal, interpersonal (i.e., social), cognitive, and physical skills that individuals develop in one context (e.g., university, sport) and are also used effectively in other contexts. These competencies enable individuals to adopt adaptive behavior and deal effectively with the demands and challenges of everyday life. Life skills are also necessary for a salutogenic, physically active lifestyle and a successful life. Therefore, they might serve as a basis and an important indicator of physical activity-related health competence. This study examined the relationship between eight life skills (teamwork, goal setting, time management, emotional skills, communication, social skills, leadership, problem-solving; Life Skills Ability Scale, LSAS; Cronin et al., 2019) and health-related physical activity competence (affect regulation, control of physical load, self-control; Sudeck & Pfeifer, 2016) in 338 physical education students (age 23.0 ± 2.77; 46.7% female). Multiple linear regressions revealed that goal setting, social skills, and teamwork were positively associated with affect regulation (r range = .31 – .39; R² = .284). Control of physical load was positively linked to emotional skills, time management, teamwork, and goal setting (r range = .21 – .38; R² = .304), while self-control was positively related to goal setting, time management, and problem-solving (r range = .06 – .51; R² = .435). Furthermore, better life skills were associated with stronger academic self-efficacy, greater life satisfaction, extraversion, conscientiousness, openness, and lower obesity rates. In conclusion, life skills — specifically goal setting — can be seen as critical personal resources that empower individuals to positively impact their health by improving their movement, control, and self-regulation skills. This, in turn, promotes the co-creation of healthy living environments.

Physical activity and depressive symptomology among university students who utilize campus healthcare

Gabriella Senior, University of North Florida; Jessie Stapleton, University of North Florida

University-aged students experience the highest prevalence of depressive episodes among adults. Indeed, nearly a third of university students report a diagnosis of depression. Among these students, cisgender women experience rates of depression diagnosis almost double that of cisgender men. Physical activity (PA) has been shown to be effective for both treating depression and decreasing depression risk among university students. Thus, the aims of the present study were to investigate the relationship between depression symptomology and PA among university students who utilize campus healthcare and to identify differences in depressive symptomology between students who report meeting aerobic and resistance training PA guidelines and students who do not. Data were collected from university healthcare service initial visits that occurred during the fall semester (N = 1018, Mage = 21.58 ± 4.41 years). Depressive symptomology was measured using the Patient Health Questionnaire-2. PA was measured using the Physical Activity Vital Sign instrument. Pearson correlations were used to examine relationships between depressive symptomology, minutes of aerobic PA, days of aerobic PA, and days of strength training. Independent t-tests were used to examine differences in depressive symptomology by PA. Significant correlations emerged between depressive symptomology and all measures of PA (p < .05). Independent t-tests revealed students who met both the PA guidelines reported significantly less depressive symptomology than students who did not (t(961) = 2.85, p < .01). When stratified by gender, this relationship remained significant in women (t(614) = 2.66, p = .01, but not in men (t(272) = .15, p = .88. The study findings demonstrate a significant inverse relationship between depressive symptomology and PA and significantly less depressive symptomology among students meeting the PA guidelines — particularly women. In US universities, women comprise the majority of the students; therefore, PA intervention could substantially enhance the mental health of the campus community.

Promoting adaptive transition out of collegiate sport: A person-centered approach

Yeongjum Seo, University of North Carolina at Greensboro; Erin Reifsteck, University of North Carolina at Greensboro

To date, sport transition frameworks have been devoted extensively to psychosocial and vocational challenges related to the interplay of...
individuals’ athletic and student identities. Comparatively, the long-term health issues that emerge as student-athletes (SAs) exit competitive sport have received less attention. Further, variable-centered approaches have yielded inconsistent findings when it comes to understanding the subjectivity of transition experiences across different sports and cultural contexts. Therefore, through the application of the model of multiple dimensions of identity (MIDI), the purpose of this study was to examine the role of exercise identity, which is predictive of behaviors related to the physical aspect of sport transition, in relation to other transition relevant identities using a person-centered approach. Specifically, we employed Vermunt’s 3-step latent profile analysis to examine 1) latent identity profiles rooted in multiple identities (i.e., athletic, student, exercise) critical to SAs’ adaptive transition, 2) antecedents to the retained profiles, and 3) the extent to which these identity profiles are associated with indicators of an adaptive transition within psychosocial, physical, and vocational domains. Among 229 collegiate SAs (N=224 men; M_age = 19.93 ± 2.4 years), five novel profiles were identified (i.e., athlete-exercise, moderate multidimensional, high multidimensional, diminished, exclusive exercise identity profiles) where profile memberships were significantly predicted by class year and career length. Further, observed associations with transition indicators suggest that individuals who have cultivated a robust multidimensional identity are more likely to experience adaptive transition in various aspects. Developing multiple identities can bring a synergistic effect to reactively and proactively cope with various challenges that emerge during and after the termination of a sport career. More studies with longitudinal and cross-cultural designs are needed to validate and extend these findings.

Feasibility of a two-arm aerobic exercise trial assessing clinical and neural outcomes in transitional-aged youth with depression

Sitara Sharma, University of Ottawa; Jennifer Brunet, University of Ottawa; Anjali Jagannathan, University of Ottawa; Katie Bush, The Royal’s Institute of Mental Health Research; Dana Crack, The Royal’s Institute of Mental Health Research; Natalia Jaworska, The Royal’s Institute of Mental Health Research

Major Depressive Disorder (MDD) is common in transitional-aged youth (TAY; 16–24 years). Whilst regular aerobic exercise is known to reduce symptoms of depression, the effect of varying exercise intensities on depression/related outcomes in TAY remains unclear. To inform future trials, we assessed the feasibility of an ongoing two-arm randomized controlled trial comparing continuous moderate (M) vs. high (H) intensity exercise protocols in TAY with MDD. Recruits from universities, health clinics, and a hospital across Ottawa (Canada) were randomized to M or H. Both arms received 3 supervised sessions/week for 12 weeks and completed measures of depression at baseline, mid-, and post-intervention. Feasibility outcomes (recruitment, randomization, retention, adherence) for the interventions (M/H) and trial methods were tracked by trial staff. Since 02/2019, 160 self-referred TAY were screened; 32 (20%) were eligible, consented, and randomized (n_M = 18, n_H = 14), yielding a recruitment rate of ~8 participants/year given a 1-year COVID-related pause. Twenty-eight (87.5%) participants provided baseline data (M_age = 21.3 ± 1.9 years; 82.1% female), but due to time restraints and participant burden, 4 (14.3%; n_M = 2, n_H = 2) did not receive their allocated intervention and 5 (17.9%; n_M = 2, n_H = 3) withdrew after attending ≥1 exercise session; 1 (3.6%) was removed on account of mental health concerns. Of the remaining 18 participants, 14 (77.8%; n_M = 11, n_H = 7) attended ≥75% (27/36) of prescribed exercise sessions (M_adherence = 78%), and 15 (83.3%; n_M = 9, n_H = 6) provided post-intervention data for the primary outcome (depressive symptoms), resulting in a trial retention rate of 53.6%. Overall, recruitment was low, possibly due to COVID-19 disruptions and strict eligibility criteria; however, targets for M/H intervention adherence and trial retention were achieved. Though caution should be taken when interpreting the recruitment rate, exploring alternative recruitment strategies and revising certain trial methods (e.g., eligibility criteria) may enhance future research to improve MDD in TAY. Funding source: University of Ottawa Medical Research Fund.

An investigation of coaches’ and classifiers’ perceptions of working with athletes with a disability

Rayona Silverman, Queen’s University; Darda Sales, Co. Education & Consulting Inc; Mercedes Watson, Coaches Association of Ontario; Amy Latimer-Cheung, Queen’s University

While there is an increasing focus on sport and disability research, to improve and enable quality sport experiences for coaches of athletes with disabilities more research into the facilitators and challenges of the coach’s role is required. The purpose of this descriptive study was to compare how coaches’ and classifiers’ perceptions of working with athletes with a disability (AWAD) has changed since 2018, and to evaluate any notable perceptions. Participants included 170 current and past coaches (125 coaches of athletes with a disability (AWAD); 45 coaches of able-bodied athletes (CABA)) and 12 current and past classifiers located across Ontario, Canada. Eligibility criteria for the participants required that they (a) were over the age of 18 at the time of the survey and (b) currently or formerly a coach/classifier in Ontario. Participants completed a mixed methods survey consisting of questions related to demographics, coach and sport background, coach learning, coach efficacy, and perceptions of capability, opportunity, and motivation behaviours (OM-B). Data analysis was completed using excel and SPSS. An inductive-deductive thematic analysis approach was used to analyze open-ended questions. Results from this study indicated that there were a few significant changes, notably in coach capability. Many coaches highlighted the importance of including athlete input when looking to improve access and overall sport experience. AWAD also rated informal sources of knowledge (i.e., interacting with other coaches and learning by doing) as the most important, in comparison to formal sources of knowledge (i.e., general NCCP training and sport-specific training). Coaches also emphasized the value of interacting with other coaches and the importance of increased networking across coaching communities. The results from this follow up study may contribute towards the measurement of improved facilitation, participation, and positive development for athletes with disabilities working with coaches and classifiers in Ontario. Funding source: Ontario Trillium Foundation.

Comparison of exercise videos and exergaming: Physiological and psychological responses

Jessica Smith-Ricketts, Kent State University; Gretchen E. Elsey, Kent State University; David Kohan, Kent State University; Jacob E. Barkley, Kent State University

Exergaming has been demonstrated to be an enjoyable mode of physical activity. Previous research suggests that exergaming is more enjoyable than and can elicit energy expenditure (EE) similar to that of common physical activities (e.g., walking). However, exergaming has yet to be compared to a similar video-based activity (e.g., exercise videos). Thus, the purpose of this study was to compare physiological and psychological responses of exergaming to the same video-based activity. Thirteen college students (n=10 female, 20.8 ± 0.8 yrs) from a large Midwestern University attended one lab visit. Participants completed four bouts of exercise: two exergaming conditions (Zumba and Boxing) using the Nintendo Switch and two video-based conditions of the same activities via YouTube. Each exercise bout lasted 5-minutes and order of conditions were randomized. Heart (HR) and EE were assessed twice during each bout. Following the completion of an exercise bout, participants completed four questionnaires assessing affective valence, arousal, enjoyment, and perceived exertion. Two-way repeated measures ANOVAs were run to determine differences
across game (Zumba vs. Boxing) and condition (Nintendo vs. YouTube) for all variables. Results demonstrated a significant interaction for enjoyment (p = 0.044), as there was a larger increase in enjoyment from YouTube to Nintendo for Zumba than boxing. Further, there was a significant main effect of condition (p < 0.02) for arousal, HR, and EE, where the Nintendo condition elicited higher ratings for all variables when compared to the YouTube condition. No further significant effects (p > 0.08) were noted. In summary, exergaming elicited increased HR, EE, and higher ratings of enjoyment and arousal than the video condition regardless of game. Further, the significant physiological changes noted in the Nintendo condition without a significant main effect of condition in perceived exertion may indicate that, while exergaming may be more physiologically taxing, the increased feelings of enjoyment could mask perceived exertion. Funding source: Kent State University EHHS Grant.

Five modules of support: A coaches’ guide to helping athletes experiencing pre-performance anxiety

Courtney Stevens, University of Lethbridge; Paige Pope, University of Lethbridge

Pre-performance anxiety (PPA) is a universal experience within the athletic sphere, impacting athletes of all ages, at all levels of competition, and with varying skill sets. PPA can impact an athlete’s performance, behaviour, and mindset, producing problematic outcomes both within and beyond sport. Due to the consistently increasing standards for success, as well as augmented pressure arising from external sources (i.e., parents, media), athletes are at a heightened risk of experiencing PPA. Providing coaches with the information and strategies to help athletes manage PPA can foster the development of coping skills and methods for tackling the negative effects of PPA within the athlete population. After performing an extensive review, we synthesized the literature and identified five salient strategies that have been effective in helping coaches support athletes with PPA, leading to the development of five modules of support: (1) PPA symptom identification and interpretation, (2) Self-confidence support, (3) Cognitive restructuring, (4) Performance routines, and (5) Effective support and coach self-reflection. The review was conducted with the intent of fostering knowledge mobilization by producing evidence-informed resources aimed toward coaches to aid in their support of athletes experiencing PPA. To facilitate this, we developed multiple resources within each module, presented in various formats such as worksheets, activities, and infographics. Because the resources were created for coaches and intended to maximize knowledge mobilization, all information presented was synthesized, user-friendly, and employed layperson terminology to ensure comprehensibility and ease of utilization. These resources are currently being administered to and tested by a sampled population of coaches. For the purposes of this presentation, we will deliver summaries of each of the five modules of support and several examples of the resources we developed for coaches. Funding source: Alberta Graduate Excellence Scholarship (AGES); University of Lethbridge Graduate Research Award (ULGRA).

Interpreting person-specific and variable-centered relationships between readiness states and affective valence during leisure-time physical activity

Kelley Strohacker, The University of Tennessee, Knoxville; Gorden Sudock, Eberhard Karls University of Tübingen; Adam Ibrahim, The University of Tennessee, Knoxville; Richard Keegan, University of Canberra

The Affective-Reflective Theory of physical inactivity and exercise posits that unpleasant experiences thwart decisions to be active, warranting identification of experiential determinants. Qualitative work shows subjective readiness (evaluations of physical, cognitive, and emotional resources) as influencing leisure-time physical activity (LTPA) experiences. Quantification of effects must consider between-person results may not reflect within-person processes. This study explored person-specific associations between LTPA-related readiness and affective experience, then compared these patterns to variable-centered associations. Participants (N = 22) initiated event-contingent ecological momentary assessments (24 ± 11 LTPA events/person). Reports captured pre-activity readiness domains (Acute Readiness Monitoring Scale) and post-activity recall of in-task affective valence (Feeling Scale; FS). Spearman rank correlations were computed from participants’ time-series data and averaged data. Associations were interpreted as small (r = 0.29), medium (r = 0.49), or large (r = 0.50). Variable-centered findings showed negligible-to-small associations between FS and physical (r = 0.22; p = 0.93; CI = −0.41, 0.44), cognitive (r = 0.19; p = 0.39; CI = −0.25, 0.57), and emotional (r = 0.05; p = 0.83; CI = −0.38, 0.46) readiness. However, medium-to-strong person-specific associations regarding FS and physical, cognitive, and emotional readiness were observed in 56%, 33%, and 52% of individuals, respectively. Non-negligible inverse associations were observed for six associations (r = −0.15 to −0.32). This work furthers our understanding of how readiness impacts LTPA-related affect by highlighting the potential for Simpson’s paradox (population-level associations reversed within subgroups of that population). Both nomothetic and idiographic approaches are needed to identify which determinants of LTPA-related experiences are unique to a person, are shared within an identifiable subgroup, and are shared across the general population to advance strategies for precision behavioral medicine.

Motivation states to move and be active in healthy and clinical populations: A scoping review

Matthew Stults-Kolehmainen, Yale New Haven Hospital; Matt Howard, University of South Alabama; Paul McKee, Duke University; Markus Gerber, University of Basel; Susannah Williamson, Walter Reed Army Institute of Research; Amanda Divin, Texas A&M University – Commerce; Sanaz Nosrat, Teachers College – Columbia University; John Kranz, Hanover College; Cyrus Dadina, Georgia Institute of Technology; Fabio Amador Bueno, Connecticut Community Colleges; Miguel Blacutt, University of Notre Dame; Rebekah Blakemore, University of Otago; John Bartholomew, The University of Texas at Austin; Regina Casper, Stanford University; Garrett Ash, Yale University

Affectively-charged motivation states (ACMS) to move, be active, and sedentary are often characterized as a “want”, “desire”, “urge” or “craving”. Only recently have they been investigated systematically, and no comprehensive reviews of the topic exist. The purpose of this scoping review is to understand the prevalence of the concept of motivation states to move the body across various literatures, descriptors used, assessments utilized, and theories or models used to describe the phenomena. A novel search method was employed. The optimal search strategy was first determined by iterative searches of Web of Science, PubMed, and Scopus. Search terms systematically varied and included motivation state descriptors + a physical activity descriptor, such as “want to move” and “urge to exercise”. Titles and abstracts were independently reviewed against exclusion criteria. A team of data extractors examined PDFs for relevant factors per JBI’s SUMARI system. Average interrater reliability across 25 factors was .68. Most studies were clinical (46.2%) or both clinical and healthy (17.4%). 30% of studies focused on Restless Legs Syndrome, 18.2% on physical activity/exercise, and 9.9% on Groove (the ability of music to motivate movement). The most common subjective descriptors were “urge” (49.0%), “want” (10.7%), and “desire” (7.1%). 23.3% of studies described exogenous sources of motivation (e.g., music). 30.8% used some kind of validated instrument to assess the motivation states.
Only 14.1% described the state as being purely positive in valence. 20.8% used an explicit model or theory to guide experimentation. 16.3% discussed aversions or diswants of movement. Only 8.3% also discussed motivation for sedentarism. Motivation states to move the body and be physically active are represented in a highly diverse literature, mostly focused on clinical conditions where such sensations are pathological and bothersome. The description of such motivations/sensations is captured much less in healthy populations. However, they appear to have similar neurophysiological underpinnings.

Exert more and feel more accomplished, but not better? Re-examining the links among changes in exertion, accomplishment, and feeling state

Cheryl Stuntz, St. Lawrence University

Zenko et al. (2016) and Stuntz et al. (2020) both examined how people respond to increasingly harder or easier exercise sessions, yet they came to different conclusions. With a general sample, Zenko et al. found that as participants increased exertion, they experienced less pleasant feeling states; decreasing exertion led to more pleasant responses. With a sample of college athletes, Stuntz et al. found that as participants increased exertion, they felt increased accomplishment and, in turn, increasingly more pleasant feeling state. The current study examined whether this indirect path from change in exertion to change in feeling state through change in accomplishment could be demonstrated in a sample of both athletes and non-athletes in an experimental setting. It was hypothesized that the positive relationships between increasing exertion and accomplishment and between increasing accomplishment and feeling state would be stronger for individuals with higher exercise identity, while the relationship between increasing exertion and decreasing pleasant feeling state would be stronger for individuals with weaker exercise identity. Participants included 131 Psychology students (58% female; 71% White; 63% athletes). After being fitted for a heart rate monitor, participants completed 10 one-minute exercise segments that either progressively increased or decreased in intensity and completed measures after each exercise segment. As hypothesized, working progressively harder led to increasing feelings of accomplishment, and individuals with stronger exercise identities showed a stronger positive relationship between change in exertion and change in accomplishment than those with weaker exercise identities. Contrary to hypotheses and past research, neither change in exertion nor change in feelings of accomplishment predicted change in feeling state. These findings call into question the replicability of past work linking change in exertion with affective responses. Working harder leads to feeling more accomplished, but not necessarily to change in affective responses.

The effects of attentional strategies on affective responses and pain tolerance during isometric contraction exercises

Sara A. Thompson, Washington State University; Sarah Ullrich-French, Washington State University; Anne Cox, Washington State University; Amanda McMahon, Washington State University; Kim Holmstrom, Washington State University

Maintaining regular exercise is difficult for many individuals. Strategies are needed to help overcome barriers to exercise, such as pain and discomfort. During isometric contraction exercises, pain during exercise through interoceptive feedback is a common reason individuals stop the exercise. One strategy tests associative and dissociative attention during exercise. Dissociation leads to more pleasant exercise experiences compared to associative attention in untrained individuals. However, recent evidence suggests mindful association can also be a pleasant experience. Therefore, this study tested if a mindfulness (associative) strategy during isometric contraction exercises differed from a mental math (dissociative) strategy on core affect, pain tolerance, mindful reappraisal of pain, and remembered and forecasted affect. An active sample (N = 31, M_age = 21.29, 54.8% female) participated in a between-subjects experiment consisting of a randomly assigned attentional strategy (either mindfulness or mental math) to use during a plank and wall-sit exercise. Participants were taught the strategy in a baseline session and asked to practice the strategy before returning to the experimental session 2–3 days later. Preliminary results reveal those who used the mindful strategy during a plank had higher pain tolerance (p < .02) compared to those using the mental math strategy. Participants in the mindful strategy condition were also more detached from negative thoughts and feelings associated with pain during a wall-sit (p < .03) and a plank (p < .01), compared to the mental math condition. Experimental manipulation was supported with higher (p < .05) state mindfulness and internal attentional focus in the mindful compared to the mental math condition. Results suggest the use of a mindful associative strategy can lead to the ability to hold a plank longer and be more mindfully detached from the pain compared to using a dissociative distraction strategy. This study is ongoing, and more research is needed to support conclusions about attentional strategies during isometric exercise.

The emotional and cognitive effects of mental fatigue on physical activity enjoyment

Samira Sunderji, University of Toronto; Catherine M. Sabiston, University of Toronto

Mental fatigue (MF), characterized by feelings of tiredness and a lack of energy, is experienced during or following prolonged and challenging activity. MF is consistently reported by university students as a barrier to physical activity (PA), as higher levels of MF are shown to decrease PA. PA enjoyment is one of the strongest predictors of PA participation and could be an important factor to target within students. While the relationship between MF and PA has been tested, the specific cognitive and emotional domains of MF on PA enjoyment have not been explored. The purpose of this study was to determine the effects of cognitive and emotional fatigue on PA enjoyment among university students. Participants (N = 21) were randomized into a cognitive fatigue (CF), emotional fatigue (EF), or comparator group. Participants completed a Stroop task in the CF group, a relived emotion writing task in the EF group, or a mindfulness meditation practice in the comparator group, with all tasks standardized to 20 minutes. Manipulations successfully elicited fatigue states for participants within the CF (CFPRE = 34.05 ± 24.38; CFPOST = 37.38 ± 26.44) and EF (EFPRE = 30.24 ± 22.11; EFPOST = 32.10 ± 23.93) conditions, with higher mean score responses indicating higher levels of fatigue post-manipulation. Following a 15-minute bout of self-selected intensity treadmill walking, participants used the Physical Activity Enjoyment Scale (PACES) to reflect on their levels of enjoyment during the task with higher scores indicating more enjoyment. ANOVA results displayed no significant group differences (F [2,18] = .09, p = .91). PACES mean responses were highest in the EF group (4.55 ± 1.03) followed by the CF group (4.46 ± 0.93) and comparator group (4.30 ± 1.28). Future research will benefit from determining if other factors (i.e., motivation), in combination with CF and EF, contribute to PA enjoyment. These findings also emphasize the need for university students to adopt practices specific to their type of fatigue to increase PA enjoyment levels and promote PA participation. Funding source: Canadian Graduate Scholarships—Masters (CGS-M) on behalf of the Social Sciences and Humanities Research Council (SSHRC).
Testing the applicability of a competing values framework-based 360° leadership feedback with coaches in the German gymnastics federation

Maike Tietjens, University of Muenster; Sebastian Brückner, University of Muenster; Ralf Lanzwehr, Fachhochschule Südwestfalen; Jasper Möllmann, University of Muenster; Cornelius Reh, University of Muenster; Tobias Samol, University of Münster; Bernd Strauss, University of Muenster

Our aim was to implement a leadership assessment based on the Competing Values Framework (Quinn, 1984) in a competitive sport setting. Contrasting leadership roles that reflect complex coaching behavior in sport can be mapped using the CVF supplemented with visionary- charismatic leadership. This concept precisely describes an individual’s ability to exhibit a wide range of contrasting behaviors (Lawrence et al., 2009). Thus it has the potential to deepen our understanding of coaches’ successful leadership behavior. However, to date, no studies have examined the applicability of the CVF in sport settings. 21 national coaches (trampoline, rhythmic gymnastics, gymnastic; age \( M = 44.73 \) years, female 52%) and 241 external reviewers (athletes, colleagues, and supervisors) were recruited (360° feedback). Context-adapted modified questionnaires by Lawrence et al. (2009) (collaboration, creativity, control, competition, omega \( \rho = .57 - .90 \); 1=disagree to 5=agree) as well as Bastardo (2020) (charisma, omega \( \rho = .63 \) – .80; 1=disagree to 5=agree) were filled in separately by coaches (self-image, SI) and reviewers (external-image, EI). Coaches showed high values in all leadership roles (SI: \( M = 3.25-4.33, SD = .35-87; EI: M = 3.60-4.21, SD = .61-88 \)). Male and female coaches consistently rated themselves equally \((p > .05, except for competition Mm = 4.06 Mf = 3.76, p < .05)\). No differences were found between the reviewer groups \((p > .05)\) and different sports \((p > .05)\). EI feedback matches coaches’ SI and is homogeneous. Unexpectedly, gender differences were not found for SI, with SI showing high scores throughout all leadership dimensions. Limitations are the small sample size of coaches and a potentially positive selection bias. Nevertheless, the diagnostics are applicable for the context.

The physical activity and sports behaviour of adolescents with mental illness: Correlations with physical self-concept, motivation and anxiety

Maike Tietjens, University Münster, Germany; Lena Henning, University Münster, Germany; Matthias Marchhoff, Universitätsklinikum Münster, Germany; Manuel Föcker, Universitätsklinikum Münster, Germany; Nils Neuber, University Münster, Germany; Angela Roelver, Universitätsklinikum Münster, Germany; Ute Große-Westermann, University of Münster, Germany; Sebastian Salomon, University Münster, Germany; Dennis Dreiskämper, University Münster, Germany

COVID-19 has led to an increased prevalence of mental illness among school students (Reiß et al., 2023). Students with mental illness have a high prevalence of physical inactivity and could therefore particularly benefit from the health-promoting potential of physical activity promotion (PA). Among other things, PA can increase well-being, represent a coping strategy and protect against comorbidities (Radovic et al., 2017). To date, there is little research on PA and predictors of PA in students with mental illness. Although much research exists on motivation, enjoyment of sport and physical self-concept for healthy populations, this does not apply to negative emotions such as sports anxiety. As part of an interdisciplinary project funded by the NRW State Chancellery, 38 adolescents (\( M_{\text{age}} = 15.53, SD = 1.2 \); in particular depressive episodes, gender identity disorder) who were admitted as inpatients to a child and adolescent psychiatry clinic were asked about PA as well as their motivation, self-concept, social anxiety and sports anxiety. On average, the adolescents fulfill the WHO recommendations for PA on 3.8 \((SD = 1.6)\) days. The size of the standard deviation indicates a high degree of heterogeneity. They tend more towards self-determined forms of organization, are more intrinsically motivated \((M = 3.93, SD = .82)\) than extrinsically motivated \((M = 2.87, SD = .95)\), and have a level of anxiety about physical education \((M_{\text{anxiety}} = 3.18, SD = 1.39; M_{\text{som. anxiety}} = 3.35, SD = 1.35; 5-point Likert scale). General anxiety correlates negatively with self-esteem \((r = -.67, p < .001)\) and physical self-concept (sportiness: \(r = -.51\) and attractiveness: \(r = -.60, p < .001\)) and positively with social anxiety \((r = .63, p < .001)\). The findings show that it is necessary to record constructs such as negative emotions in order to gain a better understanding of participation conditions and to align interventions accordingly. The next step will be to compare the results with other groups of school students. Funding source: State chancellery NRW, Germany.

An incubator for best-practices: Establishing a national community of practice of community-based exercise programs for persons with disabilities

Jennifer R Tomasone, Queen’s University; Natara J Ng, Queen’s University; Isaac Kelman McFadyen, Queen’s University; Jasmin K Ma, University of British Columbia; Amy E Latimer-Cheung, Queen’s University

Community-based exercise programs (CBEPs) tailored for persons with disabilities (PWD) promote participation in physical activity, yet little published guidance exists to optimize CBEPs. The potential for providers to learn from each other’s “on-the-ground” experiences and establish best practices for program delivery was the impetus to formalize a network in Canada. Communities of practice (CoPs) are groups wherein people with common interests come together to share knowledge and foster innovation. Thus, we aimed to establish a CoP for providers of CBEPs for PWD in Canada. Using Cambridge et al.’s (2005) lifecycle stages for CoP development (i.e., inquire, design, prototype, launch, grow, sustain), a collaborative multistep process was undertaken. First, a needs assessment survey was distributed to potential members to identify the CoP’s audience, purpose, vision, goals and logistics, and to nominate other potential members. Second, group processes and roles grounded in the Integrated Knowledge Translation Guiding Principles were outlined. Third, formal invitations were sent to 24 providers in CBEPs for PWD across Canada, and interested members completed a member profile. The CoP was launched in July 2022 with 18 members. The CoP’s co-produced mission is “To create and mobilize best practices for optimizing participation among PWD in CBEPs”. Members attend quarterly virtual meetings and share knowledge and resources in an online platform between meetings. Since its inception, the CoP has grown to 27 members representing 15 CBEPs across five provinces. To sustain its operations and create opportunity for innovation, the CoP has partnered with a research initiative – the Canadian Disability Participation Project (CDPP) – which provides a mechanism for conducting CoP-driven research. The process used to establish our CoP may serve as a model that can be leveraged for CoP formation where there is potential for researchers and practitioners to share knowledge, create best practices, and generate a research agenda that is meaningful in the real-world. Funding source: Social Sciences and Humanities Research Council of Canada (SSHRC).

The Wild, Wild West: Exploring relationships of sport and physical activity leaders across the intermountain west United States

Daxon Toone, Utah State University; Katherine Alexander, Utah State University; Travis Dorsch, Utah State University; Mitchell Olsen, Utah State University; Kat Adams, Utah State University; Daniel Fleming, Hull University

Due to a general lack of regulation and oversights, along with many other significant challenges (Gould, 2019), youth sport and physical activity
leaders must often fulfill complex and multi-faceted roles in their organizations. The sport and physical activity landscape of the Intermountain West region of the United States stands out as unique, with distinct opportunities, including ample opportunity for outdoor recreation as well as traditional and culturally diverse activities. However, it also has specific drawbacks, including geographical challenges and limited resources. The present study was designed to explore the perspectives of sport and physical activity leaders (i.e., sport administrators) within this region to better understand how they perceive relationships with parents, athletes, and others as influencing their organizational motives and considerations. Semi-structured interviews were conducted with 24 sport administrators in the Intermountain West.

Questions examined participants’ experiences, their commitments and responsibilities, their relationships with families and others, and how their communities supported youth sport and physical activity initiatives. Participants revealed a diverse range of motives across individual and relational domains. Data provide insight into participants’ personal involvement, daily duties, and complex interactions with coaches, children, and parents. Overall, findings highlight the importance of considering how leader perspectives around personal and relational aspects might influence the design and delivery of youth sport and physical activity programs. This is especially salient given the lack of local, state, or federal oversight in the sport and physical activity contexts.

Effects of self-control and brain endurance training on physical endurance performance

Daniel Trafford, McMaster University; Matthew Winkel, McMaster University; Christopher Ring, University of Birmingham UK; Neil Dalaway, University of Birmingham UK; Steven R Bray, McMaster University

Self-Control Training (SCT) and Brain Endurance Training (BET) are novel training modalities designed to enhance physical and cognitive capabilities by building resiliency to fatigue. SCT involves systematic exposure to tasks requiring self-control, while BET involves systematic exposure to challenging cognitive tasks sequentially or concurrently with physical endurance tasks. This study investigated the effects of SCT and BET on performance of a maximal isometric endurance task (high plank). It was hypothesized that, after training, SCT and BET would outperform controls on the high plank task. Participants \( N = 33 \) were randomized to one of three groups: SCT (maximal isometric handgrip; \( n = 13 \)), BET (10-minute cognitive task [SOMA NPT™] followed by maximal isometric handgrip; \( n = 10 \)), no-training/control (10-minute documentary video viewing; \( n = 10 \)) and completed 18 training sessions over a 4-week training schedule. Maximum endurance performance trials of the high plank task were completed at baseline, mid-training (2-weeks), and post-training (4-weeks). Analysis of covariance (ANCOVA) models were computed for each of the mid- and post-training trials (controlling for baseline high-plank performance) to assess between-group effects on performance. There were no significant effects of training on high plank performance at mid-training. Results of the post-training analysis showed the SCT group outperformed the control group (\( p = .044, d = .961 \)) while no other between-group effects were significant. Findings support the use of SCT as a training method for increasing physical endurance performance. The cognitive exertion/fatigue associated with BET may necessitate longer exposures for training adaptations to occur. Future research should explore potential dose-response effects of SCT and BET on performance as well as effect modifiers such as fatigue sensitivity and trait self-control.

The brain CARs (Compassion Appreciation Research) intervention: A qualitative exploration within physical activity

Maya Trajkovski, Oregon State University; Deanna Perez, University of California, San Diego; Erica Woekel, Oregon State University

The conventional “war on fat” narrative, centered around weight-focused health interventions, is associated with negative psychological and biological effects, such as shame, guilt, disordered eating, weight gain, and poor long-term health outcomes (Rahimi-Ardabili et al., 2018; Richmond et al., 2021). This discourse perpetuates health inequities and societal norms ingrained with weight stigma, particularly with women, impacting their emotional well-being (Peng et al., 2023). In an effort to shift from a traditional focus on physical health to a more holistic approach, the purpose of this study was to gain an in-depth understanding of participants’ experiences and perceptions of a self-compassion and gratitude program in the context of a strength and conditioning based activity setting. The exploratory Brain CARs (Compassion Appreciation Research) Intervention comprised of six weekly prompts. Each prompt in the intervention was adapted from the Mindful Self-Compassion activities for adults (Neff and Germer, 2013) and supplemented with a gratitude-specific category. As a result of the intervention, participants experienced interconnected and dynamic themes: awareness, cognitive dissonance/discomfort, acceptance, and personal growth and development. Themes not only coexisted but also evolved organically in relation to one another. The Brain CARs Intervention demonstrates the potential for transformative shifts in individual perspectives and adds to the growing line of research for potential alternative approaches to health interventions.

Players or referees: Who is affected most by the home crowd?

Edda van Meurs, University of Munster; Mara Kofath, University of Munster; Bernd Strauss, University of Munster

What drives home advantage (HA) in team sports? A key explanation by sport psychologists – the supportive behavior of fans – only partially relates to improved performance (cf. Strauss et al., 2023). Meanwhile, the fans’ behaviors can be viewed as decision cues for referees, and bias them to favor the home team, which in turn increases HA (cf. Unkelbach & Memmert, 2010). The recent Home Advantage Mediated (HAM; Bilalić et al., 2021) model for soccer used team performances (TP) and referee decisions (RD) in a Bayesian hierarchical mediation model to show that in the absence of spectators during COVID-19, TP declined, and the referees’ bias decreased, which was related to a decrease in overall HA \( N = 4,356 \) games, 12 leagues, 1,131 games without spectators). We extend the HAM model to include the influence of the absolute number of spectators (rather than present/absent) on TP, RD, and match outcome in handball, while controlling for the general decline in HA since 2014. We acquired data from the German male premier league (2014 – 2021, from www.liqui-moly-hbl.de) to analyze whether the influence of spectators on TP and RD mediates the spectator-HA relationship using hierarchical structural equation models. 55% of the \( N = 2,764 \) games in the German handball league were won by the home team. Composite scores for team and referee performances were derived from individual player statistics and referee decisions (fouls, penalties) using confirmatory factor analysis. Before COVID-19, more penalties were given to the away team by the referee \( \beta = .08^* \), but this had a negligible, non-significant effect on HA (\( \beta = .05 \)). Both the indirect effect on the referee \( \beta < .001^* \) and on the TP \( \beta = .07^* \) were smaller than in Bilalić et al. (2021). Hence, the HAM model could not be confirmed for handball (in contrast to soccer), and a model specification and extension to Bilalić et al. (2021) is presented.
Parents’ perspectives on the junior lifeguard program as a context for positive youth development

Danielle Vickland, California State University, Fullerton; Megan Stellino, University of Northern Colorado

The Junior Lifeguard (JG) Program is a summer youth program that emphasizes ocean safety education through direct application (e.g., CPR, first aid, understanding ocean conditions) and physical conditioning (e.g., swimming, conducting simulated rescues). Positive Youth Development (PYD) is defined as an opportunity for youth to learn life skills that they may transfer to other contexts (Catalano et al., 2004). From the experiences within a PYD environment, the goal is that youth build upon skills, such as resilience, confidence, and prosocial behaviors (Pepitas et al., 2005). Parents who enroll their children in the JG Program may be motivated to pursue a socially and contextually specific provision of opportunities for their children believed to contribute to their PYD (Coakley, 2011). Expectancy-value theory (Eccles et al., 1983) suggests activity pursuits are in part dependent upon perceived subjective task values. The purpose of this study was to examine parents’ understandings of the JG program from a developmental perspective and compare them to the tenets of PYD by means of Lerner’s Five Cs (Lerner et al., 2005). JG parents (N = 38, M_age = 46.3 years, 78.9%) female participated in an interview, which included six questions, that explored their motivation for provision of JG Program involvement opportunity for their children. Results of thematic analyses (Braun et al., 2016) revealed a hierarchical emergence of four themes: Process of Skills, Water Safety, Confidence, and Opportunity. Parents expressed the profound acquisition of skills their children learned from the program related to water safety, their children’s confidence, and created a new form of opportunity both for future development and social connection to the JG Program and broader ocean lifeguard community. Findings also highlighted how parents perceived their respective JG programs as a context for PYD. Discussion and conclusions elucidate parent rationalizations for why they provide and will continue to pursue specific PYD opportunities, such as the JG program involvement, for their children. Funding source: United States Lifesaving Association.

Struggling to do well: Development and maintenance of performance crises in professional soccer

V. Vanessa Wergin, The University of Queensland; David Jaimer, Technische Universität Braunschweig; Nicola Boehlke, Technische Universität Braunschweig; Svenja A. Wolf, Florida State University

The continued underperformance over the course multiple competitions or an entire season typically constitutes a sport team’s worst nightmare. While the phenomenon of repeated underperformance occurs throughout all levels of team sport and has recently been conceptually referred to as “team performance crisis” (Buennemann et al., 2023), its psychological mechanisms have not been investigated empirically. To contribute to a comprehensive in-depth understanding of the phenomenon, we employed a grounded theory methodology (Breuer et al., 2018) to develop a substantive theory of team performance crises in professional soccer. We conducted problem-centered interviews with N = 17 (M_age = 33.0 ± 4.3 years) male players of professional European soccer leagues. The repeated self-reinforcing disappointment of expectations on different levels, especially regarding team performance, evolved as a core category of our grounded theory, driving the team crisis through interacting structural and team-related factors. Based on these expectations, teams tend to enter a crisis through a vulnerable state, out of a pressure to perform well in a specific competitive situation, followed by a trigger, typically the non-fulfilment of the expectations tied to the vulnerable situation. The trigger seems to negatively impact team-related factors, such as team atmosphere, perceived collective efficacy, and pressure on the team. A crisis is furthermore characterized by a deficient regulation of this perceived pressure, atmosphere, and accompanying negative emotions in the team, interacting with team performance on a structural level, leading to continued negative results. Other external structural factors, such as club officials, fans, and media appear to reinforce the development and maintenance of the team performance crisis. The results generally support existing conceptual ideas (e.g., Buennemann et al., 2023) empirically, providing a substantive model for the development and maintenance of crises in soccer. Practical implications to mitigate against performance crises in teams are discussed.

Psychological mattering predicts wellbeing in youth athletes

Rachel E Williams, University of Tennessee Knoxville; Jedediah E Blanton, University of Tennessee Knoxville; Christine Pacewicz, Miami University; Christine Habeeb, East Carolina University

Psychological mattering is generally thought of as feeling valued and adding value to a particular relational context. Researchers have used mattering to examine relationships in family, school, and community contexts (Edwards & Neal, 2017; Marshall, 2004; Tucker et al., 2010), concluding that perceptions of mattering significantly influence and predict various measures of self-concept and mental health. To date, mattering has not been explored in youth sport, which is a rich context for participants to possibly develop meaningful relationships and exhibit favorable mental health outcomes. Thus, the purpose of the current study was to investigate variables of mattering, self-esteem, and wellbeing in youth sport. Youth athletes (N = 299, M_age = 14.05 ± 1.94 years) from club sport teams completed a survey battery with four measures of general and sport-specific mattering (i.e., General Mattering, Antimattering, Mattering to Coaches, and Mattering to Teammates), a self-esteem scale, and a measure of mental wellbeing. Latent variable path analysis was used to test the hypothesized model whereby measures of mattering would directly predict wellbeing and indirectly through self-esteem. The model was considered an adequate-to-good fit. Various direct pathways were significant (b_range = −.55 to .50). Using a bias-corrected bootstrapping method with 1000 samples and a 95% confidence interval, general mattering (b = .05, [.01 to .15]) was related to social wellbeing through self-esteem. Additionally, significant indirect effects were observed between antimattering and emotional (b = −.27, −.42 to −.15), social (b = −.17, −.31 to −.06), and psychological (b = −.28, −.43 to −.17) wellbeing. Thus, self-esteem seems to help explain the relationship between variables of psychological mattering and youth athletes’ wellbeing. Future research may explore the role of mattering in youth sport, relationships, and athlete mental health, assessing how a sense of mattering may protect participants from adverse outcomes.

Friend or friendly stranger: Examining how the source of social support influences physical activity goals

Kathleen S. Wilson, California State University, Fullerton; Mouaz Aladawi, California State University, Fullerton; Isabella Gore Rivero, California State University, Fullerton; Andy Jerome, California State University, Fullerton; Kristyn Terrelonge, California State University, Fullerton

Social support is often thought to be positively related to physical activity (PA; Scarapicchia et al., 2017). However, there is much variation in the effect sizes warranting a look at the types and providers of social support (Scarapicchia et al., 2017). Much of the research has focused on how social
A proof of concept: Self-monitoring dose-response relationships in overreaching freestyle kayak athletes

Chris Wing, Appalachian State University; Marco Meucci, Appalachian State University; Kimberly Faschzewski, Appalachian State University; Andrew Shanely, Appalachian State University; Luke Dover, Appalachian State University

International freestyle whitewater kayakers are a population notorious for overtraining. The final mesocycles before the World Championships are traditionally when whitewater kayaking athletes experience overload in their training programs, and changes in athlete status are expected. Stress and recovery monitoring can allow athletes to operate optimally and avoid injuries, overtraining, and burnout; however, this type of monitoring is not currently best practice with this population. Therefore, this proof-of-concept study explores the dose-response relationships between the psychological state of recovery and stress and heart rate variability (HRV) in freestyle whitewater kayakers during preparation for the World Championships. Two athletes (male=1, female=1) were monitored for 14 weeks before, during, and after a world championship competition. The RESTQ-76, administered weekly, assesses self-efficacy, self-perceived stress and recovery, self-regulation, and environmental and lifestyle stressors. Training load was objectively quantified using weekly averaged training, rate-of-perceived exertion, and HRV. Results indicated a drop in self-regulation predicted declines in self-efficacy, and increases in burnout scores. Despite no increase in the perceived exertion in weekly training rate, HRV showed a dose-response relationship to the downward trend of self-regulation and self-efficacy. The changes were seen in both participants, although more pronounced in the athlete who was a top 5 competitor in their class. Post-exercise was also related to both current and future exercise behavior (Rho = .53, p < .001) and predicted future exercise behavior (B = 12.02, p < .001). Affective constructs have received increasing interest in exercise psychology in recent years. This study adds to the growing literature by examining how affective forecasts, intentions, and incidental affect relate to current and future exercise behavior. In a preregistered study, 164 adults (mean age: 44 ± 11 years; 71 women) completed the Affective Exercise Experiences questionnaire (Ekkekakis et al., 2021) and ad-hoc measures of incidental affect and affective forecasts about future exercise behavior, as well as exercise intentions. Self-reported exercise behavior was also measured. Participants were invited to complete measures again two weeks later. All measures demonstrated acceptable internal consistency (Cronbach’s alpha > .85). Attribution toward exercise was cross-sectionally associated with exercise behavior (Rho = .53, p < .001) and predicted future exercise behavior (B = 12.02, p < .001). Affective forecasts predicted future exercise behavior (B = 7.66, p < .001). Attribution toward exercise was also related to exercise intentions (Rho = .64, p < .001). Incidental affect was related to both affective forecasts (Rho = .697, p < .001) and exercise intentions (Rho = .54, p < .001). Incidental affect was also related to both current and future exercise behavior (Rho = .39 and .40, respectively, ps < .001). Affective forecasts and attraction toward exercise explained 8 to 10% of the variance in future exercise behavior after controlling for incidental affect (ps < .001). Linear regression
indicated that affective forecasts and attraction toward exercise explained 41% (p < .001). Of the variance in future exercise behavior (p < .001). Taken together, this study reinforces the importance of affective constructs, including both affective forecasts and attraction toward exercise. Future investigators should determine how stable constructs such as intentions, affective forecasts, and attraction toward exercise are by considering incidental affect. Funding source: Internal grant at California State University Bakersfield.

**Evaluating adolescent athletes’ scores on the Sport Friendship Quality Scale using CFA and ESEM**

*Justin T. Worley, Utah State University; Lian O’Neil, Utah State University; Alan L. Smith, Utah State University*

The most common tool used to assess features of a best friendship on one’s sport team is the Sport Friendship Quality Scale (SFQS; Weiss & Smith, 1999). This scale contains 22-items spanning six friendship quality dimensions (self-esteem enhancement/supportiveness, loyalty/intimacy, companionship/pleasant play, things in common, conflict resolution, conflict). To date, studies using confirmatory factor analysis (CFA) to analyze the 6-factor SFQS have yielded mixed results (e.g., McDonough & Crocker, 2005). This might be explained by high correlations among positive friendship quality dimensions. Exploratory structural equation modeling (ESEM) may offer an alternative to CFA in analyzing the SFQS. ESEM is less restrictive by allowing for item cross-loadings among latent constructs. The purpose of this study was to compare CFA and ESEM approaches to analyze SFQS scores. Data were collected from adolescent high-school athletes (N = 199, female n = 121, M_age = 16.2, SD_age = 1.3). The CFA showed marginal model-data fit, χ²(194) = 529.99, p < .001; RMSEA = .09; CFI = .90; TLI = .88; SRMR = .10. All factor loadings were adequate (λ > .60) and significant. High latent correlations were observed between positive friendship quality dimensions (five ρ > .80). The ESEM showed exact model-data fit, χ²(114) = 136.64, p = .07; RMSEA = .03; CFI = .99; TLI = .99; SRMR = .03. Latent correlations among positive friendship dimensions were deflated compared to the CFA (ρ < .60). Factor loadings were mostly consistent with expectations. However, two loyalty/intimacy items did not load significantly on their primary dimension but loaded significantly on self-esteem enhancement/supportiveness. Three companionship/pleasant play items did not load significantly on their primary dimension, with two items not loading on any dimension. Although ESEM may be beneficial given reduced latent correlations, we encountered challenges replicating dimensionality of parts of the SFQS. Cross-validating these findings in other samples would add further insight into modeling SFQS scores.

The mediating effect of autonomy motivation in the relationship between perceived teacher feedback and dance satisfaction of dance class participant

*Eun-sim Yang, Korea National Sport University; Young-eun Lee, Korea National Sport University*

In the context of physical education and sports, satisfaction refers to a positive emotional state that is expressed from complex evaluations of processes and results related to physical activity experience. In other words, if a dance participant feels high satisfaction with the dance class, it means that they have experienced the effect on the dance, and the likelihood of continuing participation increases Therefore, in this study, the mediating effect of autonomy motivation in the relationship between perceived teacher feedback and dance satisfaction was examined. Participants in this study were conducted with college students (N = 243, M_age = 22.6 ± 2.4 years) who had participated in dance classes. The collected data were analyzed through SPSS 23.0 and Process Macro Model 4. As a result of the study, first, positive general feedback (β = .466***), performance knowledge (β = .480***), negative non-verbal feedback (β = −.235***), positive non-verbal feedback (β = .524***), and positive non-verbal feedback (β = .142**) were found to affect dance satisfaction (β = −.781***). Third, positive general feedback (β = .450***), performance knowledge (β = .427***), and positive non-verbal feedback (β = .142**) were found to affect dance satisfaction. Fourth, the autonomy motivation is the relationship between positive general feedback and dance satisfaction (CI=427~752), the relationship between performance knowledge and dance satisfaction (CI = .500~.854), the relationship between negative non-verbal feedback and dance satisfaction (CI = .080~.370), and the relationship between positive non-verbal feedback and dance satisfaction (CI = .431~.711). Therefore, dance leaders need to avoid negative non-verbal feedback, provide positive and performance knowledge feedback, and improve participant autonomy motivation in order to increase the satisfaction of dance participants.

**Coaching for winning or holistic athlete development? Examining the role of coaching identities in coaching job satisfaction, stress, and burnout**

*Mariya Yukhymenko, California State University, Fresno*

Coaches encounter high pressures in their roles, including the expectations to develop athletes, win, and excel in coaching, which can lead to the simultaneous adoption of multiple coaching identities. Notably, these pressures may contribute to burnout, influenced by both coaching satisfaction and job stress. The purpose of this study was to examine the role of different types of coaching identities (winning-centered, athlete holistic development-centered, generalized) in coaching burnout directly and indirectly through coaching job satisfaction and stress. Participants were 536 coaches (65.7% male) employed at universities and community colleges in the United States who completed existing valid and reliable measures of coaching identity, coaching job stress and satisfaction, and burnout. Results from structural equation modeling (SEM) revealed that coaching job stress and satisfaction fully mediated the relationships between coaching identity and burnout (r < .05). As expected, coaching burnout was predicted positively by coaching job stress (β = .39) and negatively by coaching job satisfaction (β = -.59). Most importantly, the study revealed that coaches with a strong winning-centered identity experienced low coaching job satisfaction (β = −.11), high coaching job stress (β = .23), and high burnout due to high stress and low satisfaction (total indirect: β = .15). In contrast, coaches with a strong athlete holistic development-centered identity experienced high job satisfaction (β = .25) and low burnout due to high job satisfaction (specific indirect: β = −.14). Coaches with a strong generalized coaching identity experienced high coaching job satisfaction (β = .34), low coaching job stress (β = −.36), and low burnout due to low stress and high satisfaction (total indirect: β = −.34). The SEM model explained 75.9% of the variance in burnout. Findings highlight that prioritizing the development of athletes in a holistic manner may contribute to a more positive coaching experience and reduced burnout risk.

**Initial validity evidence for responses to the coach precompetitive communication questionnaire: Preference under an exploratory bifactor approach**

*Corinne T. Zimmerman, Michigan State University; Nicholas D. Myers, Michigan State University; Robin S. Vealey, Miami University*

Pregame speech is considered a valuable tool used by coaches to impact competition readiness of athletes. Pregame speech has been hypothesized to
be comprised of both content (i.e., verbal messages shared that are tactical and/or emotional in nature) and delivery (i.e., nonverbal and paraverbal forms of messaging) factors. Previous measures of athlete perceptions of pregame speech (Vargas-Tonsing & Guan, 2007), however, have focused solely on athlete preference of a two-dimensional structure of speech content (i.e., tactical and emotional), excluding nonverbal communication (i.e., delivery). Little empirical evidence has been provided for even this reduced conceptualization of pregame speech. Moreover, in addition to excluding delivery from pregame speech measurement, existing approaches have not examined the possibility for a general pregame speech factor in addition to specific pregame speech factors. Conceptualizations of both general (e.g., pregame speech) and specific (e.g., tactical content, emotional content, and delivery – of a pregame speech) factors have been advocated for in sport, exercise, and performance psychology measurement. The Coach Precompetitive Communication Questionnaire – Preference (CPCQ-P) was recently developed to (a) include speech delivery (in addition to tactical and emotional content) and (b) allow for the possibility of a general pregame speech factor in the operationalization of pregame speech. The purpose of this study was to provide initial validity evidence for responses to the CPCQ-P under an exploratory bifactor approach at the athlete-level. Participants were athletes (N = 253) at level-1 from NCAA varsity level teams (G = 27) across the Midwestern United States. The four-factor measurement model exhibited statistically significantly better fit to the data than measurement models with a smaller number of factors. The four-factor model exhibited close to approximate fit to the data after controlling for dependency due to athletes being nested within teams.

Psychosocial factors facilitating anabolic-androgenic steroid dependence

Barnaby Zoob Carter, University of Birmingham; Ian Boardley, University of Birmingham

Over the last decade, risk of anabolic-androgenic steroids (AAS) use has been associated with several psychological factors such as muscle dysmorphia, moral disengagement (MD) and self-regulatory efficacy (SRE). Despite this, there is a dearth of evidence exploring how these constructs influence AAS dependence and associated symptoms (i.e., craving) within recreational strength training communities. The study aimed to address this. Data were collected from a sample of 402 recreational strength athletes (nAAS users = 168) and (nnon-AAS users = 234), who self-reported experience of potential risk factors of AAS use and dependence (i.e., muscle dysmorphia, MD, SRE, self-compassion, and grandiose and vulnerable narcissism) alongside bespoke measures of AAS dependence and craving. Mediation analysis identified a significant indirect effect of self-compassion on AAS dependence (β = −.76, 95% CI = −1.07 to −.45, CSIE = −.06, 95% CI = −.11 to −.10) and AAS craving (β = −.69, 95% CI = −1.03 to −.34, CSIE = −.05, 95% CI = −.12 to −.05) via doping self-regulatory efficacy. Analyses also indicated significant predictive effects of grandiose and vulnerable narcissism, and muscle dysmorphia on AAS dependence and AAS craving respectively. Results from the study indicate a protective effect of self-compassion on AAS dependence and AAS craving. Future research should build on these findings with a longitudinal design to determine a causal model of these risk factors. Funding source: ESRC.
Retractions

The following abstracts were published in the 2023 supplement, but the authors did not present at the 2023 NASPSPA conference.

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

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

Consolidation of explicit motor memory following immediate and delayed post-practice mindfulness meditation in inexperienced meditators
James O. Brown, Flinders University; Willeke M. Kitselaar, Leiden University; Jing Chen, Texas A&M University – Texarkana; David L. Wright, Texas A&M University; Maarten A. Immink, Flinders University

Can brain-endurance training augment the benefits of physical exercise? Evidence from a 6-week training program with U.S. Army service members.
Bradley Fawver, Walter Reed Army Institute of Research; Tobin Thomas, Walter Reed Army Institute of Research; Dana Henry, Walter Reed Army Institute of Research; Michaela Monson, Walter Reed Army Institute of Research; Julie Merril, Walter Reed Army Institute of Research; Michelle Gamlin, Walter Reed Army Institute of Research; Benjamin Trachik, Walter Reed Army Institute of Research; Nathan Kearns, Walter Reed Army Institute of Research; Jeffrey Osgood, Walter Reed Army Institute of Research; Per Aslaksen, Arctic University of Norway; Michael Dretsch, Walter Reed Army Institute of Research

Effect of exercise and mindfulness on cognitive and psycho-emotional functioning in children with ADHD
Hannah Bigelow, Western University; Marcus Gottlieb, UBC; Michelle Ogrodnik, University of Waterloo; Jeffrey Graham, Brock University; Barbara Fenesi, Western University

Organizational influence in athletes’ retirement preparation
Iman Hassan, University of Ottawa; Diane Culver, University of Ottawa

“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

Focused-attention meditation states promote sequence-specific learning when practice provides increased processing time
Maarten A. Immink, Flinders University; James O. Brown, Flinders University; Hassan Ali, Flinders University; Jaimi A’court, Flinders University; Russell W. Chan, University of Twente

Enhancing executive function in children and adolescents through motor learning: A review
Madison Richter, Flinders University; James Brown, Flinders University; Maarten A. Immink, Flinders University

Assessing mindfulness disposition and meditation effort as individual differences in acute meditation effects on motor sequence learning
Olivia G. Toubia, University of South Australia; Edward J. O’Connor, University of South Australia; Maarten A. Immink, Flinders University

An exploration of factors predicting change in the frequency of athlete burnout symptoms over time
Siobhán Woods, Dublin City University; Simon Dunne, Dublin City University; Pamela Gallagher, Dublin City University

Anticipating the depth boundary in returning flick serves during badminton double play
Zuoqi Zhang, University of Wyoming; Qin Zhu, University of Wyoming

Perceived differences in stress amongst Division I college football coaches
Ryan Zimmerman, Weber State University