



9th meeting of the Expertise and Skill Acquisition Network

Book of Abstracts

Wednesday 12th May, 2021

Organising Committee:

Dr Nicholas Smeeton

Dr David Broadbent

Dr Oliver Runswick

Dr Paul Ford

Keynote (09.05-10.05): Professor Damian Farrow

Umpiring Coaching & Innovation Manager, Australian Football League
Professor of Skill Acquisition, Institute for Health and Sport, Victoria University

Practice environments that develop expertise and skill learning

Having worked as a skill acquisition specialist and researcher in the high performance sport setting for the last 25 years I have been fortunate to observe and influence how skill acquisition principles are applied in practice. A primary observation is that the evidence-based design and systematic implementation of practice environments to develop skill is under-utilised by coaches who are overly-reliant on tradition and intuition. I feel this situation is in part a weakness of our field to directly impact coaches in an accessible manner. Consequently over the past five years I have engaged with coaches through the familiar physical training concepts of Specificity, Progression, Overload, Reversibility and Tedium (SPORT) and re-cast them as a skill-training periodisation framework for use in high-performance sport (see Farrow & Robertson, 2016). This presentation will highlight how we have applied this framework for both the systematic investigation of the acute and longitudinal effectiveness of practice design and as a coach education tool. Examples will be drawn from a variety of high performance sport settings to illustrate how we have implemented each principle and in turn analysed its impact.

Reference: Farrow, D. & Robertson, S. (2016). Development of a Skill Acquisition Periodisation Framework for High-Performance Sport. *Sports Medicine*. DOI 10.1007/s40279-016-0646-2

Keynote (16.10-17.10): Professor Joe Baker

School of Kinesiology and Health Science, York University

Storm clouds on the horizon: Emerging issues in the science of talent identification and development

Those working in sport science have the unenviable job of trying to balance the complexity and nuances of sport with the need for scientific control and precision. The difficulty in achieving this balance was perhaps best epitomized by American sport psychologist Rainer Marten in 1979 “I have grave doubts about the utility of laboratory research for most of sport psychology. And, I am disturbed about the gulf between those who do sport psychology research and those who interpret sport psychology research to practitioners.” The last 4 decades have not improved the situation. In this presentation, I will highlight a number of emerging concerns from my research area of talent identification and development, forecasting what this means for the future of our field. Ultimately, I hope this presentation provides the stimulus for a broader discussion of the role of the applied sport scientist as a key stakeholder in how research is conducted, evaluated and applied.

Symposium 1 (10.15-11.15): The role of internal and external information during sub-maximal exercise

Presenters: Florentina Hettinga (Northumbria University, UK), Jake Butterworth (University of Brighton, UK), Amy Whitehead (Liverpool John Moores University, UK)

Runners, cyclist and other endurance athletes are exposed to many sources of information during exercise. This symposium will discuss how information arising from within the body, interoception, and external to the body exteroception provides information to regulate exercise. Prof. Hettinga will present an ecological psychology account of pacing decision-making emphasizing the importance of information arising from how the athlete interacts with the external environment. This presentation will be followed by Jake Butterworth, showing how visceral signals can be used to regulate exercise intensity, highlighting importance of information arising from the internal milieu of signals. Finally, Dr. Whitehead will present research using Think Aloud protocols to understand how about internal and external information is cognitively appraised differently between trained and inexperienced athletes.

The science behind winning: The application of perception-action coupling to exercise and pacing decision-making (Prof. Florentina Hettinga, Northumbria University)

Elite athletes have invested many years in training and competition to reach the elite level. One very important factor towards elite performance in middle distance and endurance sports is the decision-making process regarding the regulation of effort over time, also known as pacing. Particularly when interaction with other competitors is involved in head-to-head competition, such as short track skating or athletics, athlete–environment interactions are crucial factors in understanding the regulation of exercise intensity. We have proposed a framework based on the interdependence of perception and action, which allows us to explore athletic behaviour in the more complex pacing situations occurring when athletes need to respond to actions of their opponents, and propose that opponents can be perceived as social invitations for action. The current presentation will overview the multi-disciplinary work focusing on the application of perception-action coupling to exercise and pacing decision-making to explore the science behind racing against opponents.

Regulation of exercise work rates during self-paced exercise, a role for cardiac interoception? (Jake Butterworth, University of Brighton)

Perception of physiological states, termed interoception, is proposed to influence the regulation of exercise intensity including decisions associated with pacing and task ending. Interoception is often assessed using heartbeat perception tasks. Application of these tasks demonstrate that individuals exhibit notable differences in their accuracy, sensibility, and awareness of interoceptive inputs at rest. However, the potential influence of this diversity in cardiac interoceptive experience on exercise regulation remains poorly understood. Consequently, we examined the regulation of exercise work rates at perceived light (RPE10 on the Borg 6-20 scale) and hard-to-very hard (RPE16) efforts between good and poor heartbeat perceivers. Good perceivers exhibited greater changes in PO between conditions compared with poor perceivers, with differing pacing strategies evident between groups over the first 5-minutes of both conditions. Additionally, good perceivers experienced lower physiological strain (i.e. heart rate and respiratory exchange ratio) in RPE10 but not RPE16.

Cardiac interoception therefore appears to influence judgements related to the selection of optimal exercise work rates during self-paced tasks, particularly at low exercise intensities.

“This is hurting now”: Using the Think Aloud method to understand cognition in endurance athletes (Dr Amy E Whitehead)

How endurance athletes process and attend to both internal and external cues, feedback, and internal feelings and thoughts is a continuing area of interest for both researchers and applied practitioners. From a research perspective, gaining insights into the exteroceptive and interoceptive information used by endurance sports athletes can be difficult to capture and researchers have identified potential difficulties such as memory decay and outcome bias. More recently, research has adopted the use of the Think Aloud method to capture endurance athlete cognitions as they occur during performance. Through the use of Think Aloud it can be evidenced that trained cyclists use active self-regulatory strategies during their performance and maintain a task-relevant focus, whereas inexperienced individuals attempt to use distractive strategies to overcome the perceptions of pain and fatigue associated with exertive exercise. These findings have implications for the training of both novice and trained endurance athletes.

Symposium 2 (10.15-11.15): Looking Beyond Traditional Age Grouping in Youth Sport: International Perspectives

Presenters: Adam Kelly (Birmingham City University), Jan Verbeek (Royal Netherlands Football Association, The Netherlands), Daniel Goldman (Queen’s University and York University, Canada)

Despite their widespread prevalence in youth sport, there appears to be a paucity of empirical research and practical application of strategies specifically designed to moderate relative age effects (RAEs). As such, the purpose of this symposium is to look beyond traditional age group structures by offering alternative group banding strategies aimed at moderating RAEs. Specifically, this symposium explores: (a) “birthday-banding”, (b) the “average team age” (ATA) method, and (c) “playing-up”. Since these group banding strategies are very much in their infancy, a further aim of this symposium is to offer methodological considerations for researchers and practitioners to design, implement, and evaluate such approaches.

First, Adam L. Kelly explores the strategy of “birthday-banding” as a means to moderate RAEs (Jeffreys et al., in press). Put simply, birthday-banding involves an athlete moving up to the next age group on their birthday, whereby they practice and compete against age-matched peers. As a result, during the twelve (or 24) month period, they begin as the youngest in their individual (bi)annual-age group, before progressing towards being the oldest until their next birthday. Specifically, using the England Squash Talent Pathway as a case study, we identified no significant differences between birth quarter distributions in all cohorts (Kelly, Jackson, et al., 2020). The presentation subsequently discusses the potential benefits of birthday-banding as an organisational talent development strategy, as well as how it may offer broader developmental outcomes.

Second, Jan Verbeek addresses the challenge of RAEs by proposing a new grouping strategy with the aim to reduce RAEs; namely the “average team age” method (Verbeek et al., in press). This approach aims to reduce

the competitive advantage which has been found to increase the average age of youth soccer teams, creating an overrepresentation of relatively older players (Lawrence et al., 2019). As such, eligibility is based on the average age of a team rather than the individual age of the athletes competing inside the selection year. This presentation describes how the ATA grouping method operates, whereby setting the average age of the team to creates opportunities for both relatively younger and older players to be selected and, potentially, for the reduction of RAEs.

Lastly, Daniel E. Goldman provides an exploration of “playing-up” in youth soccer (Goldman et al., in press). This phenomenon refers to the practice whereby young athletes who outperform their same-aged peers may be offered the opportunity to “play-up” at higher age levels. While playing-up may facilitate appropriate challenges for high-performing athletes, limited research exists on playing-up and its potential effects on athlete development. We discuss the results of two studies on playing-up in youth soccer. The first study showed that English academy soccer players who played-up exceeded those who did not in terms of several holistic factors (Kelly, Wilson, et al., 2020). The second study revealed that Canadian competitive soccer players who played-up perceived their experiences to involve aspects of challenge and progress (Goldman et al., 2021). Finally, we conclude with an overview of practical applications and an agenda for future research.

Oral presentations (11.30-12.30): Visual processes and performance

Visual, perceptual, and oculomotor; can training transfer positively to batting performance Greg Appelbaum; Sicong Liu; Lyndsey M. Ferris; Susan Hilbig; Edem Asamoah John L. LaRue; Don Lyon; Katie Connolly; Nicholas Port. Duke University, USA

A growing body of evidence demonstrates visual, perceptual, and oculomotor abilities contribute to batting performance in baseball and there is interest in whether training such abilities can transfer positively to batting performance. The current study tested this question through a pre-registered randomized, and placebo-controlled intervention, conducted with 24 collegiate baseball players at two American Division 1 universities. Athletes were randomized to receive either dynamic vision training consisting of stroboscopic, anticipatory timing, and eye quickness drills, or placebo drills stylized after control procedures in previous vision therapy studies. Generalized near-transfer was tested via a digital visual-motor task battery ($n = 20$), while sports-specific intermediate and far transfer of training were evaluated through instrumented batting practice metrics ($n = 14$) and box score performance in NCAA-sanctioned games ($n = 12$), respectively. The effects of training group were tested on these outcome measures while controlling for covariates such as pre-training expectations and site. Participants averaged 8.50 hours of training with no significant training group differences in adherence, expectations, or baseline assessments. ANCOVA revealed no group differences in measures of visual-motor skills or NCAA game statistics. However, batting practice demonstrated significant improvements in launch angle ($p = 0.002$, Cohen's $d = 0.74$) and hit distance ($p < 0.001$, Cohen's $d = 0.70$) for the active cohort relative to the placebo control. This controlled and pre-registered pilot study therefore provides preliminary evidence that vision training may improve batting practice performance, creating new opportunities for the transfer of skill training and warranting further study.

Visual Cognition and Experience Mediate the Relation between Age and Decision Making in Youth Volleyball Players.

Silke De Waelle (1), Sara Van Bostraeten (1), Matthieu Lenoir (1), Frederik J.A. Deconinck (1), Simon Bennett (2) . 1 Ghent University, Belgium. 2 Liverpool John Moores University, United Kingdom

Experts in different sports show superior decision making skills compared to novices, but little is known about its development and underlying mechanisms in youth players. The aim of this study was to investigate the mediating effects of visual cognition and volleyball experience on the relationship between age and decision making in youth volleyball players. 171 Female volleyball players aged 6-17 years old performed a sport-specific, video-based test of decision making, as well as 4 different visual cognition tests. Using structural equation modeling, we examined if volleyball experience and visual cognition act as parallel mediators in the association between age and decision making. The results show significant indirect effects and a non-significant direct effect, indicating that visual cognition and experience fully mediate the relation between age and decision making, and together explain 38% of the variance in decision making performance. Furthermore, our findings demonstrate that visual cognition and volleyball experience mediate the relation between age and decision making independently, which suggests that they each influence different parts of the decision making process. These results highlight the importance of further investigating the development of perceptual-cognitive skill in young players.

Anticipation and gaze behaviour when defending shots in Basketball.

Johannes Meyer (1), Nicholas J. Smeeton (2), Frowin Fasold(1), Karsten Schul(1), Stefanie Klatt (1). 1. German Sport University Cologne, Germany. 2. University of Brighton, United Kingdom

The aim of the study was to examine sources of information for predicting shooting behaviour in basketball players. Using a representative research design, 31 (15 national level experts, 16 novices) participants watched life-sized videos of basketball players performing shots or shot fakes. Shooting actions were temporally occluded at one of three events; gaze orientation to basket, ball at head height, shot initiation. Participants decided if the shooting motion was a shot or fake by activating response switches with a game-like motions. Accuracy, response time, and confidence were recorded along with gaze behaviour. The results showed an interaction between shot fake and occlusion event, indicating that later occlusion of a normal shooting motion increased the probability of a shot deceiving a defender. In comparison to novices, experts were affected by this interaction with a delay. In contrary to the accuracy, the confidence in giving the correct answer increased with later occlusion. Further, eye gaze was located at the hips for longer in experts when shots were accurately anticipated. Our results suggest that direction of a defender's attention towards to the shooter's hips to may help the anticipation of genuine and fake shots.

The role of peripheral vision in ball games: Revisiting notions from Davids (1984)

Christian Vater, University of Bern, Switzerland

In his seminal theoretical paper on peripheral vision published in 1984 in *European Physical Education Review*, Keith Davids proposed how peripheral vision is used in ball games. At that time, and with the technology available, it was almost impossible to empirically test the functionality of peripheral vision (i.e., the ability to process information from the corner of our eyes). In this presentation, I will summarize what we have learned about peripheral vision since 1984 and provide examples that show how the use of peripheral vision can be tested in football and basketball in lab and field settings. The results of these studies show that Davids was right in many of his notions but that studies need good experimental control to ensure that natural peripheral vision usage is tested without creating too artificial test settings. In an outlook, I will show how we can use virtual reality technology to control for variables affecting the use of peripheral vision.

Oral presentations (11.30-12.30): Developmental activities and skill acquisition

Early promise versus late bloomers: a longitudinal and multidisciplinary analysis of relative age effects in an elite weightlifting pathway. Vicky Gottwald(1), Dior Anderson(1,2), Gavin Lawrence (1). 1 Bangor University, United Kingdom. 2 Talent Pathway ID Ltd, United Kingdom

Over a series of three studies we investigated the relative age effect (RAE) in elite weightlifting, in the context of individual, task, and environmental constraints. Study 1 investigated the influence of gender and bodyweight on RAE. Significant chi squared effects were observed across all age groups and weight categories with the exception of female junior heavyweight and lightweight categories, respectively. Multiple logistic regressions revealed reduced prevalence of RAE in medallists at heavier weight categories as athletes progressed through the pathway, with some gender nuances. Study 2 adopted a longitudinal design to investigate influence of athlete birth month on athlete progression and medal success through developmental stages of an elite pathway. Results revealed a higher proportion of Q4 athletes retained in the pathway. Whilst Q1 athletes were more likely to show 'early promise', Q4 athletes were more likely to 'bloom' later in the pathway and transition from being a non-medallist to a medallist. Finally, study 3 investigated the role of psychological characteristics in accounting for RAE findings. Sophisticated machine learning techniques differentiated between Q1 and Q4 athletes with an accuracy of 76%, based on psychological determinants of expertise. These findings have important implications for practitioners with regards to athlete selection protocols.

Exploring the Developmental Biographies of World's Best Rugby Union Players

Alexandra Turner, Ross Roberts, James Hardy, Lew Hardy, Donald Barrell, Kate Burke. Bangor University

The development of excellence in team sports, such as Rugby Union, is not yet fully understood. As part of a multidisciplinary research programme investigating the underpinnings of success and development in Rugby Union, we conducted in-depth retrospective interviews (totalling over 32 hours) with former world's best

International male rugby players (N = 5) and nominated coaches (N = 5). Players were selected according to a rigorous set of criteria, and completed a biographical interview covering topics including early critical developmental experiences, personality factors, relationships, and training behaviours. Analysis revealed commonalities between participants, which are discussed under three main headings: 1) Formative Experiences, 2) Personality and 3) Training Behaviours. Results suggest that traits such as obsessiveness, perfectionism, narcissism and ruthlessness, and experiences such as negative life events, appear to be important and helpful in relation to super-elite performance. Findings from this study informed a second, multidisciplinary study (still ongoing), which is using pattern recognition to explore differences between players progressing through the RFU's Development Pathway and those derailing. This research aims to offer a better understanding of why some players maximise their potential in developing excellence whilst others do not, and ultimately inform coaching practices within the RFU development pathway.

Skill acquisition practices of coaches on the British Para swimming (BPS) World Class Programme

Daniel Powell (1) Dr Greg Wood (1) Dr Phil (Kearney (2) Dr Carl Payton (1). 1 Manchester Metropolitan University, United Kingdom. 2 University of Limerick, Ireland.

This study set out to gain insight into the practices adopted by elite level Paralympic swimming coaches and to shed light on the knowledge and rationale underpinning their approaches. Coaching sessions were delivered by nine senior coaches from the British Para swimming (BPS) World Class Programme. A coaching session was observed from each coach and a semi-structured interview was recorded and transcribed to explore their intentions and rationale for the structure and content of the session delivered. Results indicated that coaches: (i) predominantly emphasised internal focus instruction and feedback cues, (ii) incorporated relatively low levels of between-skill variability and higher levels of within-skill variability, and (iii) used some implicit learning techniques such as analogy and constraints-based learning. Interview data indicated coaches had limited knowledge of key skill acquisition principles, which provided some explanation for why learning techniques were often implemented sub-optimally according to the recommendations from scientific research. The findings serve to highlight potential gaps in understanding on the side of both research and applied practice in the hope of facilitating future collaborations between coaches and skill acquisition practitioners.

Is the focus on physical attributes in youth soccer erroneous? Examining the role of fundamental movement skills and perceived competence in the physical fitness-technical skill relationship in young soccer players.

Michael J. Duncan (1), Emma, L. J. Eyre (1), Mark, R. Noon (1), Rhys Morris (1), C. Doug Thake(1), Neil D. Clarke (1), Anna J. Cunningham (2). 1 Coventry University, United Kingdom. 2 Nottingham Trent University, United Kingdom

This study examined the role of FMS and perceived competence in the relationship between physical fitness and technical skills in prepubescent soccer players. Following institutional ethics approval, informed parental consent and child assent, 70 boys, regularly engaged in grassroots football, aged 7-12 years participated in the present study. The Test of Gross Motor Development-2 (Ulrich, 2001) and the Perceived Physical Ability Scale

for Children (PPASC, Colella, et al., 2008) were used to assess FMS and perceived competence respectively. Technical skill was determined from a composite measure three tests reflecting dribbling, passing and shooting: the Ghent University (UGent) dribbling test; the Haaland and Hoff (2003) passing test and the Rosch et al (2000) shooting test. A composite measure of fitness was determined from 15m sprint time, standing long jump, and seated medicine ball (1kg) throw. Path analysis showed no direct effect of physical fitness on technical skills, after controlling for age. However, both FMS and perceived competence acted as mediators of the physical fitness-technical skill relationship. A well-developed base of FMS and high perception of ability should be encouraged in developing in children aged 7-12 years old, over physical fitness for the benefit of soccer-specific technical skills.

Oral presentations (14.00-15.00): Factors impacting on expert performance

Mindfulness, reinvestment, and rowing under pressure: Evidence for moderated moderation of the anxiety-performance relationship

Katherine Victoria Sparks (1), Professor Christopher Ring (1), Dr Maria Kavussanu (1), Professor Rich Masters (2). 1 University of Birmingham, UK. 2 University of Waikato, New Zealand.

Objectives: Our study had two objectives. First, we examined the relationship between dispositional sport-specific mindfulness and rowing performance. Second, we investigated whether dispositional sport-specific mindfulness moderated the moderating effect of conscious processing on the anxiety-performance relationship. **Design:** Cross-sectional field study. Participants took part in a competitive race and completed a survey after the race. **Method:** Rowers (N = 270) completed post-race measures of mindfulness, rowing specific reinvestment, perceived performance, anxiety and demographics. We also determined actual rowing performance. **Results:** Mindful refocus was positively associated with perceived and actual performance, whilst non-judgemental thinking was only positively associated with perceived performance. Rowing specific Conscious Motor Processing (RS-CMP) moderation effect on the anxiety-performance relationship was attenuated by high levels mindful awareness, this was true for both actual and perceived performance. Rowing specific movement self-consciousness (RS-MS) moderation effect on the anxiety-performance relationship was moderated by non-judgmental thinking but only for perceived performance. **Conclusion:** Our findings provide initial support that dispositional mindfulness may benefit performance under pressure and that this may be through the attenuation of reinvestment processes. Furthermore, the result demonstrated that mindful awareness and non-judgmental thinking may act on distinct reinvestment processes.

The effect of cognitive challenges on human performance: Implications for skills learning

Francesca Mottola, Andrew Cooke, Anthony Blanchfield, James Hardy. Bangor University

This study investigated the effect of fatigue induced by the performance of a prolonged cognitive task and by a strenuous physical task on psychological, physiological and behavioural markers and athletes' ability to perform a subsequent physical task. In a within-subject design, 18 participants underwent three visits involving: I) 45-min intense cycling followed by a 40-min cognitive task (EX+COG); II) 45-min intense cycling followed by 40-min watching a documentary (EX+DOC) and III) a 40-min cognitive task (COG). Subjective

feelings, physiological (EEG) and behavioural (cognitive and exercise performance) variables were assessed throughout the visits. The cognitive task condition (COG) induced a state of mental fatigue indicated by self-ratings and increased EEG theta power. A similar state of fatigue was reached in both intense exercise conditions (EX+DOC, EX+COG) and no psychophysiological and physical performance differences were found between these conditions. However, intense exercise provided an acute benefit to some aspects of cognition (Stroop Colour Word task performance); this benefit subsided over time. In conclusion, a similar state of low psychological and neurophysiological activation underlies fatigue induced by strenuous exercise and by sustained cognitive activity. Implications for how fatigue might impact skill acquisition will be discussed.

Decision-making Behaviours in Gaelic Football: A Performance Analysis Study

Emma Jane McLoughlin (1), Daniel T. Bishop (1), Edward K. Coughlan (2), Noel Kinrade (3), David P. Broadbent (1). 1 Brunel University London, UK. 2 Munster Technological University, Ireland. 3 Nottingham Trent University, UK.

The ability to make correct rapid decisions in dynamic environments underpins expert performance in team invasion sports. Sport expertise researchers have typically used quasi-experimental methodologies to elucidate athletes' decision-making processes, while performance analysis (PA) has been underused in this regard; moreover, individual differences have not historically been considered in previous research. The aim of this study is to use PA and psychometric data to examine interindividual differences in Gaelic footballers' on-pitch decision-making. Thirty-five players from one county team completed the Decision-Specific Reinvestment Scale, the Attentional Style Questionnaire, and the Risk Propensity Scale, and then had their performance analysed across twelve intercounty games. The games were specifically selected to analyse performance under four conditions: High-Ranking Opposition/High-Pressure Game (HRO-HPG), High-Ranking Opposition/Low Pressure Game (HRO-LPG), Low-Ranking Opposition/High-Pressure Game (LRO-HPG) and Low-Ranking Opposition/Low Pressure Game (LRO-LPG). Decision making was coded according to several contextual factors including match score, clock time, field position, teammate and opponent proximity; decision-making was coded according to decision time, type and outcome. Regression analysis will be used to explore relationships between contextual factors, individual differences and decision-making behaviour. We expect this research to highlight the potential contributions of performance analyses and individual differences assessment to the analysis of real-world decision-making.

A nonlinear pedagogical approach to foster exploratory activity in climbing: the effect of increased uncertainty during practice.

John Komar & Jia Yi Chow. Nanyang Technological University, Singapore

The purpose of this study was to investigate the effect of providing different amount of information on the exploratory activity of climbers with different level of expertise. Climbers (N=20) were assigned to an "expert" group or a "beginner" group based on their performance. They practiced 3 times not identical but similar routes, each time with a different number of visible holds. During the first trial, only the next hold was visible (the hold lights on as far as the climber actually climbs up), the second trial showed only the 3 next holds, the third trial showed only the next 5 holds. Both the performance, efficiency and exploratory activity were

measured during the ascent. Results showed that a major drop in performance arose for experts when they went through the condition with 3 visible holds to the condition with only 1 visible hold, showing that expert climbers can ensure fluidity of their climb by anticipating in the next 2-3 holds. In addition, decreasing the certainty of what will come next increased the exploratory activity of those expert climbers and could be an interesting way to foster exploratory learning in climbing.

Oral presentations (14.00-15.00): The use of kinematic and contextual information

A field-based study of the influence of probability information on skilled detection of deception

Robin C. Jackson, Saira Mirza, Jesper Bugden. Loughborough University, UK

We conducted a field study of the influence of outcome probability information on 1-on-1 duels in a group of 12 highly-skilled Academy football U-23 players. On each trial, conducted within a 10m x 10m area, the attacking player attempted to dribble the ball past the defensive player on their left or right side, with or without a deceptive 'step-over' action. Before each trial, the defender was told the probability the player would take the ball to their left and right (50-50; 35-65; or 80-20). From video recordings of each trial, the defender's performance was rated on a 4-point scale based on initial movement relative to outcome direction and whether they were successful in blocking the attacking player. In addition, separation between the attacker and defender was estimated across a time window from -400ms to +1000ms relative to the time the foot contacted or passed over the ball. Analysis revealed a significant interaction between prior outcome probability and deception. The defensive player performed worse when high outcome probability was aligned with the fake. Conversely the fake was ineffectual when aligned with low probability. This finding was reflected in the increased separation between the attacking and defensive player, which emerged as the actions unfolded. The study confirms recent lab-based evidence that probability information influences skilled detection of deceptive intent.

What are deceptive signals? The Kinematic Differences between Deceptive and Genuine Rugby Actions

Laurence S. Warren-West (1), Robin C. Jackson (2), Michael J. Hiley (2). 1 University of Nottingham, UK. 2 Loughborough University, UK

Previous research examined the kinematic differences between deceptive and genuine rugby actions during reorientation in the one-vs-one dyad. From their analyses, the authors argued that there were specific 'honest' and deceptive cues associated with the actions. Recent research, however, identified that rugby players were deceived prior to the initial (genuine or fake) change of direction. The aim of the present study, therefore, was to examine the kinematic differences between deceptive and genuine actions during the time window in which players are deceived. Statistical parameter mapping (SPM) analysis compared three-dimensional motion capture data of 144 deceptive and 144 genuine actions performed by six expert rugby players. The results indicated that to deceive an opponent, expert players display a combination of exaggerated cues (e.g., head roll, foot and COM displacement), and minimised cues (e.g., trunk yaw), relative to genuine actions. We cannot say with certainty whether individual cues are deceptive. Exaggerated and

minimised cues are instead presented as candidates for causing deception. Moreover, the findings suggest that 'honest' signals previously proposed by researchers may not be reliable sources of information. Future research should determine how manipulating the kinematic properties of deceptive actions influences to the ability to discriminate between actions.

Skill-based differences in the detection, utilisation and adaptation of behaviour following increasing exposure to opponent action

Joseph L. Thomas (1), David P. Broadbent (2), N. Viktor Gredin (3), A. Mark Williams (1). 1 University of Utah, USA. 2 Brunel University London, UK. 3 Karlbergs Bollklubb, Sweden

Skilled athletes can use opponent action preferences (APs) to enhance anticipation. However, it is unknown how much exposure to an opponent is required to detect and use this information, and how quickly players can adapt following changes in APs. In this study, a video-based 2-v-2 soccer anticipation task was presented to skilled and less-skilled players in two phases. In Phase 1, the opponent demonstrated strong APs to pass or dribble, and then this preference was reversed in Phase 2. Both phases included two exposure blocks (18 trials each), providing observation of the opponent actions, as well as test blocks to examine anticipation performance. Response accuracy and visual search behaviors were collected across test blocks. In Phase 1, skilled players significantly increased accuracy following each exposure block, whereas less-skilled players only improved after the initial exposure block and then performance plateaued. In Phase 2, skilled performance dropped significantly following the change in APs, but returned to peak performance by the final test block indicating an adaptation to the new APs. Less-skilled players did not decrease performance following the change in APs and did not improve following exposure, suggesting a failure to detect and use the APs in both phases.

The Use of Contextual Information in Sports Re-Conceptualized as Calibration & Education of Intention

Rob Gray. Arizona State University

Previous research has provided convincing evidence to suggest that skilled performers make use of contextual information in sports. Examples include the game situation (e.g., the count in baseball or the score in a tennis match), an opponent's tendencies (e.g., the frequency of a certain pitch type or serve for a given athlete), and event history (e.g., the types of pitches or serves used in the previous few executions). Typically, the effects of such variables have been explained from an information processing perspective in which this contextual information is fed into an internal, mental model which contains situational probabilities (e.g., this pitcher tends to throw a fastball in a 3-0 count, the server goes down the line when ahead). In this internal model, contextual information is combined with other cues (e.g. advance cues from the opponent's kinematics) to generate a prediction about the upcoming event and program a movement. It is proposed here that the effects of context in sports can be explained without appealing to an internal model and predictive control. Specifically, I will present an ecological account of the use of contextual information in sports conceptualized in terms of processes of education of intention and calibration.

Symposium 3 (15.05-16.05): A different way of thinking about movement: Athletic Skills Model for optimising motor development

Presenters: Geert Savelsbergh (Vrije University, The Netherlands), Rene Wormhoudt (Royal Netherlands Football Association, The Netherlands), Martina Navarro (University of Portsmouth, UK)

This symposium will discuss the athletic skills model (ASM, Wormhoudt et al. 2018) as a useful framework to structure (developmental) movement programs to enhance physical literacy as a foundation for expertise. Overall, ASM purposes a life-long physical activity participation by balancing performance, fitness and health for the recreational as well for the disable and able (elite) athlete. By adopting non-linear developmental trajectories into account (and also considering the possibility to follow a linear developmental pathway), the ASM adopts three “roads” to achieve this goal: the concentric approach, the design of challenging environments, and exploiting transfer. In combination or individually, these three ‘roads’ can increase the level of physical literacy by creating several functional movements and skills variations, which consequently will develop adaptable and healthy people. In the first talk, Prof Savelsbergh and ASM founder Rene Wormdhout will present the ASM vision informed by the combination of theoretical ideas from the constraints-led model (Newell, 1986) and the diversification ideas of Cote et al (1992, 2015), followed by the definition of the ASM building blocks (Basic Movement Skills, Coordinative Abilities and Conditions of movement), which were based on scientific evidence, and experiential knowledge from extensive practice in (high performance) sport. In the second talk the ASM Academy Education Manager Yordi Veermat along with Rene, will discuss the ASM practical applications into different environments such as elite sports, PE settings and rehabilitation programs. By presenting several examples of current initiatives that adopt ASM, the presenters will describe concepts and tools available for practitioners to plan and design structured yet diverse physical activity and sports program. These concepts and tools include the Fundamental10 and the Basic Movement Analysis (BMS) as the basis for designing activities that falls within the ASM Continuum of activities: Sport Specific, Sport Adaptive, Donor Sport and Multi Sport. Finally, in the third talk, Dr Navarro will present the findings of a pilot study that investigated the impact of a ASM program delivered in a PE setting on motor skills, brain executive functions and levels of enjoyment of children. In collaboration with Liam Brown, 90min PE sessions were designed adopting the ASM framework and offered once a week as extra activities to 10-11 years old children studying at Horndean Technical College. Planned to run during the entire year, unfortunately due to Covid the sessions were delivered for 7 weeks only. Pre and post intervention, children took part in a battery of tests including the Athletic Skills Track for motor skills measurement, Flanker and Stroop-tests for executive brain function measurements and a questionnaire measuring current levels of physical activity and levels of enjoyment during the ASM sessions. Although no significant differences were found for motor skills and brain function, children reported very positive enjoyment reaction to the sessions delivered. These results and ASM as suitable framework to PE lessons will be further discussed during this talk.

Poster Presentations

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Poster Session 1 (12.20-13.15)**Virtual reality training improves decision-making skills in boxing**

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Video-based training for improving perceptual-cognitive skills has been criticised by the lack of representativeness regarding functionality and action fidelity. Virtual Reality (VR) technology has the potential to circumvent these limitations by improving perception-action coupling in decision-making tasks. The aim of the study was to compare the efficacy between VR and video-based training for improving perceptual-motor skills of boxers in real sparring. Twenty-eight boxers divided in two training groups, VR and video-based, performed a pre, post and retention real sparring task. Between pre and post-tests boxers trained three times per week for one month sparring against a virtual avatar (VR group) or a video-recorded opponent displayed in a life-sized screen (Video-based group). Number of participants' and opponents' shots scored were compared across tests. Generalised Estimating Equation (GEE) revealed that only the VR group increased the number of shots scored and had reduced the number of shots scored by opponent after training. Boxers in the VR group potentially improved their ability to pick up relevant information to inform action maintaining interpersonal distance during sparring within action capabilities. These findings support the notion that VR might be a more suitable technology to improve decision making skills in boxing than video-based simulations.

Development and initial validation of the Rowing Specific State Reinvestment Scale

Katherine Victoria Sparks, Christopher Ring, Maria Kavussanu, & Rich Masters.

Objectives: The purpose of this study was to develop and validate a rowing-specific measure of reinvestment. **Method:** Two studies were conducted to develop and validate the Rowing-Specific Reinvestment Scale (RSRS). In Study 1, a 24-item questionnaire was developed and the content validity was assessed using experts (N = 7) and pilot-tested in rowers (N = 24). Next, rowers (N = 282) completed the questionnaire with the remaining items, and exploratory factor analysis (EFA) was conducted. This reduced the items and revealed two factors, rowing specific conscious motor processing (RS-CMP) and movement self-consciousness (RS-MS). In Study 2, rowers (N = 270) completed the scale that was evaluated using confirmatory factor analysis (CFA). Moreover, the construct validity of the scale was investigated by asking them to complete measures of movement specific reinvestment, perceived performance, self-consciousness and state anxiety. Actual performance was also determined depending on their finish position in the race. **Results:** Study 1 EFA resulted in a 2-factor model with six items assessing RS-CMP and six items assessing RSMSC. Study 2 supported the factor structure of scale; CFA indicated an acceptable model fit with good internal consistency. Content validity was also supported, with evidence of concurrent, convergent, discriminant, and predictive validity. **Conclusion:** Taken together, these studies provided good initial evidence for the validity and reliability of the RSRS, a state measure of reinvestment during rowing.

Affordance-based control of braking in naturalistic cycling task

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Affordance-based control theory argues that movement control is scaled to the actor's action capabilities. When driving in a virtual environment, brake adjustments were regulated relative to the maximum deceleration (D_{max}). The aim of the study was to investigate whether urban cyclists similarly use affordance-based control during braking in a naturalistic task. It was expected that urban-cyclists would show more brake adjustments as ideal deceleration approached D_{max} . Twenty urban-cyclists and eighteen non-cyclists were asked to brake in order to stop the bike as close as possible to an obstacle. Brake strength (i.e., the cyclists' action capability) was manipulated by adding weights on the bike without the participants' being aware: strong-brake, +0kg; medium-brake, +5kg; weak-brake, +10kg. Cycling speed was manipulated by varying initial distances: low-speed 21.6m and high-speed 37m. Urban-cyclists showed higher bicycle velocity in high- than low-speed. Increasing bike weight provoked lower perceived D_{max} for urban-cyclists in the high-speed condition and lower perceived D_{max} for non-cyclists in the low-speed. Linear regression revealed that, for both groups, higher D_{ideal} was associated with greater brake adjustments for intervals where the difference between current and ideal deceleration was zero. These observations support the hypothesis according to which movement control in braking tasks is affordance-based.

Intra-individual movement variability of an international badminton player performing the forehand smash during different spatio-temporal constraints

Idrees Afzal, Stuart McErlain-Naylor, Michael Hiley, & Mark King. Loughborough University. University of Suffolk

Intra-individual movement variability of an international badminton player performing the forehand smash during different spatio-temporal constraints Due to the complex interacting constraints, elite badminton players must adapt and adjust their technique to produce the desired performance outcome. Data were collected at the 2016 BWF All England open Championships, of one international men's singles badminton player (27 years; 1.81 m; 79.1 kg). A Vicon three-dimensional motion capture system (400 Hz) with 18 infra-red cameras, was used to collect the data and determine subsequent joint kinematics and racket-shuttlecock impact locations. Mean knee flexion variability during the preparatory phase was significantly greater during the target condition in comparison to the no target condition ($p < 0.001$). Initial three-dimensional position of racket foot plant in relation to the incoming shuttlecock (y direction) showed a significantly positive correlation in the target condition ($r = 0.497$, $p = 0.70$). Impact location on the racket face had a significantly lower variability in the target condition ($p < 0.031$). Badminton coaches should look to vary the shuttlecock feed and potentially use an external focus of attention, to lower variability of impact location on the racket face and to produce faster, more consistent shuttlecock speeds.

Sprint coaches' application of skill acquisition

Jack Tierney & Philip E. Kearney. University of Limerick

The integration of core skill acquisition principles into the preparation of sprint athletes may enhance performance and accelerate athlete development. However, a lag between research and coaching practice is frequently observed. Previous investigations in track and field have found that coaches appear to select training activities based on what other successful coaches do, rather than published literature. To establish the extent to which sprint coaches incorporate core principles of skill acquisition into their practice, thirteen sprint coaches completed semi-structured interviews focusing on their practice behaviours and session design. These coaches had an average of 11 years' experience (range 5-20 years), and all held at least the Athletics Ireland Level 2 qualification. As a collective, coaches were found to utilise a broad range of skill acquisition tools in their practice design and interactions with athletes. However, individual coaches demonstrated limited knowledge of what skill acquisition tools exist, and how these tools may be best applied to enhance athlete development. These findings suggest that there is considerable scope to develop athletics coaches' knowledge and application of core principles of skill acquisition, and indicate how guidelines relating to skill acquisition may be best integrated into coach development.

The use of instruction and feedback in Physical Education settings: An OPTIMAL theory perspective.

Thomas Simpson, Paul Ellison, Evelyn Carnegie, & David Marchant. Edge Hill University

In Physical Education (PE), the use of instruction and feedback are central to children's motor skill learning. Recently, it has been identified that instruction and feedback which promote OPTIMAL theory motor learning factors (e.g., an external focus of attention, enhanced expectancies and autonomy support) can enhance children's motor learning. However, it is unclear how these OPTIMAL factors are used in the instruction and feedback of PE teachers. Therefore, this study aimed to explore how PE teachers use instruction and feedback in relation to the OPTIMAL theory. Statements ($n = 912$) from 7 PE lessons were collected and thematically analysed. Preliminary data analysis indicates that PE teachers use more externally focused (15.4%) vs internally focused (13.6%) statements during PE lessons. Most feedback statements provided were positive (78.9%) and enhanced expectancies. However, PE teacher's language generally thwarted autonomy (20.4%) as compared to instructions and feedback that supported autonomy (12.7%). Overall, these early findings suggest that current teaching practices are aligned with OPTIMAL motor learning principles and should, theoretically, optimise children's motor learning in PE settings. Whilst instruction and feedback are central in PE, such environments are complex and interactive, and may not always be conducive to applying optimal motor learning principles.

Lessons from Adapting a Coaching Science Research Project During the COVID-19 Pandemic.

Kevin Murray, Con Burns, Cian O'Neill, & Edward K. Coughlan. Munster Technological University, Ireland

COVID-19 affected many elements of society due to regulations, such as social distancing, sanitisation and self-isolation guidelines. As a result, coaching science research data collection changed significantly. The purpose of this work is to detail those changes to the methodology and procedure of a coach education project that

was designed and initiated prior to the pandemic. The original study involved three coaches from a Gaelic football development academy. The multi-component intervention included four face-to-face workshops, mentoring, reflective practice and coaching session design workshops. Coaches were to be filmed on two occasions, at baseline and post-intervention. Having collected baseline coaching session data and delivered two of the planned workshops, the data collection went online via Zoom. Here a coach mentor conducted individual semi-structured interviews on specific elements of the project. A reflective tool was designed and developed by the participants together with the coach mentor to plan, monitor and evaluate both their own and their peers coaching sessions. Participants completed two post-intervention coaching sessions, which were audio and video recorded. Implications of the amendments are discussed, and recommendations for future research suggested.

Methodological and procedural amendments to sport science research in response to COVID-19: Considerations for future research

Sam Jermyn, Cian O' Neill, & Edward K. Coughlan. Munster Technological University, Ireland

COVID-19 poses a great risk and challenge to all facets of sport, including researchers conducting laboratory-based sports science projects. The current laboratory-based study investigated the acute effects of various time intervals following weighted Gaelic football place-kicks on standard Gaelic football ball velocity. However, in light of local, national and international health and safety guidelines established as a consequence of COVID-19, numerous methodological and procedural amendments were created to preserve the integrity and validity of the study. A review of the risk assessment of the original experimental design led to essential amendments such as remote participant recruitment and the creation of a COVID-19 health screen form. The participant information sheet was updated to enhance understanding of the health and safety requirements, with the number of participants permitted to attend testing sessions reduced to ensure maintenance of social distancing regulations. Data storage procedures were also updated and additional procedures were implemented to ensure safe arrival and exit of participants to and from the testing laboratory. A post-testing session protocol was developed to ensure laboratory sanitisation. This abstract details the amendments' implications on the data collection process and discusses directions for future research so that laboratory-based studies can preserve experimental purposes and procedures.

Coaching Through the COVID-19 Pandemic and its Impact on the Design of a Coach Education Research Study

Kevin Smith, Con Burns, Cian O' Neill, & Edward K. Coughlan. Munster Technological University, Ireland

The COVID-19 pandemic challenged many conventional aspects of society with government lockdowns, social-distancing and strict sanitisation protocols altering everyday life. Sport, and coaching science research, did not escape this 'new norm'. The current research outlines how a coach education study in rugby union was adapted, methodologically and procedurally, in response to government guidelines. The original research design sought to evaluate the effectiveness of a coach education framework in a practical setting by filming and examining coach behaviours (n=5), inclusive of their perceptions of relationships with their athletes (n=68), and vice-versa, pre- and post-intervention. Prior to national lockdown, participants had completed the pre-observation phase and education intervention, leaving the post-intervention observation phase

incomplete. Consequently, this data collection phase moved online to comply with health and safety regulations. Coaches received video footage and behavioural data from their previously recorded sessions (pre-intervention) as a surrogate of the live observations and were instructed to self-assess their performance using a bespoke mobile application designed by the research team. Self-perceptions of respective coach-athlete relationships were collected online via questionnaire and supplemental interviews to gain more context-rich data. These technology-flexible, yet robust, methodological adaptations could provide future researchers with agile solutions should similar unforeseen pandemic restrictions return.

Poster Session 2 (13.15-14.00)

Talent identification and development in male cricket: A systematic review

Thomas Brown^{1,2}, Paul Greetham², Lewis Gough¹, Irfan Khawaja¹, and Adam L. Kelly¹. ¹ Birmingham City University. ² Warwickshire County Cricket Club.

The aim of this systematic review was to synthesise existing literature surrounding talent identification and development in male cricket, whilst highlighting recommended areas of future research. Database searches were conducted in Google Scholar, PubMed, Scopus, SPORTDiscus, and Web of Science according to the PRISMA guidelines. The Boolean combination of (((cricket)) AND ((talent identification) OR (talent development) OR (expert) OR (elite))) was applied. The search was conducted in December 2020, with selection limited to peer-reviewed articles. The initial search returned 587 records of which a total of 80 were eligible for full-text analysis (IRR=96.8%, k=0.88; Viera & Garrett, 2005), with a subsequent final inclusion of 45 articles (IRR=93.7%, k=0.87). A cumulative of 2559 participants were measured across eight factors. The dynamics framework was applied to collate factors (Sarmiento et al., 2018); 1) task constraints (n=13): (a) participation history (n=13); 2) performer constraints (n=61): (a) technical and biomechanical (n=21), (b) perceptual-cognitive (n=23), (c) psychological (n=11), (d) physiological (n=5), and (e) anthropometrical (n=1); 3) environmental constraints (n=6): (a) socio-cultural (n=4) and (b) the relative age effect (n=2). Results suggest biomechanical, technical, and perceptual-cognitive factors were reported more frequently, whilst there was limited inclusion for environmental constraints and physiological and anthropometrical factors.

Test retest reliability of technical and tactical skill tests in 10-11 year old grassroots footballers

William Pattison, Emma Eyre, Mark Noon, Michael J. Duncan. Coventry University.

This study aimed to provide exploratory evidence on test-retest reliability of technical and tactical soccer skill tests in 10-11-year-old grassroots footballers. Eight boys (mean age 10.25±0.46years) undertook the Haaland and Hoff (2003) passing test, Rosch et al. (2000) shooting test, Ghent University (UGhent) dribbling test and Procedural Tactical Knowledge Test (KORA) on two occasions, separated by two weeks. Pearson's product moment correlations, paired samples t-tests and 95% limits of agreement (LoA) were used to determine the degree of relationship, difference, and stability between measurement time points. Results indicated excellent relationship for Rosch et al. (2000) shooting, UGhent dribbling, KORA (identifying gaps) ($r > .9$) and moderate relationships for Haaland and Hoff (2003) ($r > .7$) and KORA (off-the-ball movements) tests ($r > .6$). There were no significant differences between test and retest for any of the skill tests (all $P > .05$). 95%LoAs indicated

no learning bias and a significant level of agreement for all tests. This study demonstrates, good to excellent levels of test-retest reliability and acceptable levels of bias for technical (Rosch et al. (2000) shooting test, UGhent dribbling, and Haaland Hoff (2003) passing test) and tactical (KORA - identifying gaps and off-the-ball movements) soccer skill tests in 10-11-year-old grassroots footballers.

Enhancing equality in sport: informing the development of a standardised starting system for Deaf athletes.

Elizabeth Steele, Vicky Gottwald, & Gavin Lawrence. Bangor University.

Presently in Deaf sport, there is no single standardised starting system that promotes fair competition between Deaf and hearing athletes. Deaf athletes are often required to compete alongside hearing athletes with varying starting systems. These often include a range of uni-modal and multi-modal stimulus modalities, including auditory, visual, and haptic. Research has acknowledged sensory differences in RTs across Deaf and hearing populations between different sensory modalities. More specifically, evidence suggests a visual facilitation in Deaf subjects, largely explained by neuroplastic adaptations amongst other factors. Hearing subjects typically have RT advantages in bimodal auditory-haptic conditions due to increased attentional capacities. Despite this knowledge, there has not been a comprehensive research effort to explore these differences and apply them to an applied sporting environment, such as a novel standardised system. To address this, we investigated RTs to different sensory modalities (auditory, visual, haptic, and bimodal combinations) across Deaf and hearing subjects to establish the optimal sensory conditions that produce the smallest RT discrepancies across populations. These findings will help inform a standardised starting system that ensures sensory equality across populations. Developing this system will enable Deaf people to participate and perform freely and fairly alongside their hearing counterparts with no sensory discrimination.

Identifying Motor Competence based profiles in Children and the association with Physical Activity, and Motivation Towards Physical Activity.

Chelsey Lawson, Emma L.J Eyre, Jason Tallis, Michael J. Duncan. Coventry University, UK

The present study identified children's motor competence (MC)-based profiles and investigated difference on physical activity (PA) behaviour and motivation towards PA between profiles. Children's (n = 216 mean SD years) perceived motor competence (PMC) was assessed using the pictorial scale. Actual motor competence (AMC) was assessed using the Test of Gross Motor Development and a composite 10-m sprint time, standing long jump distance and 1-kg seated ball throw. Adapted BREQ questionnaires assessed motivation towards PA and objective measure assessed PA. K-means cluster analysis was used to create profiles. Differences in PA and motivation towards PA were examined using multiple ANCOVAs. Four groups of divergent levels and four groups of convergent levels were identified based on the contribution of either product or process AMC with PMC. Motivation towards PA was only affected by MC-based profiles that included actual process and PMC. Specifically, children with high actual-process and high-perceived had higher levels of autonomous motivation than children with high actual-process but low-perceived. No significant differences were found between PA behaviour and profiles. Overall, quality and execution of AMC has a greater impact on children's motivation

towards PA. Moreover, developing and maintaining AMC and PMC may be imperative to children's future PA behaviour.

Genetic testing in professional football: Perspectives of key stakeholders

Alexander B. T. McAuley (Birmingham City University), David C. Hughes (Birmingham City University), Loukia G. Tsaprouni (Birmingham City University), Ian Varley (Nottingham Trent University), Bruce Suraci (AFC Bournemouth), Thomas R. Roos (University of Lausanne), Adam J. Herbert (Birmingham City University), and Adam L. Kelly (Birmingham City University)

Genetic research in football is currently in its infancy but is growing rapidly. However, the practical application of genetic testing in football and the views concerning its use are unknown. Thus, the purpose of this study was to assess the current practical application of genetic testing in professional football and provide an insight into the perspectives of key stakeholders. In total, 122 participants completed an online anonymous survey. This consisted of 21 multiple choice and Likert scale questions, with the option of providing an explanation for each response. Findings revealed genetic testing is rarely utilised by key stakeholders (10%) or their respective organisations (14%). However, three quarters (75%) had the opinion that genetic testing will have great utility in the future. The majority (72%) believed genetic testing should be used for athlete development and injury risk, whilst 35% believed that genetic testing should be utilised for talent identification purposes. However, most key stakeholders viewed their own (89%) and their colleagues' (79%) knowledge related to genetic testing as insufficient; mainly due to ineffective current communication methods (91%). Most believed educational workshops are required (71%), whilst nearly all (91%) were interested in developing their expertise on the utility of genetic testing.

Exploring coach perceptions of Parkour-style training for athlete development in team sports

Ben William Strafford¹, Keith Davids¹, Jamie Stephen North², Joseph Antony Stone¹. ¹ Sheffield Hallam University. ² St Mary's University.

Contemporary pedagogical models identify Parkour-style training as a potential vehicle for athlete enrichment and development. However, perceptions of team sport coaches and their receptiveness to such training methods have not been investigated and remain unclear. To develop understanding on how Parkour-style training could be integrated into team sport practice, we interviewed sport practitioners to explore their pre-existing knowledge of Parkour and their perceptions on its potential application for athlete development in their coaching practice. Experienced talent development (n=10) and strength and conditioning coaches (n=10) were interviewed using an open-ended, semi-structured approach, with a two-stage thematic analysis being conducted to identify themes. Three dimensions were identified: Coaches' General Perceptions of Parkour, Potential Applications of Parkour, and Feasibility of Integrating Parkour into Coaching Practice. Participant perceptions revealed that: 1) Parkour activities were viewed as supplementary activities to enrich specific sport training routines, including use of obstacle courses and/or tag elements, 2) Parkour-style obstacle environments needed to be scalable to allow individual athletes and coaches to manipulate object orientation and tasks using soft play and traditional gym equipment, and 3), The implementation of continued

professional development opportunities, athlete-centred approaches to learning design and coach-parent forums were recommended to support inclusive Parkour learning environments.

Expanding our horizon: Elite longitudinal talent development research in sport: A systematic review

Emily L. Dunn, Victoria M. Gottwald, & Gavin P. Lawrence. Bangor University

Background: Effective talent pathways have conventionally been orientated towards performance, whilst neglecting to consider development-related variables. To our knowledge, no systematic review has longitudinally examined performance-related and development-related variables in elite athletes from a multidisciplinary and multi-method perspective. Objectives: Examine the longitudinal effect of athlete development on performance between 1990-2021. Methods: The Preferred Reporting Items for Systematic Reviews was used to synthesise quantitative studies (N=38) and a meta-aggregation was conducted for qualitative studies (N=3). Results: Quantitative studies examined development-related variables (58%) e.g., injury incidence, performance-related variables (16%) e.g., tactical ability or combined development and performance-related variables (26%) e.g., self-regulation and technical performance. Development-related studies (n=22) examined physiological (77%) or psychological variables (23%). Performance-related studies (n=6) examined physiological (33%), psychological (50%), or technical variables (17%). The combined development and performance-related studies (n=10) examined physiological (30%), multidisciplinary (60%) and technical variables (10%). Conclusion: Applied practice can be greatly enhanced by examining interactions between development and performance related variables such as the timing of maturation and multidisciplinary performance during adolescence. With a better longitudinal understanding of the multifaceted nature of talent development, we strive to improve selection efficacy as well as support requirements to meet athlete needs within a pathway.

Characteristics that differentiated selected and non-selected male under-15 rugby union players at an English Premiership academy

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Entry into an academy can be a defining moment for a promising young player. The aim of this study was to explore the multidimensional characteristics that differentiated selected and non-selected male under-15 rugby union players at an English Premiership academy. Seventy-four players (mean age 14.6±0.3 years: selected n=29; non-selected n=45) were measured across nine characteristics from four overarching factors: (a) anthropometric (n=2), (b) physiological (n=5), (c) cognitive (n=1), and (d) birth quartile. An ANOVA compared differences between groups (selected vs. non-selected), whilst a Welch's t-test and Cohen's d were used for further comparisons. A multivariate logistic regression was also used to predict selection. Results showed significant differences between selected and non-selected players for anthropometric (P=0.021) and physiological factors (P<0.001). Moreover, relatively older players were overrepresented with 65% born in the first half of the year, whereas no significant differences were apparent for the cognitive test. More specifically, selected players possessed greater body mass (P=0.022, d=0.5) and handgrip strength (P=0.020, d=0.5)

compared to non-selected players, whilst multivariate analysis showed the 20 m sprint explained 25.4% of the variance ($P=0.001$). Overall, it appears selection into an English Premiership rugby union academy may be due to enhanced physical attributes rather than cognitive abilities.