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D1.S3 - Free Communications

D1.S3.1 - Free Communications - Physical Activity for Health

D1.S3.1(1) Influence of free time activities on the maturation state of basic movement patterns of children

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Basic movement patterns (BMP) are fundamental for the acquisition of complex motion and are determined mainly by changes in growth and maturation. All these features influence the maturation state (initial, intermediate or final) of BMP, namely, running, jumping, catching, throwing and kicking (Stodden, D. and Goodway, J.D., Journal of Physical Education, Recreation & Dance, 78(8), 33-49). The aim of this research was to determine the influence of free time leisure activities on the maturation state of BMP, using a quantitative method to analyse a sample of 127 students (60 boys/67 girls) aged 8-10 years in Bogotá, Colombia. The research method was descriptive, with a saturated sample and exploratory scope. This research used two different studies, both with institutional ethics approval. In the first place, a 26-question survey, validated through expert judgement, was answered by the participants, and in the second place, an observational analysis through the EIIBMP (Evaluation, immersion and improvement of BMP) software (Sandoval, 2019, Master thesis, Universidad Manuela Beltrán, 31.2.19 S218), based on the Fundamental Movement Pattern Assessment Instrument (FMPAI) protocol (Gallahue, D. and Ozmun, J. (Eds.), 2006, Understanding Motor Development: Infants, children, adolescents, adults. New York, McGraw Hill). The survey has shown that 55% of the participants use their free time doing homework, 50% playing videogames, 89% watching TV, 46% playing in the park, and 12% take part in sports club activities. From the observational analysis, it was observed that only one participant in the sample reached the final state in the five BMP assessed. For running, 28% and 43% of the sample are in the initial and intermediate states, respectively, with similar results for jumping, with 30% and 44%. For catching and throwing, 24% and 30% of the sample are in the initial states, respectively, and 42% and 44% are in the elementary level. Finally, 31% of the sample are in the initial state for kicking and 40% in the intermediate state. These results suggest that frequent leisure activities in children, encourage a sedentary lifestyle, with strong consequences in the maturation state of the BMP. On the other hand, excessive homework decreases the time children could perform physical activity, affecting the maturation of BMP. Even though some children manifest practising sports on a regular basis, their maturation state of BMP is initial or intermediate. Finally, it is recommended to include global motor activities for children, promoting physical activity in their lives and decreasing homework time.

D1.S3.1(2) Qualitative investigation into the factors that impact playground design and structure from the perspectives of playground design stakeholders.

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Playgrounds are public spaces open to children of all ages and abilities to allow them to engage in physical activity (PA). However, playgrounds are underused by children, and they are also unable to facilitate the required PA levels recommended by the World Health Organisation (Pawlowski et al. 2018, European Physical Education Review, 24, 39–55). Recent research reported playground engagement is reducing due to several factors (e.g. too risk adverse and limited range of equipment) resulting in uninteresting and unstimulating environments for children, consequently reducing PA (Little and Eager, 2010, European Early Childhood Education Research Journal, 18, 497–513). This study aimed to gain insight from the perspectives of playground design stakeholders to understand the factors that impact playground design and subsequently children's engagement. With institutional ethics approval, participants (n = 7) were purposefully recruited from several companies (housing developers, local authority, playground designers and landscape architects) that had designed and implemented a playground in Rugby (UK). Interviews were audio recorded, transcribed, and analysed using thematic analysis, before member reflections and critical discussions were conducted. The most commonly identified

themes that influenced playground design were: who uses the space and how, aesthetics, risk and safety, cost and maintenance, and personal experiences of stakeholders. Participants emphasised that none of the themes functioned independently and they repeatedly influenced each other. Analysis also highlighted that whilst playground design and implementation were a balancing act between several factors, the final decisions were often made by "the client" (the individual/company responsible for the playground). The willingness and openness of the client influenced all final decisions with regards to playground design and implementation. Some of the stakeholders highlighted that they were working with clients to educate them on what should be included in playgrounds to ensure the best experiences for children. However, analysis showed that there were several gaps in the knowledge of the stakeholders that may influence what advice is being given. For instance, there was limited understanding of children's physical activity or how children interact and play with different playground features. Much of this knowledge was informed by stakeholder experiences as children or by their current roles as parents. More research is needed to investigate how children interact with playgrounds and how physically active they are, so stakeholders and clients can use this information in playground design. In doing so playgrounds may be able to appeal more to children, encouraging greater PA and engagement.

D1.S3.1(3) Assessing the role of biomarker feedback in a 12-week community weight management programme among overweight men: a pilot study

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Obesity remains one of the nation's greatest long-term health challenges. Community-based weight management services are an effective way to address both physical and psychological aspects of weight management, but enrolment and adherence rates are low. The primary objective of this study was to examine the feasibility of recruitment, retention, and delivery of biomarker feedback among men partaking in Shape Up, a physical activity for health programme. Secondarily, it explored the potential effects of biomarker feedback on participants' adherence and motivation levels. In this two-arm non-randomised pilot study with ethics approval, 46 men (mean age 46.0 ± 8.6 years) participating in the 12-week Shape Up programme were assigned to a control group or biomarker feedback group. Biomarker feedback consisted of 3 blood test panels: at baseline, 12 weeks, and 24 weeks (follow-up), each with a doctor's report. Recruitment, retention, and attendance rates were determined. Both groups completed questionnaires (Short Active Lives Survey [SALS], Treatment Self-Regulation Questionnaire [TSRQ], and EQ-5D-5L) to gauge levels of motivation and engagement. The mean difference was calculated between baseline and programme end. Mean recruitment (approach-to-consent), retention, and attendance rates were 96%, 93%, and 84% in the control group, and 85%, 86%, and 82% in the biomarker feedback group, respectively. Of biomarker feedback group participants, 86% attended their 12-week blood test and 45% attended their follow-up blood test at 24 weeks. The mean 12-week differences (95% CI) for the control group and biomarker feedback group were 138.1 (2.7, 273.5) and 467.3 (249.4, 685.2) for active minutes per week, 0.2 (-0.8, 1.2) and 0.4 (0.0, 0.8) for autonomous TSRQ domains, 0.2 (-0.3, 0.8) and 0.8 (0.1, 1.4) for controlled TSRQ domains, and 19 (12.7, 26.5) and 27.2 (19.8, 34.6) for EQ-5D-5L scores, respectively. Biomarker feedback was well-received by participants and deemed feasible, with high recruitment and retention rates for the duration of the 12-week programme. Biomarker feedback may affect aspects of motivation but did not appear to influence adherence to the programme. Improvements in biomarker results, including haemoglobin A1c (HbA1c), non-high-density lipoprotein (non-HDL) cholesterol, and triglycerides, may provide additional evidence of programme efficacy in addition to weight loss. Important design considerations are provided for definitive larger-scale trials.

D1.S3.1(4) Development and validation of the COM-B Physical Activity Questionnaire (COM-B PAQ)

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Critically low levels of physical activity suggest a need to develop a better understanding and provide solutions for practitioners to address physical inactivity. Determining underpinning factors driving physical activity engagement will support intervention design. The aim was to develop a physical activity questionnaire to assess perceptions and attitudes based on the COM-B model of behaviour change (Capability, Opportunity and Motivation) (Michie al. [2011]. Implementation Science, 6(1), 1-12). COM-B can provide explanations for behaviour such as physical inactivity, whilst presenting practitioners and researchers with the opportunity to address constructs using the Behaviour Change Wheel and Behaviour Change Technique Taxonomy. The Theoretical Domains Framework (TDF) also underpinned the questionnaire, with the domains mapped to COM-B. Prior authorisation was obtained from Canterbury Christ Church University's ethics committee (ETH1920-0269). There were 5 phases; developing a pool of items, evaluating content and face validity, assessing model fit, confirming concurrent, discriminant and predictive validity, and establishing test-retest reliability. The item generation phase resulted in 106 items, after content validity with experts and a pilot study this reduced to 59. Confirmatory Factor

Analysis (CFA) resulted in 3 models representing 3 scales: Capability, Opportunity and Motivation. Within each model, 15 factors reflected all domains of the TDF. After CFA COM-B PAQ (COM-B Physical Activity Questionnaire) comprised 37 items. Concurrent validity was demonstrated with significant positive correlations with similarly previously established measures; General Self-Efficacy Scale (Chen al. [2001]. Organizational Research Methods, 4(1), 62-83), Social Support for Exercise Behaviour Scale (Sallis al. [1987]. Preventive Medicine, 16(6), 825-836) and Behavioural Regulation in Exercise Questionnaire-2 (Markland & Tobin. [2004]. Journal of Sport and Exercise Psychology, 26(2), 191-196). For test-retest reliability repeated measures ANOVA showed no significant change in the distribution of scores between the two timepoints (F3, 55 = 0.545, P = 0.654, partial eta squared = 0.029). COM-B PAQ resulted in a 37-item questionnaire consisting of 3 subscales that is a psychometrically sound, valid, and reliable instrument with good discriminative capacity. The COM-B PAQ provides researchers and practitioners with a new tool and a method to assess perceptions and attitudes towards being physically active. COM-B PAQ can contribute to the development of more effective interventions for promoting physical activity and further understanding influences on engagement.

D1.S3.1(5) Application of motor training combined with cognitive training in early rehabilitation of limbs function in patients with cerebral hemorrage

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Cerebral haemorrhage, a widespread global health problem, is one of the leading causes of disability and reduced life expectancy (GBD 2019 Diseases and Injuries Collaborators, 2020, Lancet, 396, 1204-1222). Traditional rehabilitation is based on various neurodevelopmental techniques to guide the patient through the active and passive movement of the limbs through single movement training, which is inadequate in meeting the needs of patients returning to life in the community (Chiaramonte et al., 2022, Journal of Functional Morphology and Kinesiology). Early rehabilitation interventions can help patients establish nerve collateral circulation early and speed up impulse conduction between nerve cells (Ward et al., 2004, Neurorehabilitation and neural repair). Dual-task training enriches the external environment, increases the activity of nerve cells and ultimately optimises limb control and improves flexibility when performing multiple tasks (Sim et al., 2015, Clinical rehabilitation). The study aimed to investigate the role of motor training combined with cognitive training in the early rehabilitation of limb motor function in patients with cerebral hemorrhage. 63 participants eventually completed the experiment, 31 in the control group and 32 in the dual-task group. The control group implemented conventional physical rehabilitation care; the dual-task group added cognitive training to the control group. The intervention started 24h after onset and lasts for a fortnight, once a day for 45 minutes. All participants underwent a physical motor function test, a test of daily living ability before and after the intervention, and an exercise compliance test after discharge. The data were analysed for differences by independent samples t-test, and $P<0.05$ indicated statistical significance. The dual-task group had significantly higher scores on the Fugl-Meyer Assessment than the control group ($p=0.021$). Also, the dual-task group had substantially higher Modified Barthel Index (MBI) ($p=0.006$)and Exercise Adherence scores than the control group ($p=0.009$). The exercise combined with cognitive training simulates life scenarios with appropriate task combinations to better match daily activities, increase participation of the patients, help the patients maintain the flexibility needed to perform motor functions in complex environments. Motor training combined with cognitive training is practical and feasible when applied to the functional rehabilitation of limbs in patients with cerebral hemorrhage. The training can observably improve the limb motor function, improve the ability to perform daily living activities, and appropriately improve patient compliance with exercise after discharge from the hospital. It is worth applying in the early rehabilitation care of cerebral hemorrhage.

Ethics approval: the First People's Hospital of Huzhou (2019KYLL006).

D1.S3.1(6) Primary school physical education in Colombia and its influence in the physical, psychological and social well-being of children. An exploratory analysis.

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Children taking part in a physical education (PE) class generally have better self-esteem, physical and mental health, and greater physical resistance (Sáenz, Hernández and Salicetti, 2022, EmásF, Revista Digital de Educación Física, 74, 134-148). During the last decade, the Colombian government has implemented policies on primary education, especially for PE, to improve the physical and psychological health of children. The aim of this study was to analyse the situation of primary education PE in Colombia, through an exploratory analysis including a systematic review of literature, a survey, and observation of PE classes. From 81 studies finally analysed in the review, it was found that PE classes produce significant improvement of strength, cardiovascular resistance, and flexibility, which complemented

with games and cooperative sports could enhance teamwork, self-esteem and self-confidence. Additionally, an examination of Colombian policies on PE has shown that curriculum standards imply the creation of learning strategies to develop motor skills and body expression to promote physical, emotional and social well-being. In a survey applied to 53 practicing PE teachers, with institutional ethics approval and informed consent from the participants, with an experience time of (14.92 ± 5.41) years (mean ± s), it was found that 96.23% of the participants considered that the PE curriculum does not include the methodological and assessment procedures to guarantee the physical, mental, and social welfare of children, and 88.96% considered that there is a need to increase the class time for the subject. Additionally, 77.36% of the participants think that the curriculum does not include current trends in physical education, and there is a lack of resources and spaces for the implementation of a proper PE education program. Remarkably, 100% of the participants think that a specific education for primary PE teachers is necessary to address the physical and psychological health of children. The observation of 17 PE classes was performed by 5 experts with an experience time of (16.60 ± 3.63) years, who considered that the classes do not contribute to the emotional and social well-being of children (70.59%), the class activities were monotonous and non-ludic (76.47%) and their content did not fulfil the proposed objectives (82.35%). These results suggest to design a PE curriculum with greater impact on the physical, emotional, and social well-being of children, including cooperative activities and games. Additionally, it is fundamental to train professionals accordingly to this new curriculum, guaranteeing the all-round development of children.

D1.S3.2 - Free Communications - Sport and Performance

D1.S3.2(1) Implementation of entrustable professional activities into Sport and Exercise Sciences teaching to map BASES accreditation competencies

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BASES Sport and Exercise Scientist Accreditation sets out the professional standards within the UK. Authentic learning environments are key to develop students, especially for those focused on a practitioner career pathway. Entrustable professional activities (EPAs) are units of professional practice, defined as 'tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence' (Ten Cate, 2013, Journal of Graduate Medical Education, 5, 157-158). Therefore, embedded EPAs create a development pathway for all students and act as a pedagogic strategy to improve employability and the aim of was to explore how these can be implemented in Sport and Exercise Sciences modules. EPA were implemented in UG L4 and MSc L7 Sport and Exercise Sciences modules at two separate institutions. Frameworks were developed to map the key competencies assessed within the modules against the BASES accreditation sections. At L4, three EPA domains were identified (Effective Implementation, Evaluation of Practice, Student Behaviours), while at L7 two EPA domains were identified (Athlete Safety and Welfare, The Assessment is Undertaken Effectively). With institutional ethical approval, exploration of EPAs and student perceptions were assessed. At L4, the majority of students considered the EPA framework process easy to understand (93%), clearly defined (97%), well communicated to them (80%). Of the listed competencies, 'maintaining health and safety' was the most important followed by 'duty of care' and 'communication of procedure'. At L7, students reported that 'the value of the applied exposure and expectation to evaluate athletes using a variety of physiological assessments and analysis equipment'; 'developed interest to pursue a physiology career/applied work with athletes'; and 'opportunity to work towards independence'. EPAs provide alignment of learning activities and practical skill development in discipline of Sport and Exercise Sciences towards students' professional development, to produce work-ready graduates. Individual accreditation as a Sport and Exercise Scientist is a career path many graduates choose to take following a period of postgraduate study and applied practice. There remains an opportunity to explore ways to develop and assure practical and professional competency at the undergraduate level of education. Development of an appropriate skill and competency base that can be considered ready to be assessed for entrustment and responsibility in a professional setting is important throughout an undergraduate degree programme in Sport and Exercise Sciences.

D1.S3.2(2) Impact of a novel saddle design on 10-mile time-trial performance

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Some of the mechanical energy generated during the pedal action in cycling is lost as the rider generates internal resistive forces to maintain their position on the saddle. Therefore, the purpose of this study was to examine if the application of a novel saddle design incorporating a 15 cm saddle spur to the rear could influence 10-mile cycling time-trial (TT) performance and associated physio-mechanical and perceptual responses. Following institutional ethics approval, 16 TT-experienced cyclists (7 females and 9 males; age: 44 ± 10 years; height: 174.7 ± 8.9 cm; body mass: 74.30 ± 13.16 kg; body fat: 19.6 ± 11.0%; VO_2max: 49.68 ± 8.94 ml·kg^{-1}·min^{-1}; self-reported functional threshold power: 233 ± 43 W; maximal aerobic power: 338 ± 46 W) volunteered to participate. Participants reported to the laboratory on three separate occasions in a randomised cross-over design, completing a 10-mile TT course with either a novel-design saddle (SPU) or a commercially available unisex standard saddle (STA)

(Prologo, Kappa Space T2.0, Italy) after an initial assessment of VO2max and GET. The TT course incorporated a series of flats and declines as well as ascents (multiple 20% climbs) with an average incline of 11% in the final 3 miles. All TTs were completed on a Wahoo KICKR BIKE Smart Bike. Results showed that the SPU was 27.2 s slower in the first 7 miles but upon completion it was 11.2 s faster indicating a 38.4 s swing in favour of the SPU over the final 3 miles coinciding with the overall steepest part of the TT. Saddle discomfort showed non-significant differences for miles 1 to 8, however, at miles 9 ($P < 0.05$) (ES = 0.59; 95% CI -0.25 – 1.39) and 10 ($P < 0.05$) (ES = 0.81; 95% CI -0.05 – 1.61), SPU exhibited significantly less discomfort. Results suggest that for the same overall time when comparing the two saddles, the SPU was far more comfortable to ride. These results are linked to the point in the TT when the course and effort are at the toughest, yet perception of discomfort did not reflect this. The ramifications of this are that less discomfort will translate into more efficient cycling in a single (acute) condition and that the application of a saddle spur seems to have a positive effect once the gradient of incline reaches a point where the rider must generate resistive forces to maintain their position on the saddle.

D1.S3.2(3) The rise of e-cycling: who is taking part and is it a sport or a game?

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Cycling has a long and rich history in comparison to esports, which are comparatively new, but have grown to a massive global market with 532 million online viewers in 2022. E-cycling is one of the very few esports that require physical exertion to 'play' the game and its level of physical exertion is the same as riding outdoors (Westmattelmann et al., 2021, European Journal of Information Systems, 30, 119-136). E-cycling is a growing exercise modality, and Zwift, the biggest platform with approx. 1million users, is a virtual training tool that also hosts daily competitions, and the e-cycling world championships. E-cycling's popularity continues to increase post Covid-19, and we set out to understand who takes part in e-cycling and why. With institutional ethical approval 1467 participants (337 females & 1130 males; mean age: 46.2 ± 11.3 years; height 176.7± 8.9 cm; weight 76.4 ± 13.1 kg) (mean ± sd) were recruited over a 7-week period via social networking sites to complete an online survey. Participants had taken part in all available forms of in-person cycling for 21.1 ± 16 yrs. Pre Covid-19 46% took part in e-cycling; now 96% do. The average amount spent on their e-cycling setup was £1425 ± 7911. 53% e-cycle all year round, and 32% only e-cycle in winter. 60.47% are members of an in-person cycling club, and of those, 51.6% took part in in-person club rides, whereas 96% did online group rides. 48.3% raced in-person races, compared to 68.6% who raced in e-cycling races. In-person races frequency: 26.9% race 1-2p/m, 12.7% race 3-5p/m, 3.3% race 6-10p/m, and 0.1% race > 10p/m. Online race frequency: 19.2% race 1-3p/m, 26% race 4-6p/m, 13.5% race 7-9p/m, 6.7% race 10-12p/m, 1.3% race 13-15p/m, and 1.9% race >16p/m. 24.9% perceive e-cycling as a game, 51.3% as a mode of cycling, 12.9% a bit of both, 1.8% unsure, and 0.5% neither. 64% thought that e-cycling was a more accessible way of cycling. The results indicate that e-cycling is being used by experienced cyclists, predominantly male, who cycle and compete outdoors. There was a large increase in the number of participants who started e-cycling during the pandemic, and 96% are still e-cycling. More people race online, and more frequently, compared to in-person racing. The majority do not view e-cycling as a game, and believe it is a more accessible form of cycling despite spending a significant amount of money on their e-cycling set-up.

D1.S3.2(4) We are what we learn: statistical education in UK undergraduate sport and exercise science-related degree programmes

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A large proportion of research findings may be false [1]. Underpowered studies [2], inappropriate research designs, and questionable research practices are at the heart of the problem — this includes sport research [3]. Many researchers misunderstand fundamental aspects of statistics [4] and it is important to consider how this affects the teaching of undergraduates who will enter the academic or industry workforce. To examine this, we surveyed 94 academics from 60 UK institutions on aspects related to the teaching of research methods and statistics on undergraduate sport and exercise science courses. Topics 'covered in depth', on average, included null-hypothesis significance testing, p-values, statistical significance, and assumption checks. This was at the expense of 'not covered' topics such as the Neyman-Pearson approach, the Fisherian approach, Bayesian approaches, open science, pre-registration, and Registered Reports. Students were mostly assessed via written assessments (54%), although individual research projects (29%), multiple choice tests (29%), and computer-based assessments (27%) were also common. Most courses used SPSS (76%) and Microsoft Excel (64%), although open-source software such as JASP (20%) and JAMOVI (10%) were also used. Online videos and tutorials (73%) were referred to more than textbooks (68%) or journal articles (64%). The median response for modules providing practical ability to conduct data analyses was 'strongly agreed', with 'agreed' the median response for providing effective preparation for dissertations and conceptual understanding, and 'slightly agreed' for students being properly prepared for data analysis in both sporting and industry settings. Content analysis of open responses indicated that participants judged the effectiveness of their teaching based on aspects relating to feedback (students, other staff), assessment (formative, summative), industry

(preparedness for work), and future study (preparedness for dissertations/postgrad). The usefulness of student module evaluations was debated. There were also contrasting views on the relative effectiveness of students passing tests compared to developing conceptual understanding. There were some collaborative projects with industry, but responses generally indicated that students were not prepared to work in industry, with participants not even sure what that would require. Our study suggests that academics in our discipline mostly take a 'well-worn path' to teaching statistics. Although some alternative approaches are being used, staff are focusing on the 'doing' of statistics — conducting statistical tests — instead of developing conceptual understanding. Our study also suggests that particular emphasis should be given to the constructive alignment between academia and industry.

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D1.S3.2(5) Underwater fly kick development in swimming using a skill-acquisition intervention: A pilot study

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Within coach education programmes, training periodization focusses upon the manipulation of training intensity and volume with consideration to the physiological and physical loading experienced by the athlete (González-Ravé et al., 2021, International Journal of Sports Physiology and Performance, 16, 913-926). There is a distinct lack of information available to coaches as to how best to structure skill developments within practice (Otte et al., 2019, Frontiers in Sports and Active Living, 61, 1-17). Swimming coaches tend to use targeted drills to develop skills (Brackley et al., 2020, Journal of Sports Sciences, 38, 2532-2542; Thompson et al., 2022, International Journal of Sports Science and Coaching, 17, 984-998), but these focus on short-term performance rather than longer-term learning, and do not have scientific grounding. Therefore, the aim of this study was to assess the effects of a four-week intervention on underwater fly kick performance. Ethical approval was granted by the Faculty of Engineering and Physical Sciences at the University of Southampton. The intervention, based upon skill-acquisition frameworks (Farrow and Robertson, 2017, Sports Medicine, 47, 1043-1052; Otte et al., 2019), consisted of four key stages working through coordination, skill adaptability, movement variability and performance stability training. Potential interventions relating to each stage were collated and this library was provided to the swimming coach as a framework. Nine national level male participants (age 21.4 years ± 1.5 years, mass 80.80 kg ± 8.63 kg, height 1.82 m ± 0.06 m, FINA points score 681 ± 62, intervention = 7, control = 2) attended two data collection sessions exactly four weeks apart. Ten reflective markers were placed on key bony landmarks, and a six camera Qualisys motion capture system (100 Hz) recorded kinematics. Within the intervention group, improved underwater fly kick performance was observed through increased average and peak horizontal swimming velocity (2%, $P = 0.04$ and 4%, $P = 0.02$ respectively). Kick frequency increased (11%, $P = 0.00$) and the kick became more symmetrical (4% decreased up-beat duration and 39% reduced difference between up and down-beat toe velocities, $P = 0.02$ and $P = 0.00$ respectively). Ankle range of motion reduced ($P = 0.01$) and peak knee extension increased ($P = 0.00$). Positive feedback was gathered from both the coach and athletes involved in the study. The results indicate that the four-week intervention improved underwater fly kick performance, providing evidence for the structured implementation of skill training theory driven practices in underwater fly kick coaching.

D1.S3.3 - Free Communications - Multi: Biomechanics and Motor Behaviour; Psychology and Sport and Performance

D1.S3.3(1) The role foundational movement skill proficiency plays in identifying increased risk of paediatric anterior cruciate ligament injuries

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Increasing numbers of paediatric anterior cruciate ligament (ACL) injuries are reported in children aged 5-14 years. Various risk factors (e.g., non-modifiable/modifiable) have been mechanically linked to an increased risk of ACL injuries. Reasons are multifactorial and include early single sport specialisation with increased focus on a small subset of skills, and a lack of developing a diverse range of skills considered foundational for broad sports participation. The present study explored whether foundational movement skill proficiency, and proficiency in selected skills with similar demands to the ACL injury mechanism, are associated with kinematic measures mechanically linked to increased ACL injury risk. Following institutional ethics approval, this study recruited grassroots football players in the UK. Informed consent was provided prior to participation. 3D motion capture (Vicon, UK) with integrated force platforms (AMTI, US) were used to determine ankle, knee, hip and trunk joint kinematics at initial contact and peak during the first landing from a 30cm drop jump. Proficiency in 13 foundational movement skills was assessed with the Test of Gross Motor Development (e.g., locomotion

(e.g., jump, hop) and object control skills (e.g., throw)) and selected skills from the Resistance Training Skills Battery (i.e., squat, lunge). Skills were analysed as raw scores for correlations and classified as near-mastery/mastery (N/M) or Poor to determine difference in kinematic variables. Eighteen participants (5 female, mean±SD age (years)=11.95±1.68, peak height velocity (years) =-1.12±1.29) were included. Object control scores, rather than locomotion scores, correlated with kinematic variables, e.g., hip and knee peak flexion (P<.05). Larger knee flexion angles at initial contact (mean±SD) (N/M=30.85°±6.37°, Poor=23.03°±4.02°, P<.05) and smaller knee valgus angles (N/M=1.94°±2.95°, Poor=4.70°±2.18°, P<.05) in the drop jump were observed in children classified as N/M, compared to those classified as Poor in the standing broad jump. No differences in kinematic variables were observed for N/M or Poor classifications in the hop, squat or lunge. Proficiency in the standing broad jump shows potential to determine children with greater prevalence of kinematic risk factors mechanically linked to increased ACL injury risk in the drop jump. Criteria for judging drop vertical jump performance describe a knee flexion at landing of >30° as good movement pattern and lower injury risk, whereas <30° represents a higher injury risk. Therefore, the standing broad jump offers potential as simple and effective screening task for children that reveals key kinematic patterns mechanically linked to ACL injury risk.

D1.S3.3(2) Reliability of the VALD Dynamo to Measure Isometric Neck Strength in the Quadruped Position

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The importance of evaluating isometric strength of the neck muscles has gained considerable recent interest given the link between optimal muscle function and the risk of neck injury and concussion (Farley et al. 2022 British Journal of Sports Medicine, 11, 616 – 621). There is a lack of reliability regarding recently applied tools and no comparison of assessments techniques which is essential for accurate screening and monitoring. Therefore, the aim of this study was to assess the inter and intra-session reliability of the VALD Force Frame and VALD Dynamo and determine their association. With institutional ethical approval, a repeated measures reliability study was conducted with 20 male (mean age 26.83 ± 7.79 years: stature 175.38 ± 21.73 cm: body mass 79.5 ± 10.89 kg) (mean ± s) recreational active participants. Peak isometric neck force from three repetitions were assessed in the quadruped position (McBride et al. 2023 Sports, 11, 2-11) in flexion, extension, left and right-side flexion with the VALD Force Frame and then Dynamo in two testing sessions a week apart. Intra-session and inter-session reliability were assessed using intraclass correlation coefficients (ICC), coefficient of variation (CV), standard error measurement (SE¬m), and minimal detectable change (MDC). Passing-Bablok procedures were used to assess construct and proportional differences between methods and Bland-Altman plots were used to compare bias and variability in the devices. Intra and inter-session reliability for both devices showed acceptable reliability ICC > 0.7 and CV % < 14 %. There were no systematic or proportional differences based on the Passing-Bablok procedure. The Bland-Altman plots displayed mean bias of; -10 N for Left-side flexion, -19 N Right-side flexion, -37 N for Flexion and a mean bias of 28 N for extension when compared to the Force Frame. The findings suggest that both tools can be used to reliability assess neck strength and support the use of such assessments for screening and monitoring in sport and clinical settings. However, the tools should not be used interchangeably due to small systematic bias, the VALD Dynamo may offer a suitable lower cost alternative given the demonstrated within and between session reliability.

D1.S3.3(3) Differences in approach run step kinematics: successful vs. unsuccessful jumps in the long jump

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Bilateral asymmetry has been the focus of attention for its part in the biomechanics of sprint running. Research (Theodorou et al., 2017, Journal of Sport Sciences, 35, 346-354) has reported individual asymmetry profiles for step length (SL) and step frequency (SF) in long jumpers favouring a different limb for each step variable, but eventually resulting in no significant asymmetry in step velocity. The aim of the study was to investigate if step kinematics and the magnitude of the inter-limb asymmetry would interact with the outcome of the attempt. Following ethical approval by the French Federation of Athletics, the legal (LAJ; n = 218) and foul (FAJ; n = 96) attempts of 65 adult female long jumpers (official performance: 5.83 ± 0.38 m) (mean ± SD) were recorded during the 2017 to 2023 French National Indoor Athletics Championships. Thirty meters of the Optojump Next (Microgate, Bolzano, Italy) system were installed on each side of the runway to measure the step kinematic parameters (step frequency: SF; step length: SL; step contact time: SCT, step flight time: SFL; step time: ST) for the third up to the eleventh last step of the approach. Inter-limb asymmetry in the examined parameters was quantified

based on symmetry angle (θSYM; Zifchock, Davis, Higginson and Royer, 2008, Gait and Posture, 27, 622-627). A Stalker Pro II radar gun (Applied Concepts, Inc., Plano, TX) measured the average horizontal speed (V) of the approach at the 20-15 m (S1), 15-10 m (S2), 10-5 m (S3) and 5-0 m (S4) sections from the take-off board. Independent Samples T-test revealed that LAJ, SL, SFL, SCT, and ST were significantly smaller while SF was significantly larger ($P < 0.05$). A significantly ($P < 0.05$) lower S4 was recorded at the FAJ (8.59 ± 0.46 m/s) compared to LAJ (8.75 ± 0.40 m/s). No difference was observed for θSYMs between LAJ and FAJ. The 2 (result) x 2 (leg) ANOVA revealed significant ($P < 0.05$) main effects of result and leg for SF, SL, SCC, SFL, and ST. Although the magnitude of asymmetry remained unchanged, in LAJ the take-off leg had a larger SL, SCT, SFL, and ST, but a lower SF compared to the swing leg. This could imply that effective regulation that leads to a LAJ is performed by manipulation of the vertical impulse of the take-off leg (Lee, Lishman and Thomson, 1982, Journal of Experimental Psychology, 8, 448-459).

D1.S3.3(5) "Smile more": An ecological approach to women's experiences of sexism while working in sport

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Study Aim: Reports of sexist behaviour in sport are ever-growing despite the potential for sexism to negatively impact the well-being of everyone. Relatively little research has investigated this phenomenon, meaning we do not have a clear picture of women's experiences and are far from implementing relevant solutions. This research aims to explore women's experiences of sexism while working in sport and gain an understanding of how multiple ecological layers intertwine to influence women's experiences.

Method: Following institutional ethical approval, 105 women (M age = 35.8; SD = 9.81) completed a survey based on the Everyday Sexism Survey (McDonald et al., 2016). Qualitative data collected was thematically analysed using LaVoi and Dutove's (2012) ecological systems theory to make sense of women's experiences. Quantitative data is presented as percentages.

Results: Qualitative data was deductively analysed to generate higher-order themes derived from LaVoi and Dutove's (2012) ecological model and inductively developed subthemes represented women's experiences of sexism: a) Intrapersonal (coping mechanisms), b) Interpersonal (men treating women as their lesser counterparts; sexual comments and behaviours; policing gender stereotypes; using banter to minimise sexist transgressions), c) Organisational (minimising women's experiences; boys' club; inadequate facilities for women; barriers and opportunities to career progression; lack of pathway or support when dealing with sexism), and Sociocultural (exclusion from sport based on gender; holistic views and beliefs based on gender stereotypes). Quantitative data was used to supplement qualitative findings throughout the layers of the socio-ecological model.

Conclusions: This study provides evidence that sexism is commonplace in sport settings, and evidence of benevolent and hostile sexism was widespread throughout every level of the socio-ecological model. Participants struggled to report and manage sexism within their organisations; additionally, interpersonal experiences of sexism often resulted in repeated sexism at interpersonal and organisational levels. This meant that women often engaged in avoidance-based coping to deal with their experiences.

Implications: The cultural development of sport as a mechanism to maintain heteronormative, white patriarchy (and maintenance of this) still excludes women at all levels of the ecological level, often leading to coping mechanisms that can negatively impact well-being. Education and awareness surrounding sexism, particularly in sport, is a necessary component to challenging sexism. Additionally, specific policies should be introduced to direct organisations and individuals on the recruitment, hiring, and treatment of women in the workplace, as well as pathways for women to deal with sexist experiences.

D1.S3.3(6) What do Applied Performance Analyst employers really want?: Comparative analysis of job advertisements in the UK and Ireland (2021-2022)

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Over the past 20 years, the area of Sports Performance Analysis (SPA) has seen significant growth. This development has led to a diversification in the responsibilities of Applied Performance Analysts (APAs) as they seek to provide valuable performance insights. The framework developed by Martin et al. (2021, International Journal of Performance Analysis in Sport, 21(6), 845–888) emphasises nine APA practice components and five areas of expertise. Whilst potentially illuminating, this framework has not yet been cross-examined against the requirements organisations use when advertising APA roles. To close this gap, the study examined 130 job advertisements gathered between January 2021 and December 2022 to analyse the skills and responsibilities of APAs in SPA. The advertisements were manually subjected to content analysis using predetermined categories from Martin et al.'s (2021) framework. To ascertain relationships between codes and employment levels, descriptive analyses were used to establish the frequencies of various codes. All job advertisements followed a similar structure, but there were variations in the length and level of detail provided. Some adverts outlined 25 responsibilities, while others only had two. A similar pattern emerged regarding the personal specifications, with variations in the number of expertise requested. Specific payment details were included in only 18 of the 130 adverts, with payment ranges for Academy roles not too dissimilar to those in a First-team role. Within the personal specification, advertisements requested APAs to evidence SPA, sport, and technical expertise along with professional

behaviours significantly over expertise in building relationships, which was argued to be fundamental by Martin et al. (2021). These areas of expertise were highlighted more in Academy roles than in First-team role advertisements, however, First-team advertisements requested more skill-specific analysis experience. The tasks and responsibilities sections of the advertisements highlighted Academy APAs were expected to spend more time collecting data, facilitating feedback, and developing and approving infrastructure for various age groups. First team roles, in comparison, would be responsible for more complex data analysis tasks, including integrating data, identifying trends, and reporting these insights to key stakeholders. Based on the analysis of the job advertisements and the distinctions between Academy and First-team roles, Martin et al.'s (2021) framework offers insightful information about the skills APAs need and a potential framework for employers to use when designing adverts. Our findings have implications for individuals' advertising roles along with those applying for positions in addition to improving curricula and training of current and future APAs.

D1.S3.3(7) An exploration of one former elite football academy player's lived experience, of 'being bio-banded' in the UK through narrative inquiry: A focus on body-self relationships and identity construction

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Research on football academies specifically and the development of young players' development and wellbeing is growing (Adams and Carr 2017; Whatman et al 2018; Goldman et al. 2021). An interest in bio-banding, the process of grouping players based on biological maturation as opposed to chronological age, led the focus of inquiry where early maturing players are chosen to 'play-up'. To date we know very little about the experience and long-term impact of being 'bio-banded' on academy footballers. This research employed narrative inquiry (Sparkes and Smith 2014) to explore the lived experiences, body-self relationships and associated identities of a footballer who had experienced maturity matched practice in academies, and as a coach worked alongside bio-banding interventions. A life history approach was adopted. Two in-depth interviews with one purposively sampled former elite academy footballer who experienced the bio-banding process was conducted following a lengthy sampling and access phase of the research process, including institutional ethical approval. Adopting the position of story analyst, a multi-level structural and thematic narrative analysis was employed to interpret the processes and critical moments (Douglas and Carless 2009) within the narrative. In a reflexive methodology, particular attention is paid to the difficulty of accessing the profile of participants that met the study criteria and critical reflection on potential barriers to elite academy voices is given. The research provides an unheard voice that will help us to understand the meaning derived from being bio-banded, as an elite academy footballer, and its effects on long-term development. Recommendations on practices and policy to the benefit of player welfare are considered.

D1.S3.4 - Free Communications - Physiology and Nutrition

D1.S3.4(1) Effect of Tribulus Terrestris on blood testosterone concentrations, body composition, exercise performance, and muscle strength following a detraining period

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Background: Some studies indicate a significant drop in testosterone levels due to prolonged inactivity, which may have resulted in significant skeletal muscle mass loss and performance. It can be hypothesised that maintaining testosterone levels during a period of inactivity could reduce the rate of detraining-induced strength loss and muscle atrophy. Tribulus Terrestris L is an androgenic herb used for centuries as an endocrine testosterone booster. It may have positive effects on exercise performance and body composition. Studies to prove the credibility of Tribulus-Terrestris L. as an ergogenic and sports supplement have been conducted. This is the first study to investigate if Tribulus Terrestris L. can reduce the loss of fitness during an enforced detraining period and to determine the effects of Tribulus Terrestris L. in offsetting losses of lean body mass, strength, and subsequent aerobic performance following a period of detraining.

Methods: Thirteen university-based sportsmen participated in a randomized, double-blind, crossover study (3-2/15-7-2015 /University of Thrace). Participants avoided intensive or long training sessions during the 10-week detraining period. They engaged in light-moderate activities (3.0 - 6.0 METs). Participants' diet and physical activity were monitored throughout the study. Participants received either a daily oral supplement of Tribulus Terrestris L. (20 mg·kg-1 x 3 times·day-1) or a placebo for 4 weeks with a 2-week wash-out period between trial periods. Before and after each intervention period, participants' body composition, isometric torque (knee), Maximal Oxygen Consumption (VO2 max), and time trial exercise test to exhaustion included 45 min running on a treadmill at an intensity corresponding to 70–75% VO2max were assessed. Venous blood samples were collected at rest and after exercise (2 & 24h) to determine testosterone levels. Blood lactate was measured before and after each exercise test by using a hand-portable analyser.

Results: Supplementation with Tribulus Terrestris L. reduced the detraining-related decrease of testosterone concentration at rest ($p = 0.001$) and significantly improved the 2h post-exercise levels of the hormone ($p = 0.030$) but did not have any effect on body composition($p > 0.005$), aerobic

performance(p = 0.652), or muscle strength (concentric: Placebo p = 0.660; Tribulus Terrestris L. p = 0.622; Eccentric: Placebo p = 0.320; Tribulus-Terrestris L. p = 0.740; Isometric: Placebo p = 0.112; Tribulus Terrestris L. p= 0.723).

Conclusions: Four weeks of Tribulus Terrestris L. supplementation had no ergogenic effect on aerobic performance or muscle strength loss following a significant reduction in the training regimes' intensity and volume.

D1.S3.4(2) Influence of water-based exercise on energy intake, appetite, and appetite-related hormones in adults: a systematic review and meta-analysis

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Single bouts of land-based exercise suppress appetite and do not typically alter energy intake in the short-term, whereas it has been suggested that water-based exercise may evoke orexigenic effects. The primary aim was to examine the acute and chronic effects of water-based versus land-based exercise, water-based exercise versus no exercise control and water-based exercise at different temperatures, on energy intake, appetite, and appetite related hormones in adults. (PROSPERO ID number CRD42022314349). PubMed, Medline, Sport-Discus, Academic Search Complete, CINAHL and Public Health Database were searched for peer-reviewed articles published in English from 1900 to May 2022. Included studies implemented a water-based exercise intervention versus a control or comparator. Risk of bias was assessed using the revised Cochrane 'Risk of bias tool for randomised trials' (RoB 2.0). Nine studies which met all inclusion criteria were identified (eight acute studies (same day) and one 12-week (training study)). Meta-analysis was performed on energy intake only (8 studies (water versus control), 5 studies (water versus land) and 2 studies (water at two different temperatures)). Meta-analysis revealed that a single bout of exercise in water increased *ad-libitum* energy intake compared to a non-exercise control (mean difference [95% CI]: 330 [118, 542] kJ, P = 0.002). No difference in *ad libitum* energy intake was identified between water and land-based exercise (78 [-176, 334] kJ, P = 0.55). Exercising in cold water (18 to 20 °C) increased energy intake to a greater extent than warmer water (27 to 33 °C) temperature (719 [222, 1215] kJ; P < 0.005). The one eligible 12-week study did not assess whether water-based exercise influenced energy intake but did find that cycling and swimming did not alter fasting plasma concentrations of total ghrelin, insulin, leptin or total PYY. To conclude, if body mass management is a person's primary focus for undertaking water-based exercise, they should be mindful of the tendency to eat more in the subsequent hours after the session due to this review highlighting energy intake may be increased when compared to a no exercise control and if the temperature of the water is cold (18 to 20 °C).

D1.S3.4(3) Ageing is not associated with greater exercise-induced muscle damage or impaired recovery in older adults; a meta-analytical comparison

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Anecdotal evidence suggests that ageing is associated with greater symptoms of exercise-induced muscle damage (EIMD) (e.g. reductions in muscle function, increases soreness and circulating creatine kinase [CK]) and impaired recovery. However, the available literature is contrasting and does not appear to support this. Therefore, the aim of this study was to provide a meta-analytical comparison of EIMD symptoms at 24, 48 and 72 hours, and for peak symptoms (i.e. those with the greatest magnitude of change), in younger (e.g. 18 to 25 years) and older adults (e.g. >35 years). Google Scholar, PubMed and Sport Discus were searched from August 2022. Studies were eligible for inclusion if they 1) provided an adult age comparison, 2) provided muscle function (e.g. strength), soreness or CK markers between 24 and 72 hours after muscle damaging exercise, 3) did not provide a recovery treatment or included a treatment free control group, 4) and were performed in humans. An inverse-variance random-effects model for meta-analyses was employed because it allocates proportionate weight to comparisons based on the size of their individual standard errors whilst accounting for heterogeneity across studies. Effects were represented by the standardised mean difference (SMD). Thirty-six comparisons from 34 individual studies were included in the analysis: 27, 21 and 24 for muscle function, muscle soreness and CK, respectively. The main effects for muscle function at 48 hours (SMD = -0.35, Z=-1.74, P<0.05), muscle soreness for all comparisons (SMD range = -0.34 to -0.62, Z range = -2.10 to -5.30, P<0.05) and CK for 24 hour and peak comparisons (SMD = -0.37 and -0.34, Z= -2.82 and -2.68, respectively, P<0.05) indicated greater EIMD symptoms in younger than older. All other comparisons were non-significant (P>0.05). These data suggest that older adults do not experience greater EIMD symptoms or impaired recovery after muscle-damaging exercise. Indeed, there is strong suggestion that older adults experience a reduced magnitude of EIMD symptoms, particularly for muscle soreness. These findings provide insight and encouragement to practitioners who may be concerned about the potential impact of EIMD in older adults specifically.

D1.S3.4(4) The effect of age and sex on peak oxygen uptake during upper- and lower-body cycle ergometry: A meta-analysis.

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Age and sex related norms for peak oxygen uptake (VO2peak) during lower-body cycle ergometry (LBCE) have been established (Rapp et al, 2018, BMJ Open, 5;8(3):e018697-018697). However, little is known regarding the effects of age and sex on VO2peak during upper-body cycle ergometry (UBCE), which may have important implications for independent living. The aim of this study was to determine the effect of age and sex on VO2peak during LBCE and UBCE in the same participants. Following ethics approval and pre-registration (PROSPERO; Ref: CRD42022349566) a database search was undertaken using Academic Search Complete, including; CINAHL complete, CINAHL Ultimate, Medline, PubMed and SPORTDiscus. Variations of the search terms "cycle ergometry", "arm crank ergometry", "age" and "peak oxygen uptake" were used. Participant characteristics and VO2peak were extracted and grouped by age and sex. VO2peak was plotted against age to determine the rate of decrease in VO2peak per decade. Differences between pooled age-group means for VO2peak were assessed using Hedges g where <0.3 represented small, 0.5 medium and >0.8 large importance. Heterogeneity was determined using I2 where 0-40% suggest unimportant, 30-60% moderate, 50-90% substantial and 75-100% considerable hetereogeneity. Study methodological quality was assessed according to Downs and Black (Downs and Black, 1998, Journal of Epidemiology and Community Health, 52, 377-384). The initial search yielded 460 articles. Removal of duplicates (n=243) and full screening process resulted in 66 articles being included. The rate of decrease in relative VO2peak with age during LBCE was greater for females than males (6.1 and 4.8 ml·kg·-1min·-1 per decade, respectively) whereas decreases during UBCE were similar (3.1 and 3.5 ml·kg·-1min.-1 per decade, respectively). Decreases in absolute VO2peak during UBCE for male participants were greater in younger age categories (i.e. 18-39 years; g=0.786-2.566) likely due to associated changes in body mass and body composition with age. Mean effect sizes comparing VO2peak between LBCE and UBCE for male (2.3 ±1.0) and female data (2.7 ±2.0) were large. However, although strict inclusion criteria were applied, heterogeneity across studies was considerable (I2: male data 84%; female data 85%) with inter-individual variation within sample population characteristics likely responsible. Methodological quality was equivalent to 'good', but a considerable lack of data for ages above 40 years was evident for both sexes. The association between physiological factors contributing to VO2peak in relation to age should be studied further in LBCE and UBCE, particularly in consideration of changes in body composition with age and activities of independent living.

D2.S1 5 in 5 Free Communications

D2.S1.1 5 in 5 Free Communications - Multi: Physical Activity for Health and Psychology

D2.S1.1(1) Analysis of the influence of the physical education curriculum for early childhood on mental and physical health of children in Colombia

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Physical education (PE) improves health, emotional well-being and sociability, focusing on the development of physical competences and the reinforcement of skills and understandings beyond physical activity (Lynch and Soukup, 2016, Cogent Education, 3:1, 1217820). In Colombia, PE curriculum has been unstable, compromising the all-round development of children (Guerrero and Camargo-Abello, 2023, International Journal of Child Care and Education Policy, 17, 2). The purpose of this study was to determine the current situation and drawbacks of Colombian early childhood PE, through an exploratory research method, in which educational policy documents were analysed and compared with literature data. With participants' informed consent and institutional ethics approval, a validated questionnaire (Sanz-Arazuri et al., 2013, Revista Iberoamericana de Diagnóstico y Evaluación - e Avaliação Psicológica, 1(35), 9-34) was answered by practicing PE teachers to determine their perception of the curriculum. It was found that Colombian educational policy for early childhood focuses on the development of body scheme, motion, expression and creativity, and the refinement of physical skills according to age, but does not provide activities to improve the physical, mental and social well-being of children. Additionally, using the Rayyan artificial intelligence tool for literature reviews, 311 papers on early childhood PE were analysed, finding that current trends in this subject focus on psychomotricity, learning through play and games, and the development of motion skills, which contribute to improving health and emotional well-being. Finally, 69 practicing PE teachers (63 women/6 men), with (17.06±7.68 years) experience time (mean ± s) answered the questionnaire. Remarkably, all participants agreed that Colombian PE curriculum does not aid in improving both mental and physical health of children, due to the lack of specialized professionals teaching for these ages (93.5%), the lack of both appropriate resources (85.1%) and sport areas (75.9%) for PE classes, and the need of increasing class time (87.9%) to guarantee a proper development of physical skills. Using methodological triangulation, it was found that there is a need of a curriculum specially designed for early childhood, and the improvement of

the teachers' competence on psychomotricity and strategies to develop social interaction through games is a must. These results suggest that PE curriculum for early childhood should include activities to benefit mental and physical health, including basic motor skills and the improvement of physical proficiency and body expression, accompanied with a proper education for PE teachers in the special requirements of early childhood.

D2.S1.1(2) Physical activity levels among young people with congenital heart disease: Do they move enough?

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Young-people with congenital heart disease (CHD) generally have lower physical activity (PA) levels than healthy peers, especially those with severe heart defects. This negatively affects quality of life and long-term outcomes. The current UK general PA recommended children and adolescents aged 5 to 18 to engage in an average of 60 min·d-1 moderate-to-vigorous PA (MVPA) across the week. Although MVPA has been shown to improve cardiovascular and metabolic health, the potential of light-intensity PA (LPA) may have been overlooked; hence, may not accurately reflect total PA (TPA). The aim of this study was to examine TPA levels, including LPA, MVPA, and sedentary time (ST). Following ethics approval, 28 adolescents with CHD (12-17 years) were randomly assigned to control (n=12) and PA intervention (n=16) groups in a prospective, randomised controlled trial [mean age 14.3±1.7 y (42.9% female), height 165.7 ±9.8 cm, body mass 58.3±12.2 kg]. Informed consent and assent were obtained. Participants wore a wrist-worn accelerometer for 24 h 7-days at baseline, 3- and 6-months. Data were converted into 1-second epoch and included if the wear time was ≥16 h/day and ≥4 days. TPA, LPA, MVPA, and ST were defined using age-specific cut-points and analysed using mixed factorial ANOVA. There was no significant difference across time points for TPA (Control vs. Intervention; baseline, 238.1±53.1 vs. 216.8±66.2, 3-month, 236.2±74.5 vs. 197.1±54.6, 6-month, 221.9±85.1 vs. 210.3 ±43.1 min·d-1, respectively, P = 0.49), LPA (Control vs. Intervention; baseline, 174.9±33.4 vs. 163.7±45.3, 3-month, 172.4±40.7 vs. 151.2±35.5, 6-month, 167.0±57.9 vs. 161.7 ±29.7 min·d-1, respectively, P = 0.58), MVPA (Control and Intervention; baseline, 63.3±31.9 vs. 54.1±26.3, 3-month, 61.3±35.7 vs. 46.0±26.1, 6-month, 52.5±37.5 vs. 48.2±21.7 min·d-1, respectively, P = 0.40) and ST (Control vs. intervention; Baseline, 756.4±53.6 vs. 779.1±130.8, 3-month, 762.0 ±76.3 vs. 759.2±117.0, 6-month, 747.9±98.3 vs. 729.4±76.0 min·d-1, respectively, P = 0.58). Despite not being statistically significant, TPA, LPA, and MVPA improved at 6-months compared to 3-months in the intervention group. In the intervention group, ST decreased with time, implying an increase in daily PA through interventions. PA levels in children and adolescents are still below the recommended guidelines. However, adolescents with CHD spend more time undertaking LPA (17-19% of waking hours) than MVPA (5-6%) with lower ST, indicating that LPA is potentially beneficial. Therefore, assessing LPA and other intensity spectrums is necessary to reflect the overall PA of young-people with CHD.

D2.S1.1(3) Direct Parent Engagement to Improve Fundamental Movement Skills in Children: A Systematic Review

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Fundamental movement skills (FMS) are basic movements in children that represent the building blocks for more complex motor skill development, and act as a prerequisite for enduring sport and physical activity (PA) engagement and positive health-related behaviours (Seefeldt, 1980, Psychology of Motor Behavior and Sport, 36, 314-323; Wick, Leeger-Aschmann, Monn, Radtke, Ott, Rebholz, Cruz, Gerber, Schmutz, Puder and Munsch, 2017, Sports Medicine, 47, 2045-2068). However, FMS is vastly inadequate worldwide including the UK, and consequently there are alarming levels of inactivity and obesity in children (Bolger, Bolger, O'Neill, Coughlan, O'Brien, Lacey, Burns and Bardid, 2021, Journal of Sports Sciences, 39, 717-753; Morley, Till, Ogilvie and Turner, 2015, Human Movement Science, 44, 150-156). Parents have largely been ignored by research despite them having the power to influence their children's PA behaviour as their primary role models. Therefore, the aim of this study was to investigate if parent-focused interventions could improve FMS competency of 2–7-year-old children, and to evaluate which setting and method of parent engagement was most impactful. A systematic review was performed with keyword searches conducted via SPORTDiscus, Scopus, Web of Science, PubMed, Science Direct, and Google Scholar. Only nine articles worldwide met the inclusion criteria that examined the influence of PA interventions with direct and explicit parental participation on the FMS proficiency of their early year's children, either within the home environment, the community, or the childcare and educational setting, none of which originated from the UK, highlighting the urgent need for further FMS interventions that involve parents. FMS competency improved in all nine studies, with significant changes reported in seven of the articles ($P < 0.05$). Parent counselling would appear to be an inadequate method for improving children's FMS. However, education and empowerment of parents, co-activity, and the

provision of clear FMS guidance, messaging, and structure may be key components that facilitate positive parental influence on children's FMS. Furthermore, the recent emergence of smartphone apps has increased accessibility and feasibility of FMS practice in the home environment and may be integral to future FMS interventions. Direct parent involvement can have a positive effect on children's FMS and further research is clearly warranted.

D2.S1.1(4) Reflecting on the delivery of a mindfulness intervention programme with global majority students at a higher education institute in the west midlands: some initial findings

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Background: The relevance and importance of mental health and well-being is amplified when considering that students upon entering higher education can be exposed to a range of stressors (academic, social, personal, and emotional) due to the changes and the expectations they place on themselves. These stressors also interact with inequalities in society, which puts some communities at far higher risk of poor mental health. This is dramatically more evident for Black and Asian communities in the UK. Promoting wellbeing and improving coping responses, is often more effective than cure (Fjorback et al., 2011; Frydenberg et al., 2007). Advocating mindfulness as a preventative intervention can help to improve students' perceptions of well-being and self-awareness. Mindfulness has many psychological health benefits, individuals can reduce stress levels, improve mood, alleviate depressive signs, and enhance general well-being (Brown et al., 2007, Weinstein et al., 2009).

Aim: The destabilising terrain of higher education was acknowledged, where global majority students are at increased risk of experiencing mental ill health and therefore the purpose was to explore the experiences of a mindfulness intervention programme for global majority students.

Method: This study explored the experiences of a Mindful Intervention Programme (MIP) for global majority students (n = 7) at a Higher Education Institute in the West Midlands. Following University Ethical approval, a qualitative case study research design was adopted drawing on verbal and visual data. Students engaged in a four-week mindfulness intervention programme and were involved in focus group interviews using the write, show, tell, emoji (WSTE) (Keane, 2021) approach pre and post-intervention.

Results: The reflection draws on evidence directly linked to the intervention and the student's lived experiences. Students shared a message of 'rising up' against the discrimination they had experienced in their earlier lives and how this acted as an impetus to be their authentic selves to survive and thrive. Self-care was therefore a key feature of negotiating this oppression and almost an act of resistance to prior experiences. This was complemented by an open-mindedness to self-care through engagement in the mindful intervention programme they experienced.

Conclusion: This study provides initial evidence for the value and receptiveness of mindfulness interventions with global majority students in higher education. Equally, it provides a platform from which to discuss social justice in well-being in academic and sporting spaces so that practitioners can pay attention to the challenges and layers of oppression that global majority communities experience.

D2.S1.1(5) Translating research into practice: Reflections on developing creative representations of research for coaches, sport psychology practitioners, and exercise professionals

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Although the academic field of sport and exercise science has made considerable advances, it has been suggested for some time that there is a disconnect between what athletes, coaches, or practitioners should do according to research evidence and what they actually do in the real world (Bartlett and Drust, 2021, European Journal of Sport Science, 21(11), 1579-1587). Some have suggested that this research-practice gap may be in part due to issues with traditional scientific journal articles, as these might not be easy to interpret (Barton and Merolli, 2021, British Journal of Sports Medicine, 53(10), 594-598) and are time-intensive (Pope et al., 2015, International Journal of Sports Science & Coaching, 10(6), 1055-1070). Consequently, there is a need to consider alternative ways to increase the use of research evidence in practice. Based on existing research (Bird et al., 2023, Journal of Applied Sport Psychology, Advance online publication), our team of researchers and practitioners developed resources to share knowledge about goal setting in sport with coaches, sport psychology practitioners, and exercise professionals in the United Kingdom. Within this work, we sought to increase engagement and uptake of research knowledge about goal setting by using several forms of creative analytic practice, a term that captures a range of evocative and creative genres used to represent research in accessible formats (Richardson, 2005, Writing: A Method of Inquiry. In N. K. Denzin and Y. S. Lincoln (Eds.), Handbook of qualitative research (pp. 959-978). Thousand Oaks, CA: Sage). In this talk, we will provide a collective reflection that explores the process we engaged in to develop our resources and the learnings formed through our work. As a reflective account, the work did not require ethical approval. By offering insights into the process of developing creative representations of research for relevant knowledge users, we hope to contribute to knowledge translation efforts within sport and exercise science by highlighting the potential opportunities that exist to increase

the transfer and uptake of research. Furthermore, we offer suggestions on how researchers and practitioners can work together to close the research-practice gap and increase the likelihood that research in sport and exercise science can bring about positive real-world outcomes.

D2.S1.2 - 5 in 5 Free Communications - Biomechanics and Motor Behaviour

D2.S1.2(1) Validity and Reliability of the DANU Sports System for Walking and Running Gait Assessment

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Gait assessments have traditionally been analysed in laboratory settings, but this may not reflect natural gait. Wearable technology may offer an alternative due to its versatility and portability. The purpose of the study was to establish the validity and reliability of temporal gait outcomes calculated by the DANU Sports System (DANU), against a 3D motion capture system. The DANU is a combination of capacitive pressure sensors on the sole of the foot and tibia based IMUs encompassed within socks. With institutional ethical approval, forty-one healthy volunteers (26 male, 15 female, age 36.4 ± 11.8 years) completed a series of overground walking and jogging trials and 60s treadmill walking and running trials at various speeds (8-14km/hr). Participants returned to repeat the testing within one-week of their initial session. Temporal gait outcomes generated by the DANU included ground contact time, swing time and stride time. All outcomes demonstrated excellent validity (ICC(2,1) >0.900, LoA% 3.1 to 25.3), aside from ground contact time during overground jogging (ICC(2,1) 0.778, LoA% 15.6). The mean difference rate increased as a function of speed during treadmill trials, the DANU tended to under-estimate ground contact time (mean difference 4.33-9.71 ms, $p < 0.001$) and over-estimate swing time (mean difference 1.06 – 9.26 ms, $p < 0.001$). Intraclass correlations for the reliability were excellent (ICC(2,1) >0.900, LoA% 1.5 to 7.2), for all outcomes across treadmill trials, except for swing time during treadmill walking, with good reliability (ICC(2,1) 0.886, LoA% 9.0). Overground trials demonstrated moderate – good reliability (ICC(2,1) 0.672 -0.750, LoA% 5.1 to 15.6). The evaluated wearable technology exhibited good and excellent agreements with 3D motion capture in quantifying temporal outcomes during overground and treadmill walking and running at various speeds, thus providing a scientific basis for applying this system to sporting and clinical contexts. To expand its application, further study in more ecologically valid settings, with varying speeds, surfaces, gradients, and changes in direction, as well as in those presenting with gait disorders is necessary to clarify the range that the DANU can analyse accurately.

D2.S1.2(2) The effects of simplified Tai Chi on functional ability and lower limb muscle strength in the elderly

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Due to ageing, muscle strength declines, especially the lower limb muscle strength, which severely affects the balance function and makes it easy to fall during walking or position transfer (Rubenstein and Josephson, 2006, Medical Clinics of North America, 90(5), 807–824). Tai Chi is a popular Chinese traditional exercise, it can mobilize the contraction of the lower limb muscles thus playing a role in preventing falls (Bubela et al., 2019, Journal of Geriatric Physical Therapy, 42(4), 209–215). But traditional Tai Chi is complicated for the beginners. The new Bafa Wubu Tai Chi simplifies and adapts the traditional Tai Chi, making it easier to learn. However, it needs to be clarified whether the simplified Tai Chi can improve the functional ability in the elderly. Therefore, this study aimed to investigate the effects of Bafa Wubu Tai Chi for improving muscle strength in the lower limbs and functional ability among the elderly. The participants aged 65-75 were recruited and randomly divided into the Bafa Wubu Tai Chi Group (TG) and the Control Group (CG) with institutional ethics of Shandong Sport University approval. 20 participants eventually completed the experiment, 10 in the CG and 10 in the TG. Participants in TG received an 8-week intervention, four times a week, one hour each, with teaching instruction by a professional Tai Chi instructor. The control group participated in a health science course with no physical activity at the same time. All the participants received lower limb isometric muscle strength test and Time Up and Go (TUG) walking test before and after the interventions. Isometric muscle strength tests were performed using the Isomed 2000 for lower limb hip abduction and ankle dorsiflexion, averaged over three trials and divided by weight. The TUG test was processed in the same way as above. A two-way ANOVA with repeated measures was used. The results showed that time*group interactions were detected on the TUG test ($P=0.008$). The two groups showed significant interaction effects for ankle dorsiflexion peak torque ($P<0.001$) and hip abduction peak torque ($P=0.003$). Participants in the TG showed a significant reduction in TUG and improvements in lower limb muscle strength after intervention. No significant improvements were detected in the CG before and after the intervention. Therefore, the results of this study support the 8-week simplified Bafa Wubu Tai Chi can improve functional ability and lower limb muscle strength among old adults, indicating improved balance and reduced risk of falls.

D2.S1.2(3) Effects of plyometric training on physical performance in adolescent cricketers – Randomized Control Trial (RCT)

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Cricket continues to gain popularity and prominence, particularly among young schoolboys and adolescent girls and boys. The main aspects of cricket are batting, bowling, and fielding. Plyometrics are an important part of a cricket player's training as they can help improve power, speed, reaction time, reactive strength, mental toughness, and confidence. Therefore, this RCT aimed to investigate the effects of an 8-week plyometric training (PT) paired with frequent cricket training conducted biweekly for a total of 16 sessions for the upper body and lower body on adolescent cricket players' physical qualities. With ethics approval, sixty cricket players aged 12 to 13 years were randomly assigned to either the experimental group (EG; n = 30), which received an additional 30–60 minutes of PT in place of some cricket training during the regular 120-minute practice, or the control group (CG; n = 30) that had the regular cricket practice session. Physical tests were carried out at baseline and after the training period, including (a) anthropometric measures: height (stadiometer), sitting height (stadiometer), body weight (scale), BMI (bioelectrical impedance analysis), fat percentage (bioelectrical impedance analysis); (b) physical tests: vertical countermovement jump (CMJ), standing long jump (SLJ), 20 meters sprint (free lap), 505 agility tests (free lap), and overhead medicine ball (1kg) throw (MBT); and (c) skill tests: bowling velocity test (radar gun), throwing velocity test (radar gun), and running between the wicket tests (free lap). The EG indicated significant (P.05) improvements in all parameters in physical and skill tests examined following the training intervention, with percentage changes ranging from 1.93% to 11.96%, while no significant improvements in CG were identified. The results of this RCT provide compelling evidence that an 8-week PT program can lead to substantial improvements in muscular power, speed, and agility among adolescent cricketers, which are crucial attributes for cricket-specific actions such as batting, fielding, and bowling. Incorporating plyometric training into the regular practice regimen for adolescent cricketers may offer a viable means to optimize their athletic potential and overall performance on the field. However, it is essential that young players obtain appropriate instruction from a qualified coach, begin with a low volume of plyometric exercises, and gradually increase the intensity and volume over time in order to prevent injuries. Nonetheless, future research with larger sample sizes and longer follow-up periods is warranted to validate and further explore the long-term effects of plyometric training on adolescent cricket players.

D2.S1.2(4) Qualitative analysis of the effect of visualisation during stability training for people with chronic ankle instability

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A rehabilitative programme is only effective if adhered to, which is more likely if the programme is enjoyable (Marshall et al, 2012, Journal of Sport Rehabilitation, 21, 18-25). To create a motivating tool for rehabilitation, a stability-based training package was developed using visualisation (biomechanical feedback in a gamified environment). This study was a qualitative analysis to determine the effect of visualisation on motivation and perception of stability for people with chronic ankle instability (CAI) both during the intervention, and in the months following completion. The stability-based package and intervention are described in Forsyth et al. (2022, Medical & Biological Engineering & Computing, 60, 1199–1209). Three months following completion of the stability training intervention participants were emailed a 12-question survey. Ethical approval was granted prior to initial study participation. The survey was designed using open-ended questions with actions taken to minimise risk of bias. Participants' subjective survey answers were thematically analysed, and sub-categorised within five main themes - training experience, visualisations, perceptions of stability, impact to current training, and comparison to previous rehab experiences. Of the 17 participants with CAI contacted three months post-training, 16 responded (94%). During the intervention all participants reported remaining motivated to attend training sessions, with only one declaring a decline by completion. The main sources of motivation for the visualisation (VIS) group were scoring, clear levels of progression, rehabilitation pathway (leading to autonomous feelings), and evidence of improvement. Specifically, participants enjoyed the interactive nature and avatar real-time feedback creating an external focus to detach from the rehabilitative environment, distract from repetitive practices, and create an immersive experience. Motivation in the group without visualisations (No-VIS) focused on improvement and challenge. During No-VIS training, external cues were integrated to challenge participants. However, we question the ability to continually challenge and progress training without aid of visualisation while being practical, safe, and simple for clinical practice. Both the VIS and No-VIS groups subjectively reported increased ankle stability and overall postural control following the four-week intervention. In addition, participants self-reported a reduced number of ankle sprains in the months following training compared to normal. The results imply that both the VIS and No-VIS groups found training motivating and the programme effective, with injuries reduced in subsequent months. Thus, the effect of the visualisation is inconclusive. Sources of motivation during training were described differently between groups and warrants further investigation. For further development, public and patient involvement should retain an integral role to optimise clinical practice implementation.

D2.S1.3 - 5 in 5 Free Communications - Multi: Sport and Performance and Physiology and Nutrition

D2.S1.3(1) The napping behaviours of British student-athletes

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Student-athletes are a population that display a high prevalence of poor sleep characteristics in response to sport- and academic-related sleep risk factors, and poor sleep may be harmful to sporting and academic performance (Kroshus et al., 2019, British Journal of Sports Medicine, 53(12), 731-736). Napping provides a means to supplement restricted nocturnal sleep. Therefore, the aim of this investigation was to examine the self-reported sleep characteristics and napping behaviours of British student-athletes. With institutional ethics approval, 157 participants (age range 16-25, 51.0% male) completed the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and the Sleep Hygiene Index (SHI). Participants that reported napping also completed a modified version of a 6-item napping questionnaire (Lovato et al., 2014, PLoS ONE, 9(11):e113666). Associations between sleep questionnaires and napping were investigated using Pearson correlations. The results demonstrated that 100 participants (63.7%) reported napping ≥1 weekly and were classified as nappers. Amongst nappers, mean (±SD) weekly nap frequency was 2.5 ± 1.3 times. Most participants reported napping once (26%) or twice (31%) weekly (three: 24%; four: 14%; five or more times: 5%). Moderate significant associations with SHI ($r(98) = .423$, $P < 0.001$) and ESS ($r(98) = .417$, $P < 0.001$) global scores and nap frequency were observed, indicating poorer sleep hygiene behaviours and increased daytime sleepiness as nap frequency increased. Mean (±SD) nap onset time was 14:43 ± 02:09, with 45% of naps commencing between 14:00 and 16:00. Participants reported naps were more commonly initiated spontaneously (39%) rather than planned (13%), with 48% of responses reporting a mixture of both. Similarly, naps were ended spontaneously (42%) more often than using an alarm (28%), with 28% reporting a mixture. Only 28% of participants reported short nap durations of <30 minutes, whereas longer durations of 30-45 minutes (22%), 45-60 minutes (31%), and >60 minutes (19%) were more common. The most reported reason for napping was feeling sleepy during the day (58%), followed by the nap refreshing them (26%), having spare time (5%), avoiding feeling sleepy later (5%), with 6% providing other reasons. These results indicate that napping is a common practice amongst British student-athletes, but some napping behaviours do not align with sleep hygiene recommendations (Irish et al., 2015, Sleep Medicine Reviews, 22, 23-36). These are likely to be driven by poor behavioural practices and inappropriate scheduling of training and lessons, which should seek to be addressed through targeted sleep interventions.

D2.S1.3(2) Validation of change of direction ability index in youth football players

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Instead of the completion time of the change of direction (COD) task (Total-time), COD deficit (CODD) calculated as the difference between the Total-time and liner sprint time of the same distance is used to evaluate COD ability (Nimphius et al. 2013. J. Aust. Strength Cond., 21: 115-117). However, it's unclear the kinematic and physical factors affecting CODD. Therefore, the purpose of this study was to investigate the factors affecting CODD and examine the validity of CODD as the COD ability index. With institutional ethics approval, 73 junior high school male football players (age:13.7±0.7years; stature:1.62±0.08m; body mass:52.3±9.1kg) (mean ±SD) performed 3 Pro-Agility tests where the turned foot was designated as the dominant (kicking) leg. Total-time was measured using timing gates, and 3D kinematic data were obtained using a markerless motion capture system. 20m-sprint, standing long jump (SLJ), and squat jump (SQJ) were also measured. Force profile during SQJ was measured using force platforms added to jump height. Each section (5m-10m-5m) in the Pro-Agility test was divided into acceleration and deceleration phases based on the velocity of the center of gravity (COG) and further divided into the first and second halves. The acceleration of COG in each phase (Ave-ACC, Ave-Dec) was calculated. Pearson's correlation coefficient was calculated between CODD, Total-time, and COG velocity variables and adapted the variables with $|r|>0.3$ and $p<0.05$ as the independent variables of subsequent multiple regression analysis for CODD and Total-time. The same procedure was adapted to determine kinematics and physical variables affecting the explanatory variables of CODD. Statistical significance was set at $p<0.05$ for all analyses. Second half Ave-Dec in 2nd turn (β=-0.424), Ave-Acc in 1st turn (β=-0.202) and acceleration from stop to turned leg toe off at 2nd turn (β=-0.263) were explanatory variables for CODD ($R2=0.330$, $p<0.001$). 20m-sprint time (β=0.417), second half Ave-Dec in 2nd turn (β=-0.343), Ave-Acc in 2nd turn (β=-0.357) and acceleration from stop to turned leg toe off at 2nd turn (β=-0.122) were explanatory variables for Total-time ($R2=0.821$, $p<0.001$). COG velocity displacement from penultimate foot contact to stop at 2nd turn, COG height, and SLJ were explanatory variables for rapid deceleration ($R2=0.602$, $p<0.001$). SLJ and average propulsive force in SQJ were explanatory variables for rapid acceleration ($R2=0.233$, $p<0.001$). These results suggest while Total-time may be affected by sprint speed, CODD may be able to evaluate the deceleration ability mainly independent of sprint speed and be validated to evaluate COD ability in youth players.

D2.S1.3(3) Training and recovery strategies to minimise performance decrement in multi-round competition performed within and on consecutive days: practice and perspectives of coaches, and practitioners

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To contest for medals in the final of major sporting championships, athletes must progress through preliminary rounds of competition, potentially requiring repeated maximal performances separated by minutes to hours. With the difference between medalling and non-medalling performance often <1%, ensuring athletes optimise recovery between bouts of competition to attenuate declines, maintain, or enhance performance is imperative. However, little evidence exists examining the use of recovery and training strategies to attenuate declines or enhance performance in multi-round competitions. Importantly, as this information has not been detailed in the literature, how athletes train for multi-round competition, what recovery strategies they use, and why, remains unknown. Therefore, the aim of this project was to identify current practices and perspectives of high-performing coaches and practitioners when preparing athletes for multi-round competition that involves multiple performances within a day and/or on consecutive days. Following institutional ethical approval, a survey was conducted with coaches and practitioners supporting athletes classified as ≥ tier 3 (McKay et al., 2022. IJSPP, 17, 317-331). Using an on-line platform (QualtricsXM, https://www.qualtrics.com/uk), participants were asked a series of questions regarding typical time-frames between rounds of competition, implementation of specific training and recovery strategies to enhance multi-round competition, sources of information, perceived efficacy, as well as gaps in knowledge. Respondents (n=36) were currently, or had previously, supported athletes competing at continental or global championships (97%), with the majority supporting athletes competing both within and on consecutive days (51%), within only (29%) or on consecutive days only (20%). Race/event specific training (percent of respondents who utilise strategy/percent of respondents who perceive the strategy to positively impact multi-round performance: 100%/100%), periodisation (97%/94%) and strength/resistance or plyometric training (94%/92%) were the most commonly employed training strategies. Small-sided games (16%/20%), altitude (52%/64%) and heat (56%/72%) were the least commonly employed. Strategies focussing on nutrition (within day [WD]:100%/97%; consecutive days [CD]:100%/100%), fluid (WD:100%/97%; CD:97%/100%) and active recovery (WD:90%/86%; CD:94%/90%) were the most commonly employed recovery strategies. Electrostimulation (WD8%/13%; CD10%/13%), heat application (WD8%/10%; CD11%/10%) and contrast bath/shower (WD:30%/21%; CD:38%/30%) were the least commonly employed. Some strategies (i.e. stretching, compression garments, foam rolling, massage) had greater rates of use than perceived efficacy, suggesting strategy implementation despite a lack of perceived impact. Respondents felt more information is required on how to implement training (97%) and recovery (89%) strategies effectively, including optimal dose, timing, and strategy combinations, as well as more sport-specific research to optimise approaches.

D2.S1.3(4) Decision-making and its characterization through tactical actions of junior footballers

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In football, decision-making in offensive game situations should be quick and precise, due to the high chance of failing, making early training in these aspects essential for consolidating technical and tactical skills in football players. The aim of this research was to characterise the offensive performance of junior football players in real-game situations such as clearance, cross and shot. Using a mixed methodology applying the Football Tactical Knowledge Test designed and validated by Sierra-Olivares and García-López (2016, International Journal of Medicine and Science of Physical Activity and Sport, 16(62), 521-536), on a sample of 29 junior footballers of the Fortaleza Junior A elite club, we were able to measure, both in declarative and procedural ways, the offensive knowledge of football players. The research had institutional ethics approval, and all participants signed an informed consent form. The test assesses declarative knowledge about tactical principles of play, the offside rule, roles and positions of players, technical and tactical elements, and attacking strategies in invasion sports. Results showed significant differences in the score of tactical knowledge of junior footballers, with a minimum score of 24.13% and a maximum of 100%. The procedural test gave information about the footballers' tactical knowledge, acquired through their training in the current and previous categories, through the analysis of real football match situations. Four indicators were established, and the minimum and maximum scores obtained by footballers were 10.34% and 68.96%, respectively, indicating that the offensive tactical process in the junior category presents shortcomings concerning knowledge, comprehension, and execution of offensive tasks, leading to frequent wrong decisions during a real game. This issue should be corrected during training, as procedural knowledge allows to regulate game situations to take better decisions and solve tactical problems during the game. The analysis, planning, execution, and verification processes allow the players to perform offensive tasks (Dochy, F.J.R.C., 1991, Mapping "Prior Knowledge" or "Expertise": A tentative outline. Heerleen, The Netherlands: Open University). These findings show that besides natural talent and innate capacity to process information, the training environment and contexts are important for junior footballers, who should develop creativity and initiative skills through specific practices designed by their coaches, who should enhance and stimulate these abilities to take better decisions on a real game situation.

D2.S1.3(5) The average and 5-minute high intensity demands of trained female football players and acute fatigue responses from match-play

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Participation in female football has grown substantially and is accompanied by a greater number of competitions and leagues at every level (Martinez-Lagunas et al., 2014, Journal of Sport and Health Sciences, 3, 258-272). Analysis of both average and high-intensity demands (i.e. highest demand period for a set epoch) and responses across the development pathway can support practitioners in understanding running volumes and conditioning players (Whitehead et al. 2019, Science and Medicine in Football, 3, 63-69). The aims of this study were 1) quantify the average and 5-minute-high intensity phase (HIP) match-play demands of collegiate female football players and 2) quantify the acute fatigue response elicited from competition. After ethical approval, twenty-one trained female football players (age 20.0±1.3, mass 64.9±12.9 kg) volunteered to take part in the study. Participants completed 3 trials of a countermovement jump (CMJ) on a force plate (Forcedecks, Australia) pre- and post-match to quantify fatigue responses. Global positioning systems (Catapult, Australia) were used to quantify external loads with fixed speed zones high-speed running 15.6-20.0km/h, sprinting >20.0km/h based off of previous work. Linear mixed models with fixed and random effects were employed for analysis of the average (n=45) and HIP (n=63) demands. CMJ data (n=35) was analysed using t-tests. Players covered total distances (TD) of ~8318 of which 491m and 145m were high speed running (HSR) and sprinting (SD), respectively; defenders covered less HSR than other positions ($P<0.004$). During 5-minute HIP's, no differences were observed for accelerations and PlayerLoad between positional groups ($P>0.05$). Attackers covered more high-speed running than central defenders ($P=0.05$; ES=1.16) and midfielders ($P=0.05$; ES=1.01). Comparisons between match-thirds showed evidence of transient fatigue ($P<0.05$) i.e. temporary reductions in work rate within match-play (Reilly, Drust and Clarke, 2008, Sports Medicine, 38, 357-367). TD ($P<0.05$; ES=0.97), HSR ($P<0.05$; ES = 0.79) and SD ($P<0.05$; ES=0.45) were reduced in the final third of the match. TD ($P<0.05$; ES=0.80) and HSR ($P<0.05$; ES=0.33) decreased after the most demanding third, though, this could be due to opposition or tactical factors. For CMJ variables, only concentric peak force relative ($P=0.035$; ES=0.85), mean power relative ($P=0.034$; ES=0.62) changed post-match. These data provide insights into the volume and high intensity demands experienced during female soccer match-play and subsequent fatigue response. Coaches should use these data when creating conditioning programmes for collegiate female soccer.

D2.S1.3(6) Momentum in netball: a simulation study

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Vallerand et al.'s (1988) antecedents and consequences model states that momentum is triggered by antecedent events. Momentum in netball changes performers' chances of scoring goals. However, the chance of scoring cannot be directly observed. This makes it difficult to attribute sequences of goals to momentum. The purpose of this study is to simulate momentum in netball to examine the scoring patterns produced. The study was approved by the Ethics Committee of the School of Sport and Health Sciences at Cardiff Metropolitan University (PGR-5801). The simulation was for a typical match between teams of similar ability who have a probability of 0.6 of scoring from their own centre pass and 0.5 of scoring from a turnover. It was assumed that the total number of possessions in a match would be an invariant of 160 possessions. Four versions of a simulator were implemented in R to each simulate 10,000 matches. The four versions of the simulator implemented the following momentum effects: (1) No momentum effect, (2) team possessions are effected by goals (probability of the team scoring from its own possessions increases by a probability of 0.1 when they scored the most recent goal, and decreases by a probability of 0.1 when the opposition scored the most recent goal), (3) the team's defence is effected by goals (the probability of the opposition scoring from its possessions decreases by a probability of 0.1 when the team scored the most recent goal, and increases by a probability of 0.1 when the opposition scored the most recent goal), and (4) the team possessions and defence are effected by goals. The interquartile ranges for runs of three or more goals overlapped between these four momentum conditions. Thus, it is possible that observable events may suggest that there are momentum effects when there is no momentum effect and vice versa. Therefore, observable sequences of events cannot be used on their own to deduce whether performance is influenced by momentum. The simulator also showed that teams are more successful if momentum enhances defence rather than the use of possession. This is because goals often alternate between the teams within netball matches meaning that teams are often defending against centre passes after they have scored.

Reference: Vallerand, R.J., Colavecchio, P.G. and Pelletier, L. G. (1988). Psychological momentum and performance inferences: A preliminary test of the antecedents-consequences psychological momentum model. Journal of sport and exercise psychology, 10, 92-108.

D2.S3 - Free Communications

D2.S3.1 - Free Communications - Sport and Performance

D2.S3.1(1) The BASES Expert Statement on Integrity in the Sport and Exercise Sciences Dr Emma Kavanagh FBASES

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The BASES Integrity Advisory Group (IAG) was formed in May 2021 and its remit is to provide expert advice and opinion, on behalf of the sector, on actions, policy development (e.g., Safeguarding, Whistleblowing) and activity that will protect the integrity of sport and the profession of sport and exercise science in the United Kingdom. The group is formally recognised in the new governance structure within BASES. The BASES IAG comprisesof Prof Sue Backhouse FBASES; Dr Neil Chester, Dr Emma Kavanagh (Chair), Dr Andy Miles FBASES, James Platt, Dr Daniel Rhind, Dr Emily Ryall and Jack Sharkey, supported by the BASES Executive Director. It is anticipated that this expert statement will support the work of the IAG through offering a concise statement from BASES on the scope of integrity in the sport and exercise sciences.

The term 'sport integrity', while difficult to clearly define, is often used to describe situations in which certain morals, norms, and values such as, inclusivity, honesty and fairness are threatened (Kihl, 2020). Match-fixing and doping are two terms most commonly tied to the topic of sport integrity across the globe, but there is a shift towards a more holistic and inclusive interpretation which includes understanding the impact of inter-personal violence in sport (Kihl, 2020) among other topics. As such, sport integrity is increasingly broadly discussed, encompassing all types of immoral behaviors in sport (McNamee, 2013).

According to Gardiner et al. (2017), sport integrity can be understood across four levels: personal integrity, organizational integrity, procedural integrity, and the integrity of sport itself. A sport integrity system consists of individuals, institutions, policies, practices, and agencies that contribute to fostering and safeguarding integrity across these levels (Kihl 2020). While the examples above provide a starting point, the definition and scope of integrity remains challenging to reach consensus over. The primary aim of this expert statement would be to outline the scope of integrity for BASES members and consider our duty of care in supporting those whom we work with.

D2.S3.1(2) The BASES Expert Statement on Methods to monitor athletes' sleep

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The importance of sleep for health and athletic performance has become widely recognised amongst sport scientists, fitness professionals, and athletes. The gold standard for measuring sleep is polysomnography (PSG), which is not usually practical when working with multiple athletes. Traditionally, the most practical sleep monitoring methods available to practitioners were research-grade activity monitors (i.e., actigraphy) and subjective methods (sleep diaries and questionnaires). Over the past decade, there has been a rapid increase in commercially available sleep monitoring technologies, such as smart watches and wristbands, which have become popular amongst practitioners, athletes, and the general public. Although these devices offer a practical and user-friendly means of monitoring sleep, the validity and limitations of sleep monitoring methods should be considered before implementation with athletes. This review outlines the validity of established and novel sleep monitoring methods along with their advantages and disadvantages. Practical considerations, such as simplicity of use and cost are also considered.

D2.S3.1(3) Relationship between peak oxygen uptake and peak power output in highly-trained handcyclists

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Handcycling has been part of the Paralympic Games since 2004. There are four handcycling classifications that employ a recumbent position (H1-H4) and successfully discriminate between performance of athletes with the greatest impairments (i.e. H1 and H2) but not those of athletes who had the least impairment (i.e. H3 and H4) (Muchaxo et al. 2020, Adapted Physical Activity Quarterly, 37, 461–480). Therefore, the aim of this study was to investigate peak oxygen uptake (VO_2peak) and peak power output (POpeak) in well-trained handcyclists according to classification. With Institutional ethical approval, 75 highly-trained male handcyclists (age 36 ±6 years, mass 67.3±9.5 kg, H2; n=10, H3; n=54, H4; n=11) performed an incremental handcycling test to volitional

exhaustion. Differences in VO_2peak and POpeak between groups were analysed using one-way analysis of variance. Relationships between VO_2peak and POpeak were assessed using Pearsons' correlation coefficient. Group differences for absolute VO_2peak were observed ($F(2)=9.548$, $P<0.001$) with H2 (2.11±0.32 L.min^{-1}) demonstrating significantly lower absolute VO_2peak than H3 (2.67±0.47 L.min^{-1}) and H4 (2.91 ±0.34 L.min^{-1}). However, no group differences ($F(2)=0.881$, $P=0.419$) were observed for relative VO_2peak (H2: 42 ±7 ml.kg^{-1}.min^{-1}; H3: 39 ±7 ml.kg^{-1}.min^{-1}; H4: 38 ±4 ml.kg^{-1}.min^{-1}). Group differences for absolute POpeak were also observed ($F(2)=16.073$, $P<0.001$) with H2 (125 ±17W) demonstrating significantly lower POpeak than H3 (179 ±31W) and H4 (185 ±25W). There was a strong, significant relationship between absolute VO_2peak and POpeak for the whole group ($r=0.866$, $P<0.001$). When considered as H2, H3 and H4, the relationship was strongest in H2 ($r=0.967$; $r^2=0.940$), moderate in H3 ($r=0.867$; $r^2=0.752$) when compared to H4 ($r=0.569$; $r^2=0.324$). For relative VO2peak, although the relationship with POpeak for the whole group was significant, the correlation was moderate ($r=0.574$, $r^2=0.329$; $P<0.001$). Similarly for absolute VO_2peak, the relationship was strongest in H2 ($r=0.840$; $r^2=0.706$) compared to H3 ($r=0.819$; $r^2=0.670$) and H4 ($r=0.612$; $r^2=0.374$). However, the gradient of the relationship was steeper for H2 ($m=0.344$) than H3 ($m=0.193$) and H4 ($m=0.097$), and shifted to the left, indicating a lower POpeak for a given VO_2peak. The results of this study suggest the relationship between VO_2peak and POpeak discriminates between handcycling classifications, specifically H2. These data may be useful in predicting VO_2peak when only power output can be monitored.

D2.S3.1(4) A natural longitudinal crossover study on player performance and training responses at different altitudes in professional soccer

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While the effects of simulated and actual altitudes have been studied in tightly controlled experiments, relatively few studies have been undertaken in 'real world' conditions and involving professional athletes. Therefore, we aimed to explore the performance and training-related responses of elite soccer players following repeated exposures to a range of different altitudes. Using a natural single-sample multiple crossover design, and with institutional ethics apporval, nineteen professional soccer players (age: 27.3 ± 3.4 yrs, height: 181.2 ± 5.9 cm, body mass: 78.7 ± 8.1 kg), completed two training sessions and a match within 96 h in altitudes ranging from 11 to 2300 m. Altitude thresholds were coded for analysis as sea level = 0 - 1000 m, low altitude =1000 - 2000 m, and moderate altitude = >2000 m. Internal load was estimated using, daily ratings of perceived exertion (RPE) using the CR-100 scale and were differentiated between lower limb neuromuscular load (leg RPE [RPE-L] and cardio-respiratory load (breathlessness [RPE-B]). External load was estimated from GPS derived total and high-speed running distance on each training and game day. Data were analysed using linear mixed models for the unbalanced repeated measures data we obtained. Here altitude code was modeled as a fixed factor with individual players modelled as random slopes and intercepts. Players were only included if they completed the full training session or played >75 minutes of the match, however duration was also accounted for within the model. Total and high-speed running resulted in no clear differences in match data, while total distance in training was reduced at low (-433, 95% CI -982 to -184 m) and moderate (-554, -860 to -209m) altitude and HSR distance reduced at moderate altitude only (-71.7, -134 to -9.5 m). No clear, practically meaningful differences were observed in RPE when analysed in isolation. However, match RPE-B increase substantially relative to match RPE-L (>8AU; Wright et al., 2020, International Journal of Sports Physiology and Performance, 1315-1323) at low (11.4, 5.2 to 17.7 AU) and moderate (10.7, 3.1 to 18.4 AU) altitudes. Match external running loads were reduced at altitude and we observed a shift in the perceptual internal load. The relative increase in cardio-respiratory (breathlessness) emphasises the importance of aerobic energy pathways in the preparation for elite soccer performance at altitude. However, caution should be taken when interpreting these findings from a single club to the wider population.

D2.S3.1(5) Exploring challenging experiences of female athletes in sports competitions and training during the menstruation period

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The research on the topic of menstruation and female athletes has advanced in recent years. However, there is still a lack of studies that contextualize the lived experiences of female athletes and highlight the psychological and behavioural symptoms they may face (Moreno-Black & Vallianatos, 2005). A survey revealed that 1/4 of girls lack sufficient knowledge about menstruation, and 48% of women still feel embarrassed discussing it (Plan International UK & Tingle, 2018). Previous research has primarily focused on the biological aspects of the menstrual cycle. The main purpose of the current study was to fill this gap by conducting a qualitative study that aimed to understand the female athletes' perspectives of their own bodies and menstruation in the context of sports. The study involved eight female athletes aged 20 to 47 years, representing a diverse range of sports and ethnic backgrounds. Ethics approval was obtained, and semi-structured interviews were conducted, covering areas such as menstruation onset, dysfunctions, challenges faced during menstruation, and coping strategies used by athletes. Through the method of the thematic analysis process, five main themes and eighteen sub-

themes were created. The findings demonstrated that female athletes encounter various difficulties during menstruation, including issues with sportswear, leakage, coaches' knowledge, choice of sanitary protection, and the overall environment. It was evident that athletes initially experienced anxiety, embarrassment, body consciousness, and difficulty in opening up about menstruation. Mental pain, decision-making difficulties, coordination and balance issues, and motivational challenges were also reported during menstruation. Body image concerns were prevalent, with athletes feeling more conscious of their bloated bodies and the type of sportswear they wore. The study highlighted the need for coach education on menstruation and female athletes, as athletes shared experiences of inappropriate workout routines due to a lack of coach knowledge. Leakage and staining concerns remained constant for athletes, despite their developed coping strategies. Speaking out about these issues had a positive psychological impact and helped athletes focus on their performance. In conclusion, this study has emphasized the implications of menstruation for female athletes in sports. Apart from physical pain, they encounter various barriers such as leakage, sportswear complications, and emotional imbalances. Therefore, it is crucial to create an open and supportive environment, raise awareness about menstruation, and acknowledge its impact on sports performance. By addressing these issues, athletes can better navigate their menstrual experiences, enhance their overall well-being and optimize their athletic performance.

D2.S3.2 - Free Communications - Physical Activity for Health

D2.S3.2(1) The BASES Expert Statement on Physical Activity and Limiting Sedentary Behaviour for Effective Management of Sarcopenia in Community-dwelling Older Adults

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Introduction: This expert statement is intended to support practitioners and researchers in the effective management of sarcopenia in community-dwelling older adults.

The Expert Statement will start by introducing the concept and definition of sarcopenia, followed by an overview of consensus measurements techniques (core outcomes) for diagnosing and monitoring sarcopenia. Evidence will be presented demonstrating that sarcopenia is significantly adversely associated with adverse health outcomes, such as a 19-39% risk of becoming dependent in activities of daily living over a 2-year period, an increased mortality risk and reduced quality of life (e.g. Tanimoto et al. 2013).

Background and Evidence: Evidence that physical activity and sedentary behaviour are associated with sarcopenia and are key targets for effective management in older adults will be provided. A scoping review regarding the effectiveness of physical activity and sedentary behaviour interventions for improving core sarcopenia outcomes (e.g. muscle mass, hand grip strength, balance) will be undertaken and presented as follows:

- Effectiveness of physical activity and sedentary behaviour interventions on sarcopenia outcomes: an overall evidence summary will be provided for these interventions being effective in the management of sarcopenia.
- Mode of physical activity: the most effective mode(s) of physical activity (e.g. aerobic, resistance, flexibility, chair-based, team sports) for effective management of sarcopenia will be provided.
- Dose of physical activity: the optimal frequency, intensity and duration of physical activity for effective management will be summarised (e.g. Onambélé-Pearson et al., 2010). This will include the concept of sedentary behaviour fragmentation (i.e. regularly breaking up prolonged periods of sedentary time) alongside increased physical activity (e.g. Grant et al., 2020).

The primary candidate mechanisms underpinning the beneficial responses to increasing physical activity and reducing sedentary time will be discussed. This will include changes in muscle mass, muscle fibre type and neuro-musculature adaptations.

In addition, safety considerations will be highlighted e.g. use of different exercise equipment, latency effects of exercise on falls risk, and risk of falls and injury during physical activity.

Conclusions and Recommendations: A summary of the reviewed evidence will be given with recommendations for practitioners in relation to mode and dose of physical activity and sedentary time reductions and how best to monitor effectiveness of interventions in the management of sarcopenia in older adults. We will also highlight areas for future research to further elucidate the benefits of increased physical activity and decreased sedentary time for the management of sarcopenia in community-dwelling older adults.

D2.S3.2(2) Characteristics of physical activity habits and metabolic risk factors of afro-Colombian population in Chocó

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Daily habits have become an intrinsic factor when talking about health status, that is menaced by conditions increasing metabolic risks, such as obesity, which induces physical and biological changes in the human body. Obesity is determined by the body

mass index (BMI), body fat percentage, waist circumference and the waist-to-hip ratio (WHR), the latter being an indicator of risk for cardiovascular diseases (CVD) (Gill et al., 2021, International Journal of Obesity, 45:1428-1438). In Colombia, Chocó is one of the regions with the highest indices of poverty, unemployment and unsatisfied basic needs (Turriago-Hoyos et al., Cogent Economics & Finance, 8:1, 1837441), implying a low quality of life for this region inhabitants, in which afro-Colombians represent 87.5% of the population. This study aimed to characterise the risk level for CVD in afro-Colombian population of Chocó using a quantitative approach relating anthropometric measures taken in a sample of 115 adult participants (63 women/52 men), chosen randomly, with a mean age of (40 ± 12 years) (mean ± s), for whom an informed consent was obtained. Under ethics institutional approval, the Global Physical Activity Questionnaire (GPAQ) (Armstrong and Bull 2006, Journal of Public Health, 14, 66-70) was answered by the sample, and using chi-squared tests of independence and regression analysis, it was found that the risk for CVD is independent of age (categorised by generations) ($P = 0.348$), but is strongly dependent on gender ($P = 0.0097$), as women have a higher CVD risk (69%) than men (51%). Additionally, it was found that the greatest differences between expected and observed frequencies came from male participants with very low risk, for whom there is a positive correlation between WHR and BMI ($r = 0.640$). These results suggest that afro-Colombian population require the implementation of physical activity strategies, focused specially on women, to guarantee at least 150 min of aerobic physical activity throughout the week to improve cardiovascular conditioning, decrease the risk of heart disease and high blood pressure, and increase the HDL levels, with the overall consequence of diminishing the risk factors of CVD. Additionally, it would be important to promote healthy diet and habits in this highly vulnerable Colombian population, which poses a huge challenge for governmental institutions, due to its sociodemographic characteristics.

D2.S3.2(3) WE are active and In this toGetHer (WEIGH): a randomised controlled trial to ascertain the feasibility of a home-based exercise programme for adults living with overweight and obesity

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Home-based exercise programmes are not typically tailored directly to the specific needs of participants, particularly those with health-related needs. Whilst current exercise and physical activity resources may be appropriate for those without health conditions, population specific and individualised approaches are often more suitable, and preferential. Within the context of overweight and obesity, needs sensitive programmes can support participant safety, programme engagement, and holistic wellbeing, independent of body mass loss. However, evidence regarding the development, efficacy and effectiveness of home-based exercise programmes, specifically for adults living with overweight and obesity is limited (Power et al., 2022, Obesity Research and Clinical Practice, 16, 97-105). Whilst this indicates a need for a Randomised Controlled Trial (RCT), an important first step prior is to determine programme acceptability. Hence, we aimed to conduct a feasibility RCT (fRCT) of the 12-week home-based exercise programme for adults living with overweight and obesity. Following a comprehensive co-design and development process, and institutional ethics approval, a recruitment aim of 30 adults (18-64 years) living with overweight or obesity (Body Mass Index ≥25kg/m^2 or ≥30kg/m^2) are to be assigned to an intervention or control group. Upon collection of informed consent, participants assigned to the intervention will undertake a 12-week home-based exercise programme utilising the Hope programme, an online delivery platform for health interventions, encouraging participation in aerobic, resistance and flexibility exercise videos, supported by integrated behaviour change techniques. Participants randomised to the control group shall be asked to maintain their usual lifestyle and offered the intervention on completion. Primary outcomes are; recruitment, attrition, adherence, engagement and adverse events. Secondary outcomes explore changes in body composition (body mass (kg), body fat mass (kg), body fat percentage (%), fat free mass (kg)), physical activity and exercise behaviour, and Quality of Life. At programme end, participants assigned to the intervention will be interviewed to explore their experiences and preferences, contributing to a qualitative evaluation of programme acceptability. Longer term, conducting the fRCT will facilitate programme and operational refinement, reducing costs and potential research waste, consequently improving programme scalability. Data collection is currently ongoing; therefore, results will be presented at the conference. Following data analysis, interpretation, and reporting, should the programme be deemed feasible, we aim to conduct a fully powered multi-site RCT in collaboration with national experts in overweight, obesity and home-based exercise.

D2.S3.2(4) Overcoming the challenges associated with accelerometer wear-time and returns: practical insights from the Walking In ScHools (WISH) Study

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Accelerometers are often used within large-scale studies to objectively measure physical activity. However, there are inherent challenges associated with using accelerometers, particularly among children and adolescents, such as compliance with wear time criteria, non-return of devices, and issues around acceptability. The Walking In ScHools (WISH) Study was a school-based clustered randomised controlled trial

(c-RCT) conducted with girls aged 12-14 years (n=589) from eighteen schools across the border region of Ireland/ Northern Ireland (O'Kane et al, 2020, BMC Public Health, 20, 541). Ethical approval was granted by Ulster University Research Ethics Committee. The primary outcome was total physical activity at the end of the intervention. On four occasions, pupils were asked to wear the Actigraph accelerometer (Actigraph LLC, Florida) for 7 days. The device was placed on an elastic waist band and pupils were asked to wear the accelerometer on their hip at all times, removing it only for bathing, water-based activities such as swimming and when asleep. Pupils were included in the analysis if they had ≥2 valid weekdays of data (500 min/day). To maximise accelerometer returns and minimise the amount of missing data, several strategies were implemented. In brief, each accelerometer was labelled with the contact information of the research team should a device be lost. Accelerometers were distributed face-to-face. On each occasion, pupils were provided with verbal instructions and attached to the wear-time log were written instructions and a note informing participants when and where to return the accelerometer. Text messages were sent to the parent/guardian on day 7 to detail where and to whom the devices should be returned. Incentives were provided when pupils returned accelerometers. These incentives were chosen (water bottles, earphones, power-banks) and designed (hoodies) by the Youth Advisory Group. Throughout the study, we liaised closely with school staff and when necessary, school staff contacted the pupils' parent/guardian to retrieve accelerometers. In total, n=2213 accelerometer devices were issued over a 12-month period. Only n=3 (0.14%) devices were unreturned. The median overall wear time was between 5 and 6 days at each time point. The number of pupils meeting the wear time criteria (≥2 weekdays) ranged from 91% at baseline, to 84% at the end of the intervention. The use of accelerometers to measure physical activity is challenging in this population group, however, a multi-faceted approach like the one implemented within the WISH Study can encourage adherence to the wear-time protocol and ensure devices are returned.

D2.S3.2(5) Validation of heart rate measures from the Fitbit Charge 4 and a wearable Nonin Pulse Oximetry against electrocardiogram across different exercise intensities

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Heart rate (HR) is an important variable in assessing the health benefits of exercise, serving as an indicator of physical fitness and a predictor of exercise-induced mortality. Wearable devices have greatly improved the convenience of monitoring HR during physical exercise. This study aimed to evaluate HR measurements from Fitbit Charge 4 (Fitbit) and Nonin WristOX315 Pulse Oximetry (Nonin, sampling rate=1Hz), during moderate (ME) and high-intensity interval (HIE) exercise, compared with the gold standard electrocardiogram (ECG). The photoplethysmography (PPG) sensor was attached to the wrist and finger for Fitibt and Nonin, respectively. With institutional ethics approval, fifteen participants, including two patients with type 1 diabetes (4 females, age: 32±7.4years; stature: 1.76±0.08m; body mass: 76.7±12.8kg), wore both wearable devices while data were simultaneously recorded from a 3-lead ECG during a 30-min rest period followed by a 30-min ME or HIE session, on two separate days. HR was assessed at each minute. ME and HIE were randomly performed on a cycle ergometer, with ME at 60% VO_2max and HIE at 60%VO_2max with 4-6 s of maximal efforts performed every 2min. During the rest period on both exercise days, low mean absolute error (MAE) and mean absolute percentage error (MAPE) were observed for both Fitbit (ME: 2.6bpm, 3.8%; & HIE: 3.3bpm, 4.9%) and Nonin (ME: 2.3bpm, 3.2%; HIE: 2.6bpm, 3.7%), with Nonin achieving higher concordance correlation coefficients (CCCs) on both days (ME: 0.90 vs 0.87 HIE: 0.92 vs 0.77). However, during the exercise period, compared to Fitbit, Nonin exhibited much higher MAE (ME: 17.4 vs 3.26bpm; HIE: 21.1 vs 7.23bpm) and MAPE (ME: 12.9% vs 2.52%; HIE: 15.7% vs 5.63%), along with poor CCCs (ME: r=0.27; HIE: r=0.29). Furthermore, the test of equivalence showed that the HR measured by Fitbit was statistically equivalent to ECG HR during both ME (P=0.12) and HIE (P=0.406), whereas Nonin was found to statistically differ from ECG HR (ME: P<0.001 & HIE: P<0.001). Overall, the strength of the relationship between HR from both wearable devices and the ECG-measured HR was strong during rest, with significant equivalence and MAPEs < 10%. During exercise, the accuracy of Nonin with finger-worn PPG decreased significantly (all P<0.001), while wrist-worn Fitbit maintained a similar performance. In conclusion, while Fitbit can accurately estimate HR in both rested and exercise conditions, practitioners must be aware that Nonin does not provide accurate HR measurement during exercise, likely due to motion artifacts and altered digital perfusion.

D2.S3.3 - Free Communications - Physiology and Nutrition

D2.S3.3(1) A Bump in the Road? The BASES Expert Statement on Pregnant and Postnatal Athletes.

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The Active Pregnancy Foundation.

Introduction: This expert statement highlights current guidelines, areas where further evidence and consensus are needed, and the multi-disciplinary approach necessary to effectively support athletes with their health, training, and performance goals during and after pregnancy.

One size does not fit all

Current guidelines recommend that healthy adult women without contra-indication accumulate 150 minutes of moderate-intensity physical activity and two days of strength training each week.

Whilst women who have engaged regularly in vigorous intensity activities before pregnancy can continue being active at this level, current guidelines do not account for the high levels of training that elite athletes may wish to sustain nor do they make sport-specific recommendations for adaptation, which may include cross training.

Evidence-based recommendations to ensure a safe return to sport after childbirth are also lacking, with practitioners and academics calling for greater recognition of perinatal health.

Great expectations

Pregnancy is a major life event characterised by significant anatomical and physiological adaptations that are necessary to support foetal development without compromising maternal health. These changes result in altered responses during acute bouts of physical activity that must be considered by the professionals supporting pregnant athletes.

The ability of competitive athletes to maintain a more strenuous training routine throughout their pregnancy also leads to them resuming postnatal activities sooner, often at a detriment to their emotional and physical health. The timescale for returning to activity should not be synonymous with success but instead focus on a whole-systems biopsychosocial approach to ensure a safe return and extended career.

It takes a village

With high-quality evidence and specific recommendations lacking, clearly defined support pathways have been slow to emerge. A multi-disciplinary approach is necessary to balance health and performance outcomes; enabling women to continue their sporting careers beyond the transition into motherhood and safeguarding their sporting longevity.

An increased focus on the integration of specialised disciplines also creates a demand for suitably qualified and knowledgeable sport and exercise scientists.

Conclusions and recommendations: To create a safe and truly inclusive environment, an understanding of the science of the reproductive years, alongside recognition of the challenges facing pregnant and postnatal athletes is needed:

- Athletes - The aspirations and individual needs of athletes during their childbearing years should be recognised with shared decision-making informing transitional plans;
- Research - Research must address the unique factors at play during the childbearing years, including fertility, breastfeeding, injury surveillance, testing and rehabilitation protocols, psychological support, etc.;
- Guidance - To reduce uncertainty, the risk of injury, and athlete drop-out, the need for evidence-based guidelines to inform the support and care of pregnant and postnatal athletes must be addressed;
- Policy - Development and refinement of policies and support pathways, enabling women to transition into motherhood and return to sport, must continue with the recognition that systemic change and long-term investment is required;
- Professionals - The profession of sport and exercise science must evolve to respond to the growing demand of women's sport through investment in professional development involving upskilling and the embedding of reproductive science in curricula.

D2.S3.3(2) The effect of 2 weeks of ischemic preconditioning on local and remote microvascular function

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Ischemic preconditioning (IPC), a technique involving short periods of repeated limb ischemia, has been shown to acutely improve arterial endothelial function. This effect is evident 24 hours after application, both where the stimulus was applied (local effect) and in tissues not directly exposed to the stimulus (remote effect). However, whether the same effect occurs in the microvasculature is still unknown. The purpose was to examine the effect of repeated IPC on local (ipsilateral arm) and remote (contralateral arm) microvascular function. Sixteen, normotensive adults volunteered to participate in the study. Following ethical approval, participants completed a two-week control period, with no change in physical activity or diet. Participants then performed six sessions of IPC (each session was 4x5 minutes of occlusion, interspersed with 5 minutes of reperfusion) over a 2-week period. Microvascular function was assessed at four time points: 1) Pre-control 2) Post-control 3) 24 hours post session one 4) 24 hours after the last (6th) session. Cutaneous microvascular function was assessed on the ventral aspect of both forearms in response to 5 minutes of forearm cuff occlusion, using a laser Doppler perfusion imager. Specifically, microvascular function was defined as 1) baseline perfusion, 2) cutaneous vascular conductance (baseline perfusion relative to mean arterial pressure), 3) peak reactive hyperaemia post-occlusion (expressed as a percentage of baseline perfusion), 4) time to reach peak perfusion (from cuff deflation), and 5) the total hyperaemic response (area under post-occlusion perfusion vs time curve). Data were analysed using separate, repeated measures ANOVA and interpreted using P values and standardised effect sizes ($p\eta 2$).

All 16 participants completed each training session in full. There were no changes across time, or significant time x arm interaction effect for 1) baseline perfusion ($P=0.07$, $p\eta 2=0.17$, and $P=0.75$, $p\eta 2=0.03$), 2) cutaneous vascular conductance ($P=0.08$, $p\eta 2=0.16$, and $P=0.81$, $p\eta 2=0.02$), 3) peak reactive hyperaemia ($P=0.25$, $p\eta 2=0.10$, and $P=0.56$, $p\eta 2=0.04$), 4) time to reach peak perfusion ($P=0.49$, $p\eta 2=0.06$, and $P=0.90$, $p\eta 2=0.01$), or 5) total hyperaemic response ($P=0.24$, $p\eta 2=0.11$, and $P=0.70$, $p\eta 2=0.03$).

Six sessions of IPC performed over two weeks did not influence local or remote microvascular function. Given the known benefits of IPC on arterial function, more frequent IPC sessions could be required to improve microvascular function.

Future research should also determine the efficacy of ischemic preconditioning in individuals with impaired microvascular dysfunction.

D2.S3.3(3) IL-1β levels are associated with higher insulin concentrations after larger exercise doses

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Exercise improves glycaemic control by increasing both glucose disposal and insulin sensitivity (Kido et al., 2020). However, the dose-response to exercise is yet to be established. The aim of this study was to investigate the dose-response of exercise on glycaemic control. NHS ethical approval (REC Ref: 19/NW/0066) and informed consent were obtained. Male participants (n=10, age 23±4 years, BMI 26±5 kg/m2) cycled on four separate occasions at 60% VO2 max for a time commensurate with expending 0kcal, 175kcal, 350kcal or 700kcal (randomised). Participants were fitted with a continuous glucose monitor (CGM) for 72 hours to monitor glycaemia. A control meal (772kcal, carbohydrate=66%, fat=18% and protein=16%) was consumed in the evening post-exercise, followed by a 12 hour fast. The morning after the exercise dose, participants returned for an oral glucose tolerance test (OGTT). A blood sample was taken from an arterialised hand vein and then, after ingesting 75g dextrose in 300ml water, samples were taken every 30mins for two-hours. Glucose area under the curve (AUC) was significantly different between doses (P=0.04) with the highest AUC after 350kcal of exercise (14.1±2.6 mmol/L). There were no differences in free-living glycaemia, measured by the CGM, within 72h after the exercise doses (P>0.05). Insulin AUC was significantly increased with higher doses (P=0.03), the largest AUC was after 700kcal of exercise (169.7±37.6 μIU/mL·hour). The AUC for GLP-1 (total) was significantly increased (P=0.02) in higher doses of exercise (both 350kcal and 700kcal). Free fatty acid (FFA) AUC significantly decreased (p=0.006) with greater exercise doses and 700kcal had the lowest AUC (4.3±0.8 mmol/L·hour vs. 5.3±0.4 mmol/L·hour at 0kcal). To assess inflammation, IL-1β was measured; IL-1β AUC was significantly increased with higher doses (P=0.01), 700kcal of exercise had the largest AUC (3.6±1.2 pg/mL·hour). There was a statistical trend where resistin, a cytokine implicated in regulation of FFA and insulin resistance, increased in a dose-response manner to exercise (P=0.09). 700kcal of exercise resulted in the largest resistin AUC (14561±5978 pg/mL·hour). These data suggest that greater exercise doses acutely increase inflammation (IL-1β), and this is associated with increases in insulin concentration. Resitin is a potential link in this mechanism. This pathway requires further investigation to elucidate the response to different doses of exercise in different individuals.

Reference

1. Kido, K., et al. Sci Rep 10, 8509 (2020). https://doi.org/10.1038/s41598-020-65397-z

D2.S3.3(4) A case study of automated pupillometry changes over a 48-hour period following mixed martial arts sparring

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Pupillary light reflex (PLR) is a valid measurement of autonomic brain dysfunction following head impacts with and without loss of consciousness (LOC) (Teixeira et al., 2021, Brain Science, 11). Understanding of PLR to identify dysfunction following 'sub-concussive' head impacts is nascent (Joseph et al., 2020, Journal of Neurosurgery, 133). Mixed martial arts (MMA) sparring may provide a model to understand PLR changes following trauma. Post-MMA sparring PLR changes indicate autonomic brain dysfunction (Kirk & Childs, 2023, Vision, 7:39), but the decay of these changes over time is unknown. Aim of this case study was: examine PLR changes in an individual over a 48-hour period following MMA sparring. An experienced MMA athlete (n=1; 22 years; 84 kg; 175 cm) completed training-based sparring (8x3mins:1min) without intervention with institutional ethical approval. PLR was measured via Neuroptics NPi-200 (Neuroptics, USA) in ambient light (30-60 Lux) immediately pre, immediately post, 15 mins, 30 mins, 45 mins, 60 mins, 24 hours and 48 hours post-sparring. Each measurement occurred under the same conditions. Variables: min and max pupil diameter (mm); constriction velocity (CV, mm·s-1); amplitude (%); latency (s). Both eyes were averaged together at each time point. Max pupil diameter = 6.5 mm pre-sparring, decreased to 6.2 mm immediately post-sparring, and measured 5.9 mm at each 15-60 min measurement point. Max pupil diameter recovered to 6.2 mm at 24 hours and reduced to 6.1 mm at 48 hours. Min pupil diameter = 4.3 mm pre-sparring, decreased to 3.9 mm immediately post-sparring. Min pupil diameter decreased by ~0.1mm every 15mins post sparring, recovering to 4mm at 24 hours and 4.1 mm at 48 hours. Amplitude = 33% pre-sparring, increased to 38% immediately post, remaining between 36.5-39% for the next 60 mins before reducing to 36% at 24 hours and 33.5% at 48 hours. CV = 2.6 $mm{\cdot}s^{-1}$ immediately pre-sparring, increased to 3.8 $mm{\cdot}s^{-1}$ post-sparring, increasing again to 4.2 $mm{\cdot}s^{-1}$ after 15 mins and remaining 3.8-3.9 $mm{\cdot}s^{-1}$ until 60 mins. CV reduced at 24 hours (3 $mm{\cdot}s^{-1}$) and 48 hours (2.7 $mm{\cdot}s^{-1}$). Latency remained between 0.20-0.23 s at each measurement during data collection. Each measured variable showed changes following MMA sparring apart from latency which remained stable. All variables required 24-48 hours to return near to baseline. MMA sparring may cause autonomic brain dysfunction which may remain present for up to 48 hours. PLR may provide a non-invasive measure of autonomic brain dysfunction and recovery in a sports setting.

D2.S3.3(5) Efficacy of intermittent cooling strategies during tennis-specific treadmill exercise in hot, humid conditions

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Environmental conditions ≥30°C wet-bulb globe temperature (WBGT) increases thermoregulatory and physiological demands for tennis players increasing the risk of heat related medical callouts (Smith et al. 2018, Journal of Science and Medicine in Sport, 21(5), 467-472). The aim of this study was to assess the efficacy of cooling strategies in alleviating thermal strain during simulated tennis match-play in a hot environment. Following institutional ethics approval, nine healthy, male amateur tennis players (mean ± SD: age 26 ± 5 years, stature 180 ± 45 cm, body mass 77.7 ± 6.9 kg; $\dot{V}O_2max$ 52 ± 6 $ml \cdot kg^{-1} \cdot min^{-1}$) completed the tennis-specific treadmill protocol (TSTP) (Debney et al. 2018, Journal of Sport Sciences, 36:sup1, 1-94) five times in hot, humid conditions (36.3 ± 0.7°C, 51.3 ± 1.5%, 30.8 ± 0.4°C WBGT): cold water (CW); ice slurry (SLU); ice towel (TWL); ice towel and slurry (TWL+SLU); and a control (CTL). After every odd game, participants ingested 2 $g \cdot kg^{-1}$ thermoneutral water in CTL and TWL (34.8 ± 0.4°C); cold water (10.7 ± 2.5°C); or ice slurry (-0.5°C) in SLU and TWL+SLU. When appropriate, the ice towel was worn until 30 s before the next game beginning. After games 3, 5, 7 and 9 in all 3 sets of the TSTP, rectal temperature (T_c), mean skin temperature ($\bar{T}_{sk}$), and thermal sensation (TS) were assessed; perceptual responses were assessed again after the rest. A three-way ANOVA (condition x time (set) x time (game)), with Bonferroni post-hoc analysis was used to assess statistically significant differences ($P < 0.05$) between conditions. Hedges g was used to assess effect size. There were no statistically significant differences between conditions until set 3, when thereafter, there was a lower T_c in SLU ($P = 0.009$, $g = -0.83$) and TWL+SLU ($P = 0.014$, $g = -1.07$) compared to CTL. T_c ($P = 0.034$, $g = -0.66$) and $\bar{T}_{sk}$ ($P = 0.007$, $g = -1.10$) were lower in TWL+SLU than CW. TS was lower after rest periods in all experimental conditions ($P < 0.05$) compared to CTL. Importantly, participants felt cooler before the rest period in TWL+SLU ($P = 0.002$, $g = -0.80$) compared to CTL. Combined cooling (TWL + SLU) was the most efficacious strategy, attenuating both physiological and perceptual thermal strain. If only one strategy can be implemented, internal cooling using SLU is likely more effective than external cooling at attenuating thermal strain during tennis-specific exercise in hot humid conditions.

D2.S3.4 - Free Communications - Multi: Physical Activity for Health and Psychology

D2.S3.4(1) Using collective intelligence to identify the barriers to the adoption, implementation and adherence of recreational football for health in older adults

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Systems science is a useful field that utilises and harnesses the collaboration of humans to produce solutions to real-world problems (Fauville et al., 2018, Marine Policy, 91, 85-96). The number of older adults adopting recreational football to combat physical inactivity is not commonplace despite there being evidence that playing football has health and fitness benefits (Helge et al., 2014, Scand. J. Med. Sci. Sports, 24, 98–104). Academics in the field are often reporting on the benefits of football, but little is being done to make playing football accessible and usual in this age group. Therefore, the aim of the present study was to gain insight into the barriers to improving the implementation and sustainability of recreational football for health in older adults. With institutional ethics approval and informed consent obtained, a collective intelligence workshop was conducted with a group of male academics (n=6) who took part in an Erasmus+ funded project that explored recreational football for older adults. Participants from 5 European countries were asked to produce and rank barriers they perceive to the adoption, implementation, and sustainability of recreational football for health in older adults. From the group, a structural model was generated, which visually explained how the barriers are ranked and connected. After the map was established, a session occurred whereby participants explored and debated solutions to the key barriers. From the 30 barriers generated, 11 were voted as top across 7 different categories. Following further discussions, 16 solutions were generated in response to the top barriers. Four key drivers were identified in relation to the trigger question: (1) coaches and organisations failing to understand recreational football, (2) the misconception of recreational football as an intense and violent sport, (3) the fear of injury from a stakeholder perspective, (4) and the lack of coaches who are willing to adopt the concept of recreational football. The present study is the first of its kind to illustrate and explore the barriers to recreational football for health in older adults. This study provides useful information to policymakers, relevant stakeholders, academics in the field, and football coaches, with particular consideration to improving widespread adoption, implementation, and adherence to recreational football for older adults.

D2.S3.4(2) Two-year follow-up of changes in English children's physical fitness, body mass index and health-related quality of life after the covid-19 lockdowns

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The lockdowns implemented in response to the covid-19 pandemic in 2020/2021 restricted the ability of children to be physically active, and global data have demonstrated short-term reductions in physical fitness and increases in overweight and obesity (OWOB). So far, data on whether these changes persisted are lacking. Our study assessed whether the detrimental changes to aerobic fitness and body mass index (BMI) observed in children from North East England between 2019 and 2020 were sustained in 2021 and 2022. Newcastle University Faculty of Medical Sciences Research Ethics Committee approved the study. Parental opt-out consent was used. Children gave written or verbal assent. Twenty-metre shuttle run test (20mSRT), handgrip strength, standing broad jump, sit-and-reach, height, body mass, and health-related quality of life (Kidscreen27 questionnaire [Ravens-Sieberer 2007]) were measured in 90 children (8-9 years, 50% female) during October 2019 ('T0'), November 2020 ('T1'), November 2021 ('T2') and June 2022 ('T3'). Age-and sex- standardised BMI (BMIz) according to UK90 data was derived, OWOB was ≥85th centile. Regression was used to check for changes across time. Mixed-effects models showed BMIz increased significantly from mean 0.71 (T0) to 0.97 (T1), remaining elevated at T2 (0.95) and T3 (0.89). Consequently, the proportion of children with OWOB increased from 32% at T0 to 48% at T3. 20mSRT decreased from 22.0 shuttles at T0 to 19.3 at T1, then increased to 23.5 at T2 and then to 28.3 at T3. Children with the highest 20mSRT at T0 had the greatest decline at T1, followed by the greatest increase from T1-T3 (R219%, $p<0.001$). Children with OWOB at T1 experienced a greater reduction in BMIz associated with improvements in their 20mSRT than those without OWOB. Standing broad jump increased at each time (from 125cm at T0 to 138cm at T3) as did handgrip strength (from 12.8kg at T0 to 18.6kg at T3). Sit-and-reach decreased from 12.6cm at T0 to 10.4cm at T1, returned to baseline levels at T2 then remained unchanged at T3. Health-related quality of life T-scores decreased over time for 'Physical Wellbeing' (58.0 at T0 to 51.8 at T3, $p<0.05$) yet increased for 'Autonomy & Parents' (50.0 at T0, to 57.4 at T3, $p<0.05$). Our findings demonstrate the mixed implications of lockdowns on public health; whilst physical fitness appears to have recovered, the increase in children with overweight/obesity represents an urgent problem. Future planning should ensure that children have opportunities for physical activity should lockdowns be considered.

D2.S3.4(3) Investigating the association between maternal sitting time and placental growth: Findings from the Queensland Family Cohort study

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Physical activity (PA) performed during pregnancy is associated with beneficial changes in placental growth and function; however, the effect of excessive sitting time has not been thoroughly investigated. Given suboptimal placental growth can lead to adverse neonatal outcomes, the assessment of the placenta can provide valuable information for potential clinical intervention. The aim of this study was to investigate maternal sitting time and its association with placental growth parameters. With institutional ethical approval, women enrolled in the Queensland Family Cohort study in Brisbane, Australia who self-reported average daily sitting time at 24-weeks and 36-weeks of gestation were included in this study. Women were classified into two sitting time groups: in range (<8 hours/day) or in excess (≥8 hours/day). Placentas were collected, weighed and sampled immediately following delivery. Placental mRNA expression of the vascular endothelial growth factor (VEGF) pathway and receptors (placental growth factor (PlGF), VEGFA, FMS-like tyrosine kinase-1 (FLT1) and kinase insert domain receptor (KDR)) were determined by qPCR and analysed by sitting time groups at 24-weeks (n=206) and 36-weeks of gestation (n=213). Differences based on the sex of the fetus were investigated. VEGFA expression was increased in the placentae of women who reported excessive daily sitting time at 24-weeks of gestation, irrespective of fetal sex ($P<0.05$). The expression of PlGF and FLT1 was increased with excessive daily sitting time at 24-weeks of gestation in the female placenta only ($P<0.05$). Term placental weight was reduced in women who reported excessive sitting time at 24-weeks and had a male fetus ($P<0.01$). Placental growth was not associated with sitting time reported at 36-weeks of gestation. Irrespective of PA, increased sitting time during mid-pregnancy may be a risk factor for abnormal placental growth. This is pertinent particularly for higher risk pregnancies where placental growth may already be compromised. The data suggests that alterations in placental growth occur in the presence of sedentary behaviour and differ based on the sex of the fetus. Indeed, sex differences in response to an adverse maternal environment have been well documented in previous literature. The findings suggest that the female placenta maintains weight, likely due to a compensatory upregulation of PlGF and FLT1 expression, whereas the male placenta exhibits reduced growth in response to sedentary behaviour. Given PA levels commonly decline as pregnancy progresses, these findings highlight the importance of reducing prolonged

sitting time during mid pregnancy and may indicate an area for greater clinical focus.

D2.S3.4(4) Perceptions of caregivers of people with dementia regarding physical activity participation and engagement. Development of a European project on table tennis programme for people with cognitive difficulties

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Dementia is affecting >55 million people worldwide and one of the major causes of disability among older people (WHO, Fact Sheet: Dementia, tinyurl.com/4wknbk9j). Physical activity (PA) can assist in managing dementia but one of the barriers is lack of available activities the carer and person with dementia (PwD) can do together (van Alphen et al., 2016, Archives of Gerontology and Geriatrics, 66, 109–118). Table tennis (TT) is a safe and beneficial activity (Olsson et al., 2020, Archives of Rehabilitation Research and Clinical Translation, 2(3):100064) the carer and the PwD can engage in together. The present study aimed to obtain the opinions of the carers of PwD on PA participation, PA levels, desire for increased PA and TT participation for the PwD they care for and for themselves. With Ethical approval, an anonymous online survey was developed, translated and piloted in six different countries before disseminated to carers of PwD in these countries. Frequency analysis was used for all questions. Goodman and Kruskal lambda (λ) examined for associations in PA participation, PA levels and TT participation, between the carers and their perceptions for the PwD they cared for. The survey was returned by 376 carers (age 51.3±21.4 years, male 116 (34.6%), female 216 (64.5%335)), with 252 (77.5%) being family carers and 63 (18.8%) care professionals. From those carers able to estimate the PwD's PA participation (253, 79.3%), 124 (49.0%) PwD were deemed physically active and 126 (49.8%) were not. For PA levels, only 4.4% of PwD were considered to meet PA recommendations. Most carers believed that PwD would like to increase PA (148, 58.5%) while 120 (48.4%) thought PwD would participate in TT. For themselves, 190 (77.9%) stated they were physically active, with 24.9% meeting PA recommendations. Most carers would also like to increase PA (175, 72.3%) and would support the PwD participating in TT (171, 71.3%). No association in PA participation ($p=0.242$, $\lambda=0.092$) and increasing PA ($p=0.266$, $\lambda=0.050$), while a trivial association in TT partaking ($p=0.001$, $\lambda=0.109$) was found between the carers' answers for themselves and for the PwD they care for. The present results are encouraging for a TT programme development, alleviating some of the barriers for carers and PwD being physically active. This could lead to several benefits such as risk reduction of the condition worsening, falling, while increasing fitness and quality of life. Programme development should consider the dissociation between carers and PwD's PA participation and level.

D2.S3.4(5) Behind the race driver's visor: applied sport psychology in motorsport

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Motorsport has gained popularity over recent years as drivers revealed their unique characters and connected with the audience on a more personal level. However, drivers' mental health and psycho-social factors affecting their performance remain behind closed doors as it often goes against the created luxurious image of motorsport. This contributes to the lack of understanding of multifaceted challenges experienced by drivers, drivers' willingness to seek help to protect their mental health and enhance their psychological skills, and the perceptions of the driver as an emotionless superhuman. This presentation will shed more light on applied sport psychology support provided to a professional male Australian race driver (he/him) from a mixed ethnic background during the 2022 and 2023 seasons. The reason for the initial contact (Dec 2021) was a drop in performance caused by a crash in 2020. Since then, the driver had been making "silly, out-of-character mistakes" and underperforming in situations similar to the circumstances of the crash. Needs analysis comprised sport and individual assessments using semi-structured interviews and pen-and-paper tasks to understand driver's approaches to achieving and maintaining the Individual Zone of Optimal Functioning (Hanin, 2000, in Emotions in Sport, Champaign, IL, 65–89). The biggest challenge the driver faced was hardship regarding sponsors and insecurity about his seat in the 2022 season while balancing physical and psychological training. As such, looking after the driver's mental health, building his coping, organisational and interpersonal skills off-track and helping him navigate the hidden challenges of motorsport became an immediate priority. The designed intervention was initially underpinned by the Mindfulness-Acceptance-Commitment framework combined with traditional mental skills to facilitate the transferability of skills from personal (off-track) to performance (on-track) domains. Regular evaluations were conducted to identify the changing priorities and make necessary changes to ensure intervention effectiveness and the driver's responsiveness. The driver reported increased self-awareness during the races, remaining composed and patient under pressure, and maintaining self-confidence under previously problematic circumstances. Driver's immediate environment noticed increased coachability, organisational and self-management skills, and an interest in implementing sports science to his off-track training. With the driver's permission and informed consent, this presentation will discuss several strategies and approaches contributing to behavioural and

cognitive changes and better performance outcomes. Overall, this case study illustrates the benefits of an evidence-based client-centred holistic approach that bridges physical and psychological preparation to achieve peak performance and a state of flourishing.

D2.S3.4(6) Mental Toughness Training Intervention for Elite Track and Field Athletes – Randomized Control Trial (RCT)

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Mental toughness (MT) is a psychological construct that encompasses a range of attributes, including resilience, determination, and confidence, which are essential in achieving optimum performance in sports. Several psychological factors contribute to mental toughness in athletes; among them are motivation, positive talk, mental imagery, and attitude control. Despite its significance, there is a lack of research investigating the specific effects of mental toughness training on elite track and field athletes. Therefore, the aim of this RCT was to investigate the effectiveness of a tailored Mental Toughness Training Intervention (MTTI) on enhancing MT among elite track and field athletes. With ethical approval, a total of twenty -six (n = 26: 13 males and 13 females) elite track and field athletes were randomly assigned to either the experimental group (n = 13) or the control group (n = 13). The experimental group received an 8-week MTTI program (one hour per week), while the control group engaged in training without any MT intervention. The web-based intervention consisted of a structured programme designed to enhance athletes' MT through various cognitive and behavioural strategies, such as goal setting, positive self-talk, visualization, and stress management techniques, and conducted a series of workshops via one-to-one and Zoom. Pre- and post-intervention assessments were conducted to evaluate participants' MT levels. The change in MT was assessed using a specially developed MT questionnaire. The data were analyzed using the Mann-Whitney U test. The result of the RCT indicated a significant improvement in MT levels among athletes who received MTTI compared to the control group ($P<0.05$). The results from this RCT provided empirical evidence supporting the effectiveness of MT training as a valuable intervention and had a positive ($p<0.05$) suggesting that the MT training intervention had a positive effect on the MT of the track and field athletes. These findings suggest that MT may present a modification trait for performance. According to current literature, MT is the most essential psychological trait for achieving performance excellence (Connaughton et al., 2008). The result has implications for coaches, trainers, and sports psychologists in developing targeted interventions to optimize MT and enhance athletic performance in specific populations. Future research examining the longevity of such change and the effect of increased MT on performance will be important based on this study.

D2.S3.5 - Free Communications - Psychology

D2.S3.5(1) English Premier League and English Football League academy managers' perceptions of how psychosocial skills and characteristics are identified and developed in youth academy soccer players.

JAMES BARRACLOUGH, PROF DAVID GRECIC, DR DAMIAN HARPER

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This is the second paper from the Professional Doctorate qualification and follows an initial paper around PCDEs (MacNamara et al, 2010 a, b) and their deployment in academy football. The aim of this study was to investigate EPL and EFL academy managers' perceptions of how psychosocial skills are identified and developed in youth academy soccer players participating on the EPPP. Nine academy managers (AMs) (Category 1 (n = 3), Category 2 (n =3), Category 3 (n = 3)) participated in semi-structured interviews. Ethical approval was granted from the first author's institutional ethics committee (BAHSS2 0305) and informed consent was obtained from all participants. Using a reflexive thematic analysis approach (Braun et al., 2019) two key themes were built from the data: 1) soccer academies methods of identifying and developing player psychosocial skills and characteristics (PSCs) and 2) challenges that affect development of player PSCs. Methods of identifying and developing player PSCs were player assessment methods (e.g., coaches' intuition and player self-assessment), psychosocial factors, social context and what academies currently do well. Challenges affecting development of PSCs were player care, staffing issues, restrictions, and additional support required for player development. Key findings pertaining to these themes highlighted the importance AMs placed on PSCs being key drivers of player progression and that embedding them into the pathway was critical to creating a successful soccer talent development environment. Interestingly, AMs expressed several important PSCs that they felt were important for players to be successful including: humility, commitment and resilience. In conclusion, findings from the current study reinforce the importance of periodising PSCs into the academy curricula to enhance both player and person development. Academies should look to use both subjective (e.g., coaches' intuition, player self-assessment) and more objective (e.g., PCDEQ2) assessment methods to profile a player's PSCs. Lower category academies should seek to overcome financial, staff and time constraints by seeking to develop innovative internal procedures and/or partnerships with external agencies (e.g., charities and universities). Recruiting and upskilling caring staff to be more comfortable and knowledgeable about delivering PSC themed sessions is seen as important as players spend the majority of their time with them. Maintaining positive staff mental health and wellbeing is also important to allow them to give their best possible coaching performance. Providing a 'British Legion' type organization (perhaps from the PFA) for players no longer in the system could be beneficial for player aftercare.

D2.S3.5(2) Dietary restraint and emotional eating among high-level combat sport athletes

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In one-on-one combat sport, weight classifications are enforced to promote fair fights and minimise the risk of injury between opponents (Artioli et al., 2010, Medicine & Science in Sports & Exercise, 42, 436-442). Few athletes are naturally at the weight they compete at necessitating rapid weight loss, and thus restrained eating prior to competition (Lakicevic et al., 2021, BMC Sports Science, Medicine and Rehabilitation, 13, 1-6). Previous research indicates that individuals self-reporting as high in dietary restraint also self-report a higher desire to emotionally eat, which if acted upon would compromise weight management goals (Herman and Polivy, 1983, Psychiatric Annals, 13, 918-927). The purpose of this mixed-methods exploratory study was to examine associations between dietary restraint and emotional eating among high-level combat sport athletes. Following institutional ethics approval, nineteen high-level competitors in Brazilian Jiu Jitsu and Mixed Martial Arts completed the emotional eating scale (Arnow, Kenardy and Agras, 1995, International Journal of Eating Disorders, 18, 79-90), a revised restraint scale (Herman and Polivy, 1980, In Stunkard (Ed.) Obesity, pp. 141–156), and a rapid weight loss questionnaire (Artioli et al., 2010, Scandinavian journal of medicine & science in sports, 20, 177-187). A subsample of six participants then completed individual interviews to explore emotional eating, particularly during the lead-up to and post-competition. Quantitative findings via non-parametric tests found high scores in restrained eating associated with a greater urge to emotionally eat. Qualitative findings via thematic analysis of interview data (Braun and Clarke, 2006, Qualitative Research in Psychology, 3, 77-101) identified three themes that helped understand this association, 'emotions eliciting an urge to eat', 'outcomes of emotional eating', and 'resisting emotional eating'. Participants described a cycle of restrained eating pre-competition followed by an increased tendency toward emotional eating post-competition, with the extent of emotional eating influenced by the degree of restrained eating required and competition outcomes. This study, to our knowledge the first in exploring perceptions of emotional eating and weight-making in high-level combat sports, supports the notion that those high in restraint show an increased tendency to emotionally eat, particularly in response to unpleasant emotions. Where emotional eating appears to be unhelpful, practitioners could help athletes to reflect upon and utilise alternative emotion-focused coping strategies.

D2.S3.5(3) "How do I know I'm doing a good job?": A poetic representation of stakeholder interactions on the development of practitioner identity within applied sport psychology

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Contemporary research has identified identity as being an under-researched area within applied sport psychology. Concurrently, recent research has identified the micro-political nature of sport psychology contexts and the significance of stakeholder interactions in shaping the professional self-understanding of applied practitioners. Utilizing a multi-theoretical perspective, this study aimed to explore how interactions with key stakeholders shape and inform practitioner identity in relation to the practitioner's current roles and responsibilities. With the institutions' ethical approval, purposive sampling identified 7 UK-based practitioners (5 male and 2 female) who gave informed consent to participate in the research. All were either registered with the Health Care Professions Council or engaged on a professional accreditation pathway. Practitioners outlined their career histories on a timeline, highlighting key stakeholders within their current environment. These timelines informed semi-structured interviews, accruing over 18 hours of data that were then transcribed verbatim and analysed using reflexive thematic analysis. The analysis process generated three themes: Out of sight, out of mind; left to my own devices; feeling a part and apart. These themes encapsulate the impact of practitioners' interactions with key stakeholders, including athletes, coaches, support staff, and management. The themes also highlight the practitioners' experiences of a lack of proximal line management, and their own perceived importance and contribution to their respective organisations as a result of the interactions with key stakeholders. The findings, articulated through a poetic representation, both aim to capture the emotional nature of applied sport psychology practice and identify the contextually bound nature of practitioner identity and professional self-understanding. Recommendations are made on how supervisory and peer-support processes can develop practitioner understanding around stakeholder interactions, and the subsequent impact that these can have on forming and maintaining practitioner identity. Subsequently, practitioners are encouraged to consider how the manage their interactions with key-stakeholders and line management processes. Further, through utilising Thoits (2011) notion of social ties as mechanisms for health, suggestions are made to consider how such interactions with key stakeholders can impact practitioners' health through such mechanisms.

D2.S3.5(4) Examination of Mood profiles: Icebergs, Sharkfins, and Surface profiles– re-examination of BBC Lab UK data

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Mood profiling is a graphical profile with a long history of use within sport and exercise psychology (Terry and Parsons-Smith, 2021, Sustainability, 13, 6116). Mood profiling has multiple benefits including helping to identify optimal performance states, injury risk, overtraining, and poor mental health. An iceberg profile; above average vigour coupled with below average anger, depression, confusion, fatigue and tension has been widely examined. Studies using large sample sizes (> 15,000) (Terry & Parsons-Smith, 2021) and the Brunel Mood Scale (Terry et al., 2003, Psychology of Sport and Exercise, 4, 125-139) added six further profiles: an inverse iceberg, Everest, inverse Everest, shark fin, surface, and submerged (Parsons-Smith et al., 2017). The present study investigated mood profiling from a BBC Lab UK data (Lane et al., 2016, Frontiers in Psychology, 7:413). Data were collected as part of an online study which examined the extent to which participants learned brief psychological skills to regulate emotions and improve competitive task performance. In the present study, we assessed 3 pleasantly oriented mood states and 4 unpleasantly oriented mood states. We present mood states in the following order anxious, angry, dejected, happy, excited, energetic and fatigued to enable comparison with the order of mood states graphed to create an iceberg profile using the Profile of Mood States. With institutional ethical approval and in conjunction with the BBC Lab UK, participants (N = 72,204, Age: M = 34.85 years; +_ 14.11) completed measures online as reported by Lane et al. (2016). We used baseline mood data collected at the start of the study and before undergoing brief psychological skills training and performing a competitive task. Data analysis followed procedures outlined by previously (Parsons-Smith et al., 2017, Frontiers in Psychology, 8, 1958) which used hierarchical cluster analysis fixing 6 clusters. In the present study, data were converted to standard T-scores where the 50th percentile represents the waterline. We found an Inverse iceberg (n = 8186), iceberg (n =17297), surface (n = 12816), anxious-excited (n = 9533), inverse shark-fin (n = 4823) and submerged (n = 21023), hence we found 5 of the 6 hypothesised clusters. Further analysis revealed an iceberg associated using psychological skills and re-appraisal more and suppression less than inverse iceberg and inverse shark fin profiles. When seen collectively, future research should investigate how different mood profiles relation to performance, injury risk, overtraining and mental health.

D2.S3.5(5) Expanding our understanding of talent development environments in English female youth football

DR ADAM GLEDHILL FBASES, DR STACEY EMMONDS, DR TOM MITCHELL, BARNABY SARGENT MEGICKS

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Female football is one of the largest growth sports in the world and has seen increased performance outcomes at senior level with the English women's national team. Despite this growth and interest, there remains relatively little research examining the environments within which players develop (Gledhill and Harwood, 2019, Journal of Applied Sport Psychology), with much of the research examining female players' experiences is small-scale and has been limited to players' perceptions (e.g., Gledhill and Harwood, 2014, International Journal of Sport and Exercise Psychology, 12, 150 - 165). To be able to fully understand and develop the quality of a player's talent development environment, work examining multi-stakeholder perspectives is needed. Hence, to gain a greater understanding that provides a more fulsome understanding of female football talent development environments, this study sought to explore players', parents', and coaches' perspectives of their female football talent development environments to compare perceptions of players, parents and coaches, and to provide suggestions regarding opportunities for development. Using a cross-sectional design, we surveyed 3217 participants from 30 different teams in the English female football talent pathway. Participants completed the Talent Development Environment Questionnaire-5 to share their perspectives on the playing environments.

Descriptive analysis revealed that perceptions of environments based on all subscales were positive and scored >4/6 of each subscale. Coaches had generally more positive perceptions of the TDEs than players and parents in all subscales of the TDEQ-5, with the exception of the alignment of expectations subscale where coaches had the least positive perception. Significant (p=<0.001) differences between players, coaches, and parents were evident across the support network and alignment of expectations subscales. Players, parents, and coaches all reflected that an opportunity for development was Coaches taking time to talk to parents and other staff about what players are trying to achieve. Players and coaches agreed that coaches trying to identify what players' next big test will be was also an opportunity for development. Contingency planning and developing psychosocial assets was also an opportunity for development. This was the first study to investigate player, parent, and coach perceptions of the English female football talent development environment and to our knowledge, the largest study of female football talent development environments in the World to date.

Posters Day 1

D1.P1 Cardiac Adaptation in Elite Athletes and the Association between Electrical and Structural Remodelling

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The athlete's heart is the physiological adaptation from chronic exposure to training. However, this process can mimic cardiac remodelling caused by pathological conditions. 12-lead electrocardiogram plays a pivotal role in pre-participation screening and this study aimed to establish the associations between ECG criteria and structural cardiac remodelling as determined by echocardiography in athletes. Ethical approval was obtained from the integrated research application system (IRAS).

954 male (22±5) and 240 female athletes (22±4) from various sporting disciplines participated in a cross-sectional study. Anthropometric measurements, 12-lead ECG and conventional 2D echocardiography were undertaken. ECG parameters including duration and axis of the P wave and the QRS complex as well as amplitude criteria for left (LV) and right ventricular (RV) hypertrophy were extracted. Echocardiographic indices of the Left ventricular mass (LVM) left ventricular diameter (LVd) and mean wall thickness (MWT); LV geometry was defined as concentric remodelling (CR), concentric hypertrophy (CH), eccentric hypertrophy (EH) or normal geometry as defined by left ventricular mass index (LVMi) and relative wall thickness (RWT). Right ventricular indices included basal inflow diameter (RVD) and right ventricular outflow tract (RVOT). Pearson's correlation was utilised to establish associations between ECG and echocardiographic parameters.

None of the athletes had non-training-related changes on 12-lead ECG. LV geometry was assessed in all study participants highlighting a predominance of normal geometry in males and females with 1.7% of male athletes having EH and CR respectively; 0.7% of female athletes having EH. Weak but significant correlations were apparent between LV structure and ECG parameters (LVM with QRS duration, QRS axis and QRS amplitude (S wave in V1 plus R wave in V5) ($r=0.10$; $P=0.007$, $r=-0.16$; $P<0.001$ and 0.09; $P=0.024$, respectively), (LVd with QRS Duration, QRS Axis, QRS amplitude (S wave in V1 plus R wave in V5) ($r=0.10$; $P=0.009$, $r=-0.12$; $P=0.002$, $r=0.19$ and $P<0.001$ respectively) and (MWT with QRS amplitude (S wave in V1 plus R wave in V5) ($r=-0.22$; $P<0.001$). No significant correlations of RV geometry with ECG parameters, with the exception of RVOT with QRS axis ($r=-0.09$; $P=0.015$).

Weak associations exist between ECG criteria and cardiac chamber geometry in elite athletes. The P-wave duration provides the strongest correlation with left atrial volume. These data indicate that ECG parameters provide minimal insight into physiological cardiac adaptation observed in athletes. In view of this, within the pre-participation setting, the presence of raised ECG indices indicative of chamber enlargement may warrant further investigation to exclude pathology.

D1.P2 Strengthening citizenship competencies through the practice of physical activity and sport in school contexts: A systematic review

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Sports practice and physical activity provide opportunities to strengthen discipline and to develop tolerance, cooperation, and respect (Lee, 2018, Sport Management Association, 487, 12). Many of these practices are developed at school in the physical education classes and their objective is to build respect for the rules of the games and for sports activities, which in turn impact coexistence behaviors and the acquisition of social competencies (Betancourt, et al., 2020, Retos, 38, 845-851).

The objectives of this study were to conduct a systematic review of literature that accounted for the strengthening of citizenship competencies through the practice of physical activity and exercise in school contexts and to make recommendations on this topic based on scientific evidence. The study was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses-PRISMA-(Page et al., 2021) guidelines. It had the approval of the ethics committee of the School of Education at Universidad de La Sabana.

Articles published in Spanish and in English between 2013-2023 were selected from Scopus, Web of Science and Science Direct databases. The words used in the search string were physical activity, exercise, citizenship skills, physical education, and pedagogical strategies. A total of 90 articles were selected and uploaded to the collaborative platform for systematic reviews Rayyan. Two duplicates were eliminated, and a blind reading of the title and the abstract was performed by the researchers. Seven articles that met the inclusion criteria were chosen for an in depth reading. The articles were classified into two broad categories: One was the citizenship competencies evaluated and the second one was strategies used to strengthen them. The articles analyzed in this review were 5 descriptive observational studies, 1 experimental studies and 1 systematic review. The results of this study suggest that sports practices and structured physical activity carried out in school contexts such as physical education classes contribute to the

development of citizenship competencies such as respect for opinions and expressions, tolerance, social cohesion and self-regulation. Likewise, it was observed that the most frequent strategies are games and playful-sports activities. Teachers or coaches become a key factor in the formation of citizenship when they provide positive stimuli and use prosocial communication. There is a call to develop more experimental studies based on games to strengthen citizenship competencies.

D1.P3 Gender differences in parkrun experience: participation motives and perceived impact

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Global physical inactivity levels keep rising, resulting in detrimental effects on the physical health and mental wellbeing of individuals and populations. Gender-specific physical activity inequalities exist, implying more negative health consequences for females. Previous research suggests physical activity levels can be increased through community-based physical activity initiatives. An example of such an initiative is parkrun, a non-profit which organises free, weekly 5km events across the world every Saturday morning. In Australia over 50,000 people participate weekly. The aim of this study was to explore gender differences in motives for attending and the perceived impact of parkrun. This was achieved through a large-scale health and wellbeing survey, ethically approved by Sheffield Hallam University and La Trobe University, that was emailed to all parkrun participants in Australia. The completed survey responses of 33,533 individuals (57.7% female) were matched to participants' parkrun data (such as completion times and activity level when registering). Since registration, 67.6% of female participants had either increased their physical activity or kept it consistent. Logistic regressions explored the gender differences in motives for participation and perceived impact of parkrun. Adjusted odds ratios (OR) and confidence intervals (CI) are reported. Compared to male participants, female participants were more likely to state that being active in a non-judgemental environment (OR = 2.10, 95% CI [1.97, 2.22]) and being active in a physically safe environment (OR = 1.83, 95% CI [1.73, 1.95]) were reasons for them for first attending parkrun. Female participants were less likely than males to say that competing against themselves (OR = 0.57, 95% CI [0.54, 0.61]) and competing against others (OR = 0.36, 95% CI [0.33, 0.39]) were motives for attendance. The same pattern was found for perceived impact: female participants were more likely to say parkrun increased their opportunity to be active in a non-judgemental (OR = 1.93, 95% CI [1.80, 2.08]) and physically safe environment (OR = 1.79, 95% CI [1.66, 1.92]). Female participants were less likely than males to report that parkrun had improved their opportunity to compete against others (OR = 0.48, 95% CI [0.45, 0.52]) and to compete against themselves (OR = 0.68, 95% CI [0.62, 0.74]). These findings suggests that community-based physical activity initiatives, such as parkrun, have the potential to increase physical activity levels. Specific messaging targeting females should be considered, such as highlighting safe, non-judgemental environments that are less competitive in nature.

D1.P4 Finger flexor strength and the effect of acute handgrip fatigue in advanced level boulderers

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Bouldering is a discipline of rock climbing that involves short (~4m-high) typically overhanging problems without ropes. Bouldering places a high demand on the finger flexors and consists of ~8s isometric holds across 30-40s climbing problems, with ~115s rest between attempts (White and Olsen, 2010, Journal of Strength and Conditioning Research, 24, 1356–1360). Strength and endurance of the fingers appear to discriminate rock climbing ability (Marcolin et al. 2022, Journal of Strength and Conditioning Research, 36, 1099-1104), however this has not been tested in boulderers or outside a laboratory setting. The aim of this study was to investigate if climbing specific finger strength relates to ability in advanced boulderers, and to assess the effects of acute fatigue and recovery. With institutional ethical approval, 13 advanced boulderers (12 males, 1 female; age 22±3 years; height 172.5±8.2cm; mass 65.8 ±5.3kg; International Rock Climbing Research Association (IRCRA) scale 19-22) volunteered. At baseline, dominant arm finger flexion strength was measured using an open-hand crimp hold on a 20mm edge. Participants performed the test in a seated, cross-legged position on the floor (with a weighted vest if required) with the dynamometer height adjusted on an individual basis so that the arm was positioned directly above the head with no elbow flexion observed. Peak force was recorded at 80Hz using a climbing specific Tindeq Progressor 300 dynamometer (Trondheim, Norway), and reported in Newtons/body mass ($N.kg^{-1}$). Participants climbed a circuit on a training wall, and repeated until failure due to fatigue. Immediately after failure, participants repeated the open-hand crimp strength test. The strength test was repeated every 2 minutes until 20 minutes. At baseline, the peak force for the open hand crimp was 7.86±1.40 $N.kg^{-1}$ and was significantly correlated with self-reported climbing grade ($r=0.810$, $P<0.001$). Peak force was significantly reduced immediately after the fatiguing protocol (6.24±1.03 $N.kg^{-1}$; $P<0.001$) and remained significantly reduced at both 10 (6.73±0.95 $N.kg^{-1}$; $P<0.001$) and 20 min (7.05±1.29 $N.kg^{-1}$; $P<0.001$). However, the gradient of recovery for the first 10-minutes was steeper for the higher ability boulderers (IRCRA 22, m=0.059) than those graded IRCRA 21 (m=0.046) and 19-20 (m=0.038). The results indicate that boulderers climbing at higher grades demonstrate higher finger flexor strength and recover from a fatiguing effort

at a faster rate. In addition, 2-minute rest periods between force measurements appears to impact force generation recovery, suggesting that advanced boulderers typically require longer rest between bouldering attempts.

D1.P5 Within competition recovery strategies to minimise performance decrement through rounds of competition: a systematic review

DR LAURENCE P. BIRDSEY, DR ADAM FIELD, DR ADAM RUNACRES, DR THOMAS DOS'SANTOS

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Recovery strategies are routinely employed by athletes in an attempt to minimise performance decrement (or enhance performance). However, studies reporting strategy efficacy on subsequent repeated performance with short timeframes (i.e., competing multiple times within the same day, or on consecutive days) demonstrate mixed results. This systematic review, therefore, aimed to examine the effects of recovery strategies in minimising performance decrement when subsequent performance is completed within the same day or on consecutive days. Databases (PubMed, SportDiscus, Medline, Scopus and Web of Science) were searched up until June 1st, 2023, by two reviewers. Studies were included if they were published in English, implemented a recovery strategy following competition or simulated-competition, included a competition or simulated-competition following the recovery intervention, assessed outcome measures (which included performance markers such as completion time) within the day, or on consecutive days, included participants classified as ≥ tier 2 (McKay et al., 2022. IJSPP, 17, 317-331) and conducted in a sport which at the highest level includes multiple bouts of competition within a day and/or on consecutive days (e.g., track and field, judo, track cycling etc.). Of the 3360 articles retrieved, 127 articles were screened in full, with 31 satisfying the inclusion criteria and included in the review. Studies included participants across 12 different sports with the three most frequent being cycling (n=14), swimming (n=5) and running (n=3). Performances were repeated within the same (81%) or on consecutive days (19%), interspersed with 15 different recovery strategies. A large proportion of strategies attenuated reductions in subsequent performance (48%) compared with controls (i.e., placebo or other strategies), whilst the same proportion was as effective as controls (48%), and one impaired subsequent performance (3%). Compression garments (number of studies utilising strategy; percent which attenuated the decline: 3;100%), breathing humid air (1;100%), and contrast water therapy (4;75%) were most frequently effective. Mixed results were demonstrated for hot water immersion (2;50%), drinks containing carbohydrates (4;50%) or carbohydrate and protein (2:50%), active recovery (11;45%), cold water immersion (10;30%) and electrical stimulation (4;25%). Whole body cryostimulation (1;0%), cold compression therapy (2;0%), ischemic preconditioning (1;0%), intermittent pneumatic compression (1;0%), manual massage (1;0%) and mixed methods (1;0%) were ineffective. Many strategies lack numerous investigations, whilst methodological consistency including effectively replicating competition demands, recovery strategy dose, recovery timeframes, and a focus on assessing performance is important for future investigations into the effectiveness of recovery strategies in minimising performance decrement through rounds of competition.

D1.P6 A systematic review of the association between extrinsic risk factors and primary noncontact Anterior Cruciate Ligament injury in adolescents aged between 14-18 years

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A higher incidence of Anterior Cruciate Ligament (ACL) injury has been observed in adolescents compared to other age groups. Furthermore, the incidence of ACL injuries has been growing in adolescents over the last few decades. To reduce ACL injuries it is important to investigate the risk factors predisposing adolescents to injuries that can be prevented such as primary noncontact ACL injury. Therefore, we conducted a systematic review summarising the literature on how extrinsic risk factors (e.g., sport type, amount of sport exposure and conditions, weather, environment, and equipment) might affect primary noncontact ACL injury in adolescents. We did a literature research applying the same search strategy within MEDLINE, SPORTDiscus, CINAHL, PubMed and Embase. Studies were included in the systematic review if: written in English; published within peer reviewed journals; investigating and discussing the association between primary noncontact ACL injury risk and extrinsic risk factors; concerning original research with an observational design; the mean age of participants was between 14-18 years. The systematic review included 16 eligible articles published between 2006 and 2022 that investigated the following extrinsic risk factors: sport (eight studies) sport exposure amount (five); sport level (three); sport season (two); environment (two); equipment (one). The articles included in this review reported differences in biomechanical risk factors predisposing to ACL injury dependent on the sport played, nevertheless, they did not find good evidence of differences in primary noncontact ACL injury rate by sport. Furthermore, inconsistent findings were reported about the associations between sport exposure and biomechanical and neuromuscular risk factors predisposing to ACL injury or primary noncontact ACL injury rate. Additionally, there was weak evidence about the association between environmental conditions and season phase with biomechanical risk factors predisposing to ACL injury. Lastly, few good quality articles reported that higher sport level might be related with enhanced primary noncontact ACL injury risk while using braces might not prevent primary noncontact ACL injuries. These findings evidenced lack of

research about the associations between extrinsic risk factors and primary noncontact ACL injury in adolescents. Further research in this field is needed to develop ACL injury prevention guidelines that would help practitioners and researchers identifying adolescents at risk and designing future interventions. Future epidemiological research should investigate the association between extrinsic risk factors and primary noncontact injury separately from secondary injuries or contact injuries to better understand how to prevent primary noncontact ACL injury in adolescents.

D1.P7 The effects of wearing different épée masks on cognitive and thermoregulatory responses in male fencers

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Fencing involves wearing thick protective clothing including a fencing mask which impedes heat loss mechanisms. The fencing mask may inhibit a valuable source of heat loss from the head during exercise (Oates et al., 2023, Journal of Elite Sport Performance, 3(1) doi:10.54080/JPBK7315). Therefore, the aim of this study was to investigate the potential differences in thermoregulatory and cognitive measures between two masks. With institutional ethics approval, 6 male fencers (mean age: 28.8 ±14.6 years; stature: 1.8 ±0.06 m; body mass: 75.7 ±7.2 kg) (mean ± s) were randomly tested wearing an AllStar (AS) or Xchange (XC) fencing mask. The protocol was designed to simulate poule (P) and direct elimination (DE) fights. The protocol consisted of running on a treadmill at approximately 87% of participants' age predicted maximal heart rate (HR; 170 ±11.4 bpm). Fencers performed 6 x 3 min. bouts interspersed by 3 min. recovery, followed by 3 x [3 x 3 min] runs separated by 10 min recovery. A cognitive test (Visual search task, PEBL 2.1) was performed pre and post each condition giving a time for search time (RT1) and time to respond (RT2). Thermal sensation, forehead and mask temperature were recorded during the last minute of each fight. A paired t-test was done on the mean thermal sensation, forehead and mask temperature between conditions. A two-way ANOVA was performed on RT1 and RT2 between condition and time. Effect sizes were calculated. There were no significant mask effects on RT1 pre- and post-fencing simulation (XC mask pre: 1112.1 ±257.3 vs AS mask pre: 1218.6 ±415.5 and XC mask post: 964.9 ±172.4 vs AS mask post: 1021.6 ±271.9 ms; P=0.54; ηp^2 =0.08) RT2 followed the same trend (XC mask pre: 701.3 ±96.2 vs AS mask pre: 748 ±77.8 and XC mask post: 665.1 ±63.5 vs AS mask post: 699.1 ±52.8 ms; P=0.61; ηp^2 =0.06). Mask temperature was lower when wearing XC compared to AS, throughout P and DE fight simulations (mean temperature: 27.1 ±0.2 vs 27.3 ±0.2°C; P<0.05; d =0.54). Forehead temperature differed significantly between XC and AS (34.7 ±0.1 vs 34.2°C ±0.1; P<0.01; d=0.63; n = 5). Face thermal sensation ratings were not significantly different between AS and XC (mean ratings: 6 ±0.1 vs 6.1 ±0.1; P=0.47; d =1.03). These results suggest that forehead and mask temperature were affected by the type of mask worn. Further work is needed with a larger sample size.

D1.P8 Exercise-induced muscle damage and recovery in youths versus adults; a systematic review with meta-analysis

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Exercise-induced muscle damage (EIMD) occurs after high volume, eccentrically biased or unaccustomed exercise, with the magnitude differing EIMD between age groups and body segments (Saka et al., 2009; Lin et al., 2018). Understanding how the peak magnitude of EIMD in youths compares to adults could help practitioners when scheduling muscle-damaging exercise. The aims of this study were to 1) provide a meta-analytical comparison of peak changes in indirect markers of EIMD in youths versus adults, 2) determine if the involved limb segment (i.e., upper- versus lower-limb) affected the magnitude of change between youths and adults. The data sources utilised were Google Scholar, PubMed, and Sport Discus and all published articles before July 2022 were assessed in accordance with PRISMA guidelines. Studies were eligible for inclusion if they 1) provided a youth versus adult comparison, 2) provided data on muscle strength, soreness or creatine kinase (CK) markers beyond ≥ 24 hours, 3) did not provide a recovery treatment or included a treatment free control group, 4) were performed in humans. An inverse-variance random-effects model for meta-analyses was employed because it allocates proportionate weight to comparisons based on the size of their individual standard errors, whilst accounting for study heterogeneity. Effect sizes were derived from standardised mean difference (SMD). A meta-regression was also performed. Fourteen comparisons from 12 individual studies were included in the analysis; 9, 11 and 9 comparisons included markers of muscle function, muscle soreness and CK, respectively. EIMD exhibited larger effects on adults than in youths for muscle strength (SMD= -2.01), muscle soreness (SMD= -1.52) and CK (SMD= -1.98; all P<0.001). The random effects meta-regression examined the effects of upper- and lower-limb exercise in youths and adults was significant for muscle soreness (coefficient estimate= 1.11; P < 0.001) but not muscle strength (P= 0.945) or CK (P=0.285). As such, the between-group effects for muscle soreness (SMD= -2.10 versus -1.03; both P <0.05) were greater in the upper- than lower-limb (i.e., greater changes in adults than youths). The magnitude of EIMD in youths is substantially less than their adult counterparts. Moreover, this effect is greater in upper- than lower-limbs for muscle soreness but not muscle strength or CK. These findings help guide practitioners who may be concerned about the potential impact of EIMD when training youth athletes. We therefore

encourage practitioners to be cognisant of these data and engage youths in physical activity that maximises their enjoyment and development.

D1.P9 Influence of environmental temperature on physiological, metabolic, and perceptual responses during a 16.1 km time trial

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Exercise in warm and hot environmental conditions often leads to a decrease in power output, total time-to-fatigue, and a greater physiological strain than in cooler environments. These changes are proposed to occur due to a greater reliance on ATP production from anaerobic energy systems, leading to elevations in extracellular lactate and perceived exertion for the same given exercise (Hargreaves, 2008, Journal of Science and Medicine in Sport, 11, 66-71). Few studies have considered the effects of heat on self-paced exercise and acid-base balance across an ecologically valid distance. Therefore, the purpose of this study was to investigate the effects of warm environmental conditions on 16.1-kilometre cycling time-trial (TT) performance. Following institutional ethics approval, eight trained cyclists (age: 36.4 ± 14.8 years, height: 1.78 ± 0.05 m, body mass: 80.4 ± 14.1 kg, VO_2max: 52.7 ± 10.4 mL.kg-^{1}.min-^{1} at 364.9 ± 33.6 W) were familiarised with the protocol and conditions before completing a 16.1-kilometre TT at both 15°C and 30°C, relative humidity was 40%. A randomised, cross-over design with counterbalancing was employed. During the TT, power output (W) was averaged every kilometre. Whilst, blood pH, lactate, bicarbonate (HCO_3-), respiratory gases (VO_2, VCO_2 and RER), rating of perceived exertion (RPE), rating of fatigue (ROF), thermal sensation and thermal comfort were collected every 4 kilometres. Completion time in the warm condition was 36.4 ± 24.4 s slower than in the cool condition (2.4%, $p = 0.006$, $g = 1.24$), with a reduction in power output (13.3 ± 9.4 W, 4.6%, $p = 0.008$, $\eta p_2 = 0.65$). The faster completion time in the cool condition was associated with significant reductions in pH ($p = 0.007$, $\eta p_2 = 0.67$), HCO_3- ($p = 0.005$, $\eta p_2 = 0.40$), RER ($p = 0.004$, $\eta p_2 = 0.63$), but not lactate ($p = 0.081$, $\eta p_2 = 0.37$). Thermal sensation and comfort were elevated in response to the warm environment ($p = 0.001$ and 0.001, $\eta p_2 = 0.87$ and 0.84, respectively) with a greater ROF evident ($p = 0.017$, $\eta p_2 = 0.67$), despite no changes in RPE ($p = 0.39$, $\eta p_2 = 0.11$). The results suggest that 16.1 km TT performance is decreased in environments of higher ambient temperature. Increases in RER and power output, during the TT, were associated with greater reductions in blood pH and HCO_3-. Further research investigating nutritional interventions, such as extracellular buffers, is required to determine their ergogenic potential across the 16.1-kilometre TT distance.

D1.P10 Effects of a 10-week school-based, integrated curriculum intervention on physical activity, resting blood pressure, motor skills and well-being in 6–7-year-olds living in deprived areas of England

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Integrated curriculum interventions, where opportunities to undertake physical activity (PA) during school curriculum activities have been suggested as an effective means to increase PA and health (Neil-Sztramko, et al., 2021, The Cochrane Database of Systematic Reviews, 9(9), CD007651). The feasibility and impact of such approaches on younger children's PA and health, particularly those from deprived backgrounds is unknown. Understanding the feasibility of such approaches with deprived children is especially important as children from more disadvantaged areas are the least active and face additional barriers to undertaking PA outside of school environments. The aim of this study was to pilot an integrated curriculum pedometer intervention in children living in deprived areas on school-based PA, body fatness, resting blood pressure, motor skills and well-being. Using a pilot cluster randomized design and following institutional ethics approval, parental informed consent and child assent, children (6-7-years-old, n=64, 37 boys, 27 girls) from two schools, ranked within the top 10% most deprived areas nationally, undertook: (1, n=32) 10-week integrated curriculum intervention or (2, n=32) control (regular school-based activity). School-based PA, body fatness, resting blood pressure, motor skills and well-being were assessed pre and post intervention. The intervention comprised a virtual walk of the London Underground linked with physically active school lessons, using pedometry as an open loop feedback tool for self-monitoring PA. To examine any differences pre to post for intervention and control groups ANCOVA was used with change scores for each variable as the dependent variable and baseline values for each variable as the covariate. For the intervention group PA was higher on school days when children had PE lessons or there were physically active integrated curriculum activities. Body fatness significantly decreased (P=.002), wellbeing (P= .001) and perceived physical competence (P=.005) increased, pre-post for the intervention group compared to controls. Accelerometer derived PA, motor skills and resting blood pressure were not significantly different pre-post for intervention or control groups (all P>.05). The results of this study suggest that those children that undertook a 10-week integrated curriculum PA intervention experienced a reduction in body fat percentage and an improvement in mental well-being and perceived physical competence pre to post compared to controls. On days where integrated curriculum PA sessions took place the level of PA was comparable to, or in excess of, school days where statutory PE took place.

D1.P11 The effects of psychological skills training during novices' learning of a motor skill on subsequent performance under pressure

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Why do some individuals remain composed within high stress environments, whereas others choke under pressure? This has been widely researched in both sporting and performance contexts, including the likes of Mesagno and Beckmann (2017, Current opinion in psychology, 16, 170-175) who have recently explored methods of avoiding performance deterioration under pressure. Interest has focused on the learning environment where skills are developed prior to performance under pressure, including the use of different practice conditions (e.g., level of pressure), instructions (e.g., implicit learning, analogy learning) and perceptual interventions (e.g., quiet eye). However, whilst psychological skills have been shown to be important for elevating choking under pressure (e.g., pre-performance routines and imagery), little is known about how they can be developed whilst concurrently learning a motor skill. Therefore, the aim of the present study was to assess whether the application of psychological skills training (PST) during novices' learning of a motor skill could benefit subsequent performance under pressure. Thirty novice speed cup stackers with no prior PST or sport psychology experience were randomly assigned to either an Imagery, Reflection or Control group. Individuals practiced a 3-6-3 cup stacking task (8 Blocks of 5 stacks) whilst also completing Imagery (guided PETTLEP imagery), Reflection (post-task guided reflection) or no intervention during the inter-block period. Participants were then required twenty-four to forty-eight hours after practice, to complete retention and pressure trials. Mental readiness was measured throughout all trials, with heart rate and reaction time being measured across retention and pressure trials. Pressure was induced during the pressure trial through a combination of social evaluation, social threat, prize incentive and deception (Gröpel and Mesagno, 2019, International review of sport and exercise psychology, 12, 176-201). Results illustrated no significant differences in average cup stacking time, heart rate and reaction time between groups. However, there was a significant effect of practice block on practice performance ($F(7, 189) = 19.93$, $P < 0.001$, partial eta squared = .425) and a significant difference between groups concerning pre-retention 'worried' scores ($F(2, 29) = 3.22$, $P = 0.05$, partial eta squared = .193). It was concluded that practice of the motor skill alone may have been enough to prepare novices to perform under pressure. In relation to practical implications and future research, it is possible the use of PST within motor performance contexts (e.g., cup stacking, darts, golf putting) requires longer term interventions in order to bring about notable effects.

D1.P12 A Scoping Review on the Psychology of Gaelic Games

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The Gaelic Athletic Association (GAA) is Ireland's most influential cultural and sporting organisation and is recognised as one of the world's greatest amateur sporting organisations. Sport psychology has been used in Gaelic games since at least the 1990s (MacIntyre et al., 1998, The Irish Journal of Psychology, 19, 504-515), yet the evidence base on the psychology of Gaelic games has been slow to develop. In recent years, however, there has been growth in research on the psychology of Gaelic games and its importance is recognised in the new Gaelic Games Sport Science Framework. To inform future research, practice, and policy, a review of this literature could make a timely contribution. Therefore, the aim of our review was to identify and synthesise current literature on the psychology of Gaelic games. We adopted the 5-step framework for scoping reviews (Arksey and O'Malley, 2005, International Journal of Social Research Methodology: Theory and Practice, 8, 19-32), as well as recommendations for enhancing this framework (Levac et al., 2010, Implementation Science, 5, 69). Ethical approval was not required for this desk-based research. After electronic database searches and manual searches up to September 2023, we included 42 studies, involving 4963 Gaelic games participants, in the review. We organised findings into eight categories: mental health and wellbeing; burnout; youth coaching practices; psychology of injury; attentional processes; optimal experiences and performing under pressure; identity; and female coach development. The review demonstrates that research attention has tended to focus on mental health and wellbeing, burnout, and psychologically-informed interventions targeted at youth-coach practices in Gaelic games. However, there are a number of areas that should be addressed by future research to enhance this literature, including studies that focus on applied sport psychology practice and group dynamics. Furthermore, the review also indicates a need for more high-quality studies, gender-inclusive research, and coherent psychology research agenda in Gaelic games. Ultimately, this will help to build an evidence base that can best serve players, coaches, parents, sport psychology practitioners, officials, and administrators and supplement the vision for sports science, inclusive of sport psychology, in Gaelic Games.

D1.P13 A Multidisciplinary Investigation into the Talent Development Processes at an English Football Academy: A Machine Learning Approach

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The talent development processes in youth football are both complex and multidimensional. The purpose of this two-fold study was to apply a multidisciplinary, machine learning approach to examine: (a) the developmental characteristics of under-9 to under-16 academy players (n = 98; Study 1), and (b) the characteristics of selected and deselected under-18 academy players (n = 18; Study 2). Parental consent and player assent were collected prior to the study commencing. The study was approved by the Ethics Committee of Sport and Health Sciences at the University of Exeter. A combined total of 53 factors cumulated from eight data collection methods across two seasons were analysed. A cross-validated Lasso regression was implemented, using the glmnet package in R, to analyse the factors that contributed to: (a) player review ratings (Study 1), and (b) achieving a professional contract (Study 2). Results showed non-zero coefficients for improvement in subjective performance in 15 out of the 53 analysed features, with key findings revealing advanced percentage of predicted adult height (0.196), greater lob pass (0.160) and average dribble completion percentage (0.124), more total match-play hours (0.145), and an older relative age (BQ1 vs. BQ2: −0.133; BQ1 vs. BQ4: −0.060) were the most important features that contributed towards player review ratings. Moreover, PCDEQ Factor 3 and an ability to organise and engage in quality practice (PCDEQ Factor 4) were important contributing factors towards achieving a professional contract. Overall, it appears the key factors associated with positive developmental outcomes are not always technical and tactical in nature, where coaches often have their expertise. Indeed, the relative importance of these factors is likely to change over time, and with age, although psychological attributes appear to be key to reaching potential across the academy journey. The methodological techniques used here also serve as an impetus for researchers to adopt a machine learning approach when analysing multidimensional databases.

D1.P14 Identifying motor competence based profiles in children: differences in physical activity, and motivation towards physical activity

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Actual motor competence (AMC) and perceived motor competence (PMC) are facilitating mechanisms for physical activity (PA) (Robinson, et al., 2015, Sports Medicine, 45, 1273-1284). Prior research has shown a positive association between these constructs, but with varying strength (De Meester, et al., 2020, Sports Medicine, 50, 2001-2049). Many studies employ a variable-centred approach, raising questions about the collective impact and individual-level combinations of AMC and PMC levels. Therefore, the present study used a person-centred approach to develop motor competence based profiles in children and investigated differences in PA behaviour and motivation towards PA between profiles. Following institutional ethics approval and parental informed consent two hundred and sixteen British children (110 boys, 106 girls; 134.4 ± 8.1 cm; 33.3 ± 9.4 kg), aged 7-10 years took part. AMC was assessed using a process measure, through the Test of Gross Motor Develoption-2 and -3 (Ulrich, 2000, Test of Gross Motor Development. TX: Pro-Ed) and a product measure through a composite z-score, of standing long jump, seated 1kg medicine ball throw and 10-m sprint distance. PMC was evaluated using The Pictorial Scale of Perceived Movement Skills Competence (Barnett, et al., 2015, Journal of Physical Activity and Health, 12, 1045-1051) and motivation towards PA using the Behavioural Regulations in Exercise Questionnaire (BREQ) for children (Sebire, et al., 2013, International Journal of Behavioral Nutrition and Physical Activity, 10, 1–9). PA data was collected using accelerometery (ActiGraph-wGT3X, USA). K-means cluster analysis was used to create profiles. Differences in motivation towards PA and PA behaviour were examined using multiple ANCOVAs. Results identified four groups of both divergent levels and convergent levels based on the contribution of either product or process AMC with PMC. Motivation towards PA only differed by profiles that included process and PMC (P =.012). Children with high actual-process and high PMC had significantly higher levels of autonomous motivation than children with high actual-process but low PMC (P =.009). No significant differences were found between PA behaviour and profiles (P =.05). The findings of this study suggest developing the quality and execution of AMC to increase children's motivation towards PA. While no significant difference in PA behaviour was observed, the findings may suggest the effect of AMC and PMC on PA take time to develop. Thus, maintaining AMC and PMC simultaneously may be imperative for shaping children's future PA behaviour.

D1.P15 Impacts of age, type 2 diabetes, and hypertension on plasma neutrophil gelatinase-associated lipocalin and kidney injury molecule-1 after prolonged work in the heat

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Prolonged work in the heat increases the risk of acute kidney injury (AKI) in young men. Whether ageing and age-associated

chronic disease may exacerbate the risk of AKI remains unclear. We evaluated plasma neutrophil gelatinase-associated lipocalin (NGAL) and serum kidney injury molecule 1 (KIM1) before and after 180 min of moderate-intensity work (200 Watts per meter squared) in temperate (wet-bulb globe temperature [WBGT] 16 °C) and hot (32 °C) environments in healthy young (n=13, 22 yrs) and older men (n=12, 59 yrs), and older men with type 2 diabetes (T2D; n=9, 60 yrs) or hypertension (HTN; n=9, 60 yrs). Participants were matched for height, weight and therefore body surface area (young, 1.97±0.12 m2; older, 1.97±0.12m2; T2D, 1.97±0.17 m2; HTN, 1.98 ± 0.12 m2). Body core temperature and heart rate were monitored continuously throughout exercise and recovery, and whole body sweat rates estimated via changes in before to after exercise body mass. Plasma/serum concentrations of NGAL and KIM1 were determined via sandwich ELISA, and values corrected to account for changes in plasma volume. The experiment was approved by the University of Ottawa Health Sciences and Research Ethics Board (H04-17-05). No between group differences were observed for body core temperature nor delta change in body core temperature in either condition (all $p \geq 0.1$). Fluid consumption and whole body sweat rates were similar between all groups when normalized to total exercise time, the percent of body mass loss was also similar between groups (all $p \geq 0.1$). There were no changes in NGAL or KIM1 concentrations following prolonged work in temperate conditions in any group. Despite a similar work tolerance time, the relative change in NGAL was greater in the older group when compared to the young group following exercise in the hot condition (mean difference +82 ng/mL; $p<0.001$). Baseline concentrations of KIM1 were ~22pg/mL higher in the older relative to young group and increased by ~10 pg/mL in each group after exercise in the heat (both $p \leq 0.03$). Despite a reduced work tolerance in the heat in older men with T2D (120±40 min) and HTN (108±42 min), elevations in NGAL and KIM1 were similar to their healthy counterparts. Age may be associated with greater renal stress following prolonged work in the heat. The similar biomarker responses in T2D and HTN compared to healthy older men, alongside reduced exercise tolerance in the heat, suggests these individuals may exhibit greater vulnerability to heat-induced AKI.

D1.P16 Perceptions of strength and conditioning training in child grassroot soccer players "it is like eating vegetables hidden in the food". A dual methodology approach using write, draw, show and tell

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The use of strength and conditioning training in childhood is a hot topic surrounded by myths and misconceptions. Despite scientific evidence supporting the safety and benefits of strength and conditioning training for children, the lack of representation of their voices poses a challenge in designing training programs that meet their specific needs and requirements. Therefore, the purpose of this study was to explore children's views, experiences and perceptions of strength and condition training. Following institutional ethics approval and parental and child consent, children's views, experiences and perceptions of strength and condition training were explored by Write, draw, show and tell (WDST) techniques. Sixteen male grassroots soccer players aged 11-12 years took part in one of three focus groups exploring the topic. Data were analysed following an inductive approach enabling themes to be explored and later deductive analyses using the Youth Physical Activity Promotion model to create pen profile diagrams. Strength and conditioning were frequently associated with muscle growth, coordination, endurance and rest. Enabling factors for strength and conditioning included autonomy, resilience of commitment, physical development, and training opportunities. Lastly, reinforcing factors included social support, social interference, coaches' communication, role models and the ways of implementation. The participants' perceptions and experiences revealed that strength and conditioning are considered a holistic practice and favour integrating it into their soccer training rather than conducting it as a separate session, and this choice is reflected in their enjoyment. Nonetheless, children remain apprehensive about the potential effects of this type of training on their growth. Therefore, providing more information about using strength and conditioning to dispel these myths and misconceptions is essential.

D1.P17 Fitness profiles of Icelandic male youth national squad soccer players

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Purpose: Fitness profiles for athletes in sports have been published regularly for decades, contributing to knowledge of the physical characteristics and fitness levels required to compete at higher levels of sports (Marques et al., 2015). The purpose of the current investigation is to provide up-to-date fitness profiles of male soccer players who are members of Icelandic youth national squads.

Methods: The study was approved by the Ethics Committee of Reykjavik University (the committee does not use ethics codes). Fitness test data were recorded for 243 Icelandic age group male soccer players during 2021 and 2022. Players' results were excluded from the current investigation if their date of birth had not been recorded or any of the 11 tests had not been completed. This left 117 players. Where players had completed all tests on more than one test day, a single set of test results were chosen for the player at random to ensure no player was represented more than once within the data set. The players were classified into four different age categories using age on the date of testing, under 16 years, 16 to 17 years, 17 to 18 years, and 18 years or above. The measurements were height, body mass, body mass index, sitting height, the fastest and the mean of five 30m sprints, the Illinois agility test, vertical jump test, and the Yo-Yo IE2 test.

Results: One-way ANOVA tests were revealed significant differences between the four groups of players for height, body mass, body mass index, sitting height, vertical jump height without arm swing, Illinois agility test speed and distance covered in the Yo-Yo IR2 test ($p \leq 0.004$). Bonferroni adjusted post hoc tests revealed significantly better performance by the 18 years and older players for all of these tests except body mass index than for those aged under 16 ($p < 0.05$) and 16 to 17 years ($p < 0.05$). However, there was no significant difference between the four groups for vertical jump with arm swing allowed, 10m sprint speed or repeated 30m sprint speed variables ($p > 0.05$).

Conclusion: These results can be used as guidance for young soccer players with aspirations to make national age group squads.

References: Marques, M., Izquierdo, M., Gabbett, T., Travassos, B., Branquinho, L. & Tillaar, R. (2015). Physical Fitness profile of Competitive Young Soccer Players: Determination of Positional Differences. International Journal of Sports Science & Coaching. 11. 10.1177/1747954116667107.

D1.P18 In the palm of the hand: comparing hand-held and stand-alone Bioelectrical Impedance Analysers for measuring body composition in adults

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For adults living with overweight and obesity, home-based exercise can be preferential to community-based exercise (Power et al., 2022, International Journal of Environmental Research and Public Health, 19, 12831). Despite this, the standard home environment has limited access to portable, research grade, valid and reliable tools to measure physiological change. Improved access to measures such as body mass and body composition can contribute towards increased exercise behaviour and progress recognition. Therefore, the aim of this study was to determine the reliability of the Biody XpertZMII hand-held bioimpedance analyser (eBIODY, La Ciotat, France. (Biody)) and concurrently validate the device against the Tanita MC-780MA S smart scale (Tanita inc, Tokyo, Japan. (Tanita)). Following institutional ethics approval and informed consent, ten adults (n = 6 female, mean age and SD: 27.4 ± 4.4 years) undertook one data collection session, measuring Body Fat Percentage (BFP, %), Body Fat Mass (BFM, kg), Fat Free Mass (FFM, kg) and Soft Lean Mass (SLM, kg) using the Biody and Tanita. Due to the handheld design of the Biody, participants conducted these measurements with clear guidance from the researcher. Comparatively, the Tanita was operated solely by the researcher. Coefficients of Variation (CV) and Intraclass Correlation Coefficient (ICC) with 95% Confidence Interval were calculated to determine reliability of the Biody. Bland-Altman repeated measures analysis was performed and plotted for comparison against the Tanita, to determine Biody agreement across all four body composition measures. Reliability results are as follows: 1) BFP, average CV: 0.015%, ICC: 0.997; 2) BFM, average CV: 0.015%, ICC: 0.998; 3) FFM, average CV: 0.004%, ICC: 0.998; 4) SLM, average CV: 0.005%, ICC: 0.999. Bland-Altman analysis to determine Biody validity against the Tanita revealed that all four body composition measures had good agreement with the following low bias': BFP: 2.17, BFM: 1.736, FFM: -1.768, SLM: -1.535. Across the full data set of 100 Biody measures, incidence of failure rate: 13%. Incidence of failure rate for the full data set of 30 Tanita measures: 0%. Findings suggest that the Biody produces reliable readings across the four body composition measures and is a valid tool for measuring BFP, BFM, FFM and SLM. Provided that standardized operating procedures are followed correctly, we can conclude that the Biody can be used to assess some measures of body composition in the home environment. Future work should qualitatively assess Biody usability and investigate whether participant anthropometrics, such as height, influence measurement success.

D1.P19 Comparison of methodological quality assessment tools: Application to exercise physiology studies

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Methodological quality appraisal tools vary in terms of the number of questions posed and the range of aspects considered (Buccheri and Sharifi, 2017, World Views on Evidence-based Nursing, 14, 463–472). Consequently, quality ratings from conventional assessment tools may differ, resulting in inconsistent appraisals of the scientific literature. Therefore, the aim of this study was to compare methodological quality ratings and their subsequent effect upon critical appraisal. Following ethical approval, methodological quality assessment of 66 studies for a systematic review (relating to age, sex and peak oxygen uptake) was undertaken. Ratings were obtained using four common appraisal tools; National Institute of Health Quality Assessment Tool (QAT; https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools); Downs and Black (D&B; Downs and Black, 1998, Journal of Epidemiology and Community Health, 52, 377-384); Qualsys (Kmet et al 2004, Alberta Heritage Foundation for Medical Research) and Joanna Briggs Institute (JBI; Moola et al, 2020; JBI Manual for Evidence Synthesis). Assessments were divided between four reviewers with a moderation process confirming agreement. Assessments were scored out of 8, 18,12 and 8 points, respectively, expressed as a percentage and rated as poor (<50%), fair (50-64%), good (65-80%) or excellent (>80%). The distribution of studies in each category and the ratio between scores of <64% (poor/fair) to >65% (good/excellent) were determined. One-way analysis of variance (ANOVA) was undertaken to determine whether differences in percentage score existed between scales. There was a significant difference in quality scores between tools (P=0.032; ES=0.09) with JBI being greater (80 ±16%) than QAT (69 ±17%; P<0.001) and Qualsys (72 ±11%; P<0.001), but similar to D&B (78 ±12%, P=0.058). The distribution of studies within each rating category varied between scales. NIH and JBI demonstrated similar poor/fair to good/excellent ratios (~35:65) as did D&B and Qual (~15:85). Most appraisal questions were addressed by over 87% of studies.

Questions regarding trial randomisation, inclusion/exclusion criteria and discussion of confounders were less frequently reported (66, 56, 50% of studies, respectively). Questions regarding reporting of actual P values and justification of sample size were infrequently reported (32 and 30% of studies, respectively). Although each tool elicited mean scores equivalent to 'good', differences existed in percentage scores and distribution of poor/fair and good/excellent ratings, likely due to the specific questions posed. The specific tool used in assessing methodological quality, and the elements addressed, should therefore be considered when interpreting appraisal ratings. All elements of such appraisal tools should be considered in conjunction with scientific writing.

D1.P20 Determination of training load and intensity for junior swimmers through the measure of blood lactate levels

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Swimming coaches need to determine athletes' training zone depending on their times and physiological parameters such as cardiac frequency (CF), ictus frequency, and blood lactate levels (BLL) (Brackley, V. et al., 2020, Journal of Sports Sciences, 38, 2532-2542), establishing load intensities for each training period, and this is especially important for junior swimmers (14-17 years), who need to prepare for competition performance. The aim of this work was to determine the anaerobic threshold of junior swimmers and its relation with training zones in a -7x200 m test, finding the blood lactate levels which, in addition to other products of anaerobic glycolysis, are the cause of fatigue and muscular pain. With institutional ethics approval, this research used a descriptive analysis applied to a group of 10 junior swimmers (4 men/6 women) in Bogotá, Colombia, aged (14.9 ± 1.8) years, (170.5 ± 8.2) cm tall, and (57.7 ± 7.5) kg weight, whose parents signed an informed consent form. All participants had at least three years of elite training experience, had taken part in national swimming competitions, and performed the test in a pre-competitive period. After a 1000 m crawl warming up, swimmers conducted the 7x200 m test in their primary swimming speciality, in such a way that the target-time was informed before starting each series, and assigned depending on the best time in Bogotá for the previous season, T: T+5 for the 7th series, T+10 for the 6th, and so on. After finishing each series, and using a Polar watch and a portable Nova lactometer, respectively, CF and BLL were measured. Resting times for each swimmer were set by the coach, depending on the primary swimming speciality. Test results showed that swimmers reached (96.4 ± 4.6) % of their best times, which is an achievement for athletes, who looked for 95% of their best times. Measures of CF and BLL showed a sustained increase between the first and third series, followed by a small but noticeable decrease in the fourth series, to suddenly increase again for the fifth to seventh series. This behaviour indicates that identifying the anaerobic threshold by the presence of an inflexion point in plots of CF and BLL as a function of swimming distance can be used by coaches to improve lactate resistance for swimmers and boost their performance in short-distance swimming events.

D1.P21 High-Fat Diet and Vitamin D Effects on Contractile Performance of Isolated Skeletal Muscle

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Reductions in skeletal muscle (SkM) health associated with excess adipose tissue exacerbate the adverse effects of obesity on whole-body function and health (Tallis, James and Seebacher, 2018, Journal of Experimental Biology, 221, 13). As such, exploring strategies to offset the adverse effects of obesity on SkM health has been identified as an area of priority; nutritional supplementation in the form of nutraceuticals may be an appealing alternative to current therapeutic strategies that are limited by poor sustainability (Tallis et al. 2022, Biomolecules, 11, 372). Evidence suggests vitamin D (VD) could mitigate adverse effects of obesity on SkM function, however, this is yet to be directly investigated. Therefore, this study used the work-loop technique to examine effects of high dose dietary VD supplementation on contractile performance of isolated SkM. Following institutional ethics and home office approval, female mice (N=37) consumed standard (SLD) or high-fat diet (HFD), with or without VD (20,000 IU/kg-1) for 12-weeks. Soleus and extensor digitorum longus (EDL) (N=8-10) were isolated and absolute and normalised (relative to muscle size and body mass) isometric force and power output (PO) were measured, and fatigue resistance determined. Absolute and normalised isometric force and PO of the soleus were unaffected by diet ($P>0.087$). However, PO normalised to body mass was reduced in HFD groups ($P<0.001$). Isometric force of the EDL was unaffected by diet ($P>0.588$). HFD evoked reduced EDL isometric stress ($P=0.048$) and absolute and normalised PO ($P<0.031$), but there was no effect of VD ($P>0.493$). Cumulative work during fatiguing contractions was lower in HFD treated SkM ($P<0.043$), but the rate of fatigue was unaffected ($P>0.060$). This study uniquely demonstrated that high dose dietary VD had limited effects on SkM contractile function and did not offset the adverse effects of HFD. However, there was non-significant small and moderate effects suggesting improvement in EDL muscle performance and animal morphology in HFD VD groups. Given trends observed, coupled with the proposed inverted U-shaped dose-effect curve, future investigations are needed to determine dose/duration specific responses to VD, which may culminate in improved function of HFD treated SkM.

Posters Day 2

D2.P1 Physical activity and sedentary behavior during school-time among young children in Saudi Arabia

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Higher duration of sedentary behaviour is associated with higher cardiometabolic risk factors, lower self-esteem, and unfavorable body composition in children (Carson et al., 2016, Applied Physiology, Nutrition, and Metabolism, 41(6), S240-S265). On the contrary, higher levels of physical activity (PA) among children have been found to be linked with favorable psychological, cognitive health indicators, and cardiometabolic biomarkers (Poitras et al., 2016, Applied physiology, nutrition, and metabolism, 41(6), S197-S239). School is shown as an important setting for children to engage in PA and reduce sedentary time. In Saudi Arabia, sedentary time and PA during school-time have not been assessed. Therefore, the aim of this study was to assess sedentary time and moderate and vigorous physical activity (MVPA) of young children in Saudi Arabia during school-time. The current study received ethical approval from Ethics Committee of Scientific Research at King Saud University, SA, and parental consent was obtained for all participants. Sedentary time and MVPA were assessed using ActiGraph wGT3X-BT accelerometer worn on the non-dominant wrist. ActiLife v. 6.11.4 (ActiGraph, Pensacola, FL) was used to initialised and subsequently downloaded data as AGD format using five seconds. A total of 179 children (49.2% girls; mean age = 8.1 years) completed ≥ 4 hours for at least three monitoring days. Data in this study were reported as a percentage of time in minutes. Descriptive data were calculated for boys and girls. Analysis of covariance (ANCOVA), adjusted for age and body mass index (BMI), was used to examine any differences in sedentary time and MVPA between boys ang girls. School-time ranged between 290 and 335 minutes. The results showed that 63% of children met the recommended 30 minutes of MVPA during school-time, with a higher proportion of boys (73.6%) compared to girls (52.3%). No significant differences were found in lessons sedentary and MVPA time between boys and girls ($P > 0.05$). Boys and girls spent most of lessons time in sedentary (70% and 68%, respectively). The proportion of MVPA during lessons time were not different between boys (7.8%) and girls (7.1%). During break time, boys spent significantly more time in sedentary (44%) compared to girls (35%). No significant differences were observed in MVPA during break time between boys and girls (28.3% and 28.7%, respectively). The finding suggests that the proportion of sedentary time during school-time is high. Therefore, intervention to reduce sedentary time in young children during school time are required.

D2.P2 From Windsor to Wembley: implementing professional practices into semi-professional football

STUART BRITTON

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Introduction: Each year, 15,000 students enrol on undergraduate Sport Science programs with over 50% expressing a desire to work in elite sport (BASES Career Guide, 2020). However, given the limited number of positions and the competitive job market at the elite level, few graduates go on to work in these environments.

With the growing access to GPS and video analysis technologies in non-league football, an opportunity has arisen for graduates or early career practitioners to gain experience in these practices, or develop their practices in associated fields such as Strength and Conditioning. These clubs can provide opportunities for the testing of new analytical tools in a relatively low-risk, high-reward environment. Similarly, due to a lack of specialist staff, there are opportunities for practitioners to gain hands-on experience in strength and conditioning, injury rehabilitation, recovery strategies, and performance analysis.

Method: This poster presents self-reflections from an early career practitioner working in a semi-professional football club across two seasons. These reflections detail the implementation of GPS monitoring, building a medical department (and return-to-performance pathways) and introducing strength and conditioning practices from the first day of the 2021/22 pre-season through to the 2023 Non-League Finals Day at Wembley Stadium. The study also explores the unique challenges faced by practitioners when working in the non-league environment, and identifies differences between professional and semi-professional athletes. These reflections were approved by the football club prior to submission of this abstract. The support has no conflicts of interest to declare.

Conclusion: These self-reflections provide real perspectives into working in performance sport from a lived experience framework, with open reflections that can provide useful insight to aspiring sport science practitioners.

D2.P3 Supporting ultra-endurance athletes with type 1 diabetes: The Marathon Des Sables experience

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Ultra-endurance athletes with Type 1 Diabetes face numerous challenges. Determining the optimal nutrition plan and insulin treatment for multi-stage events is particularly challenging. Environmental extremes experienced in some

events can increase the demand of this challenge (Rönnemaa and Koivisto, 1988, Diabetes Care, 11[10] 769-773). With institutional ethical approval (P144592), this case study reports on the scientific support provided to a Type 1 diabetic competing in the 37th edition of the Marathon Des Sables; one of the hottest editions of the ultra-endurance event with temperatures exceeding 40°C. An analysis of the nutritional strategies and glycaemic response of the athlete during the event is presented. Scientific support included aerobic fitness testing, pre and post-heat acclimation heat stress tests (exercising at ~60-70% VO2max for 60 minutes in 40°C, 20% relative humidity), a home-based heat acclimation programme and nutritional guidance. The heat acclimation programme successfully increased the athlete's tolerance to hot environmental temperatures (i.e. reduction in body temperature, heart rate and more favourable thermal perceptions in response to a heat stress test). Guidance derived from the post-heat acclimation heat stress test included: (1) to control body temperature, maintain heart rate below 160 beats.min-1 via walk-run strategy and (2) consume 1.2-1.5L of electrolyte solution (Sodium: 1,500mg, Potassium: 250mg; Calcium: 48mg; Magnesium: 24mg per litre of water) and 400-600 kcals per hour evenly split over 15 minute periods. The athlete administered insulin using an insulin pump (Omnipod Insulin pump) and continuously monitored interstitial glucose levels (Dexcom G6) during the event. The athlete completed the race in 47 hrs 2 mins 6 secs. They consumed a total of 12033 kcals (Daily average: 2005±497 kcals), 1767g of carbohydrate (Daily average: 294 ±115g) and 85L of water (Daily average 15.0±7.0L). When racing, their interstitial glycaemic values ranged from 5.4 to 22.1 mmol.L-1. Most glycaemic values (58.4%) (sampled every 5 minutes) were above 14.0 mmol.L-1. The athlete reduced their administered basal insulin levels by 50% for the first two days then increased to normal basal levels for the remaining four days of the race. Even though the athlete successfully completed the race, to assist in better glycaemic management and the consumption of more calories, future performances may be improved by using a closed loop automated insulin delivery system that is lightweight and operates in temperatures above 40°-C. A lighter, more reliable system would also assist in the reduction of additional mass carried by a diabetic athlete in the form of medications.

D2.P4 Correlations between physical activity and commonly reported psychological variables: a systematic review and meta-analysis

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Scope: There is a growing interest in measuring connections between psychological variables (PV) and physical activity (PA) to identify and implement drivers for the promotion of healthier lifestyles, especially among laypeople. We performed a systematic review and meta-analysis including articles reporting correlations between any PV and PA.

Methods: PsycINFO, PsycArticles, SPORTDiscus, Medline, and GoogleScholar were searched between 2005 and 2022. The full study protocol was published in PROSPERO (ID# 175424). Only peer-reviewed articles in English language assessing Pearson's correlations were included. Paediatric (< 13 years old) and clinical studies were excluded. A random effect meta-analysis was completed for PV reported by ≥ 3 studies. Fisher's z transformation was used to estimate 95% CI. Meta-regression and funnel plots were performed to search for source of heterogeneity and publication bias. The SIGN checklist was used to assess study quality.

Results: Thirty-three studies encompassing 19,650 subjects were included. No studies involving professional sport performers or RCTs were retrieved. The percentage of females varied from 42% to 100%. Overall, 44 different questionnaires were used assessing 17 different PV. A meta-analysis could be performed for the 6 most reported PV: 20 (60%) studies assessed self-efficacy, 6 (18%) social support, anxiety, self-regulation, enjoyment, and 4 (12%) outcome expectations. The meta-analysis showed pooled correlations of -0.16 (95% CI -0.23 - -0.08) for anxiety, 0.19 (95% CI 0.15 - 0.22) for social support, 0.28 (95% CI 0.17 - 0.39) for outcome expectations, 0.31 (95% CI 0.24 - 0.37) for enjoyment and stronger correlations for self-efficacy (0.35, 95% CI 0.31 - 0.40) and self-regulation (0.36, 95% CI 0.22 – 0.48). Overall heterogeneity was substantial (I2 60 to 91%). Gender was a source of heterogeneity by meta-regression for self-regulation and social support (p=0.001). Funnel plots reflected the heterogeneity, however when the missing studies were imputed using the trim-and-fill method, the overall effect size was similar for observed and imputed studies. Most studies (85%) were considered of high quality.

Conclusions: Correlations between PA and PV mostly regarded the self-influence area and were moderate, bidirectional, and positive. Conversely, anxiety and PA were negatively correlated. Future research should focus on the gender influence on psychological drivers and PA. Due to the possibility of designing studies to promote PA and/or enhance self-influence among laypeople, these areas represent key targets when promoting interventions in the field of exercise psychology. This review can be useful for researcher planning to design interventions affecting PV and PA.

D2.P5 Does a netball specific injury prevention program improve balance?

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Injury incidence in elite netballers is high, with lateral ankle sprains being the most common (7.9%) and anterior cruciate ligament (ACL) injuries the most burdensome (Toohey et al., 2022, Journal of Science and Medicine in Sport, 25, 294-299).

Reduced dynamic balance is linked with increased injury risk in netball. The KNEE Program was developed to reduce ACL injuries in netball, and includes balance, strength, and agility exercises (Netball Australia, 2015, https://knee.netball.com.au/). However, research demonstrating its effectiveness for reducing injuries and improving performance remains limited. Therefore, this study aimed to identify whether there was a change in the dynamic balance of university netballers after completing the KNEE Program, compared to a standard control warmup. Institutional ethical approval (application 35,279) was granted for an interventional study with a pre-post-test design, involving British University and Colleges Sport netballers aged 18-22. Exclusion criteria included absence during data collection and sustaining injury. The intervention group (n = 13) completed the KNEE Program, and the control group (n = 6) completed a standard warmup, 2-3 times a week for 6 weeks. The Y-balance test (YBT) was used to measure balance one week before and after the intervention, with the combined-direction increase (cm) used for data analysis (Wilcoxon Signed-Rank). Within the intervention group, there was a mean increase of 2.78cm (P = 0.137, ES = 0.419) and 2.31cm (P = 0.530, ES = 0.174) for the non-dominant limb (NDL) and dominant limb (DL) respectively. Within the control group, there was a mean change of -0.72cm (P = 0.462, ES = 0.300) and 0.92cm (P = 0.917, ES = 0.043) for the NDL and the DL respectively. These results did not exceed the YBT minimum detectable change (Powden, Dodds and Gabriel, 2019, International Journal of Sports Physical Therapy, 14, 683-694). The difference between the intervention and control groups was not significant for the NDL (P = 0.147, ES = 0.332) or DL (P=0.661, ES = 0.101) (Mann-Whitney U). However, the intervention trended towards improving balance compared to the control, with greater influence on the NDL. Within the parameters of this study, there is currently insufficient evidence to recommend using the KNEE Program to improve university netballers' balance. Considering this study's notable limitations and lack of pre-existing research, further studies should be completed to determine if completing the KNEE Program for a longer period with more participants provides stronger evidence towards recommending the KNEE Program.

D2.P6 Is leaping a missing piece of the rehabilitation puzzle? A biomechanical comparison

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Rehabilitation programmes must be progressive and prepare the musculoskeletal system for daily activity demands, sport performance, and reducing the risk of further injuries. Practitioners and coaches should understand optimal progression pathways, and exercise biomechanical demands. Jumping and hopping are commonly prescribed rehabilitation exercises to develop physical attributes such as strength, power, and balance. Leaping visually looks similar to jumping and hopping, but it is often neglected in rehabilitation. Unlike jumping and hopping, a leap takes off on one foot and lands on the other (Jaffri et al,2017,Int J Sports Phys Ther,12(4),512-519), making it a very functional exercise closely mimicking walking and running. The biomechanics of leaping have not been studied. The aim of the study was to compare lower limb kinematics and vertical forces for jumping, hopping, and leaping with the purpose to inform rehabilitation protocols and progressions. With institutional ethics approval, eight healthy participants (4 females, 4 males, 21±0.4 years old) attended a single laboratory session. Each performed 3 maximum effort jumps, hops, and leaps, of which the trial resulting in highest vertical height of pre-determined pelvic marker was analysed for each task. Vicon Plug-in-Gait determined lower limb kinematics and vertical ground reaction forces (vGRF). vGRF data was captured for single limbs for leaping and hopping, and both limbs for jumping. Mean filtered (Woltering) right and left kinematic and vGRF data were combined and analysed in MATLAB. The movements were split up into two phases: propulsion and landing. Peak hip and knee flexion, hip abduction, and vGRF were significantly greater in jumping compared to hopping and leaping during the propulsion phase ($P<0.05$). During landing, jumping peak hip abduction was greater than leaping ($P<0.05$), and jumping vGRF was greater compared to both hopping and leaping ($P<0.05$). No significant differences were found for peak joint angles or vGRF between leaping and hopping during propulsion or landing ($P>0.05$). The results convey that leaping and hopping produce equivalent kinematics and vGRF. This suggests leaping to have similar biomechanical advantages to that of hopping, thus there is scope for leaping to be implemented into progressive rehabilitation protocols. Leaping may be utilized for patients who struggle to balance when hopping, as moving from one foot to the other is already a natural daily movement. Future research should explore stability and specific joint contributions of the 3 movements on a larger sample to further distinguish and define the role each dynamic movement plays in successful rehabilitation.

D2.P7 Effects of acute caffeine ingestion on cognitive performance before and after repeated small-sided games in professional soccer players: a placebo-controlled, randomized crossover trial

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Soccer is a team sport that requires players to process a significant amount of information quickly and respond with both speed and accuracy to the ever-changing demands of the game. As such, success in soccer depends not only on physical attributes, but also on cognitive abilities such as perception and decision-making (Machado et al., 2020, International Journal of Performance and Analysis in Sport, 20, 1072-1091). Caffeine has been widely used in sports, and studies have shown that it can be effective in improving physical performance (Grgic et al.,

2020, British Journal of Sports Medicine, 54, 681-688) and low order cognitive function (Calvo et al., 2021, Nutrients, 13, 868). Considering the importance of cognitive aspects during the soccer game, the aim of the current study was to investigate the acute effects of caffeine ingestion on cognitive performance before and after repeated small-sided games (SSG) in professional soccer players. After ethical approval, twelve professional male soccer players (29.0 ± 4.1 years; 78.1 ± 7.7 kg body mass) participated in this study. A randomized crossover double-blind placebo-controlled trial with was used. Caffeine (5 mg.kg-1) or placebo were ingested 45 minutes before a protocol consisting of five 5-min SSG with 1 min rest intervals. A computerised version of the Colour Stroop Test (CST) was completed immediately before and after the exercise protocol. The soccer-specific exercise protocol promoted a faster response during the CST (P=0.006, η2=0.54; P=0.003, η2=0.62; P=0.005, η2=0.54; during congruent, incongruent, and neutral, respectively), with no differences on accuracy (P=0.056, η2=0.34; P=0.782, η2=0.01; P=0.662, η2=0.03; during congruent, incongruent, and neutral, respectively). Caffeine ingestion resulted in slower reaction time during the congruent and neutral CST trials, but not during the incongruent trial (P = 0.009, η2=0.53; P = 0.045, η2=0.47; and P = 0.071, η2=0.49; respectively). Accuracy was lower in Caffeine condition in congruent and incongruent trials (P = 0.023, η2=0.86; and P = 0.013, η2=0.85; respectively), but not during neutral trial (P=0.126, η2=0.59). In conclusion, a soccer-specific exercise protocol improved Stroop Test performance in professional soccer players, but acute caffeine ingestion (5 mg.kg-1) was detrimental. Prior research has indicated that the caffeine dosage employed in the current study might lead to enhanced physical performance (Grgic et al., 2020). Nevertheless, considering the importance of the cognitive aspects for overall soccer performance, prudence is needed when administering high doses of caffeine for soccer players.

D2.P8 Effects of arm movements on postural control in normal and modified sensory conditions in young and older adults

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Ageing is associated with "non-functional" compensatory postural control strategies (i.e., lower limb co-contraction), which in turn, may increase the reliance on an upper body strategy to control upright stance. Accordingly, we recently showed that older, compared to young adults, place greater reliance on arm movements to correct postural errors during quiet standing (Johnson et al. 2023, Human Movement Science, 103093). Such arm compensation is likely to compensate for sensory deficits associated with ageing. Therefore, the purpose of this study was to determine whether arm movements influence postural control when standing under different conditions of availability and/or accuracy of proprioceptive and visual information in young and older adults. Following institutional ethics approval, fifteen young (mean ± SD age; 21.3 ± 4.2 years) and fifteen older (mean ± SD age; 73.3 ± 5.0 years) adults performed postural tests challenging different sensory systems (proprioceptive, visual and vestibular) under two arm conditions: restricted arm movements and free arm movements. Mediolateral (ML) and anteroposterior (AP) centre of pressure range and frequency were calculated as indices of postural performance and strategy, respectively. A series of two-way ANOVA's were undertaken to test for the within-subject effects of arm (× 2 [free vs. restricted movement]) and sensory condition (× 4 [standard vs. proprioceptive vs. visual vs. vestibular) on dependent variables. Due to marked age-related differences in postural control, young and older adult groups were analysed separately. There was an increase in ML range and frequency when arm movements were restricted during only the most challenging condition (where proprioception and vision are both challenged) in young adults (p=.019, d=0.83). Older adults experienced greater ML range with restricted compared to free arm movements during all modified sensory conditions (p<.001, d=0.69 to 1.61). The findings presented here provide strong support for an "upper body strategy" complimenting lower limb postural control mechanisms, particularly in older adults. Our results imply that older adults are less equipped to compensate for the distortion of proprioceptive or visual input using other systems, and therefore implement an adaptive upper body strategy to help correct postural errors. From a practical perspective, these findings suggest that allowing free arm movements is a relatively easy task manipulation that could be exploited in physical training to improve balance performance, which may be important for older adults at greater risk of falling.

D2.P9 Methods of measuring the neural activity of adults during exercise: a systematic review

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Background: Over one-third of adults in the UK fail to achieve recommended levels of physical activity and the pressing health and social problems associated with physical inactivity are apparent. Strategies that aim to address this problem have begun to focus on affective responses (feelings of pleasure and displeasure) that occur during exercise, as it is posited that these feelings influence exercise behaviour. Self-report assessments commonly used to assess affective responses may be prone to cognitive biases, but advances in technology have facilitated the use of methods that may offer alternative insights into people's feelings during exercise. Consequently, techniques such as magnetic resonance imaging, electroencephalography, and functional near-infrared spectroscopy have been employed to explore and describe neural activity during

exercise. Although these novel methods may address the cognitive biases associated with self-report assessments, they have led to equivocal results, perhaps because they have been applied and assessed inconsistently.

Aim: This narrative systematic review aims to appraise the methods, measures, and findings of studies that have assessed the neural activity of adults during exercise.

Method: Following institutional ethical approval and pre-registration with the International Prospective Register of Systematic Reviews (PROSPERO), search terms were identified by exploring MESH terms, undertaking preliminary searches, and seeking feedback from four external experts in the field. Fifty-six terms were used to interrogate four databases (SPORTDiscus, MEDLINE, Web of Science, and PubMed) and 56,295 records were identified for potential inclusion in the review. Following importation into Covidence software and de-duplication, 35,218 records were subjected to screening based on inclusion and exclusion criteria identified using the Population, Exposure, Comparator and Outcome (PECO) framework.

Results: The review will consider the similarities and differences in study characteristics such as mode of exercise, participant demographics, technologies employed and implementation techniques, data analysis, and results of associated outcome measures. The reporting of findings within the review will be predicated on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) (Page et al., 2021).

Conclusion: Recommendations for future research will be made to guide the most appropriate methods and protocols for measuring the neural activity of adults during exercise; a better understanding of neural activity during exercise may lead to a deeper understanding of how to improve the exercise experience.

D2.P10 How to describe an integrative neuromuscular training? An ultra-rapid conceptual synthesis

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Integrative neuromuscular training (INT) typically employed in child and adolescent groups, involves a training strategy where motor competence and strength and power development are combined. However, there lacks a consistent conceptualisation of what best describes/defines INT as it is often used interchangeably with other terms such as "neuromuscular training" and "integrated training". There is a growing need for consensus of what INT constitutes in terms of components and modalities, especially when practitioners need to design an appropriate INT intervention for children and adolescents (Sañudo et al., 2019, Applied Sciences, 9, 3839). This study provides an ultra-rapid conceptual synthesis on INT to obtain an operational definition for conducting a follow-up systematic review. This approach was chosen because it employs multiple methodological shortcuts, therefore providing evidence at the time needed. The simple-structured Boolean search was conducted by first author in SPORDdiscus and Google Scholar on 10 April 2023. The key research question is to explore what best describes INT, and eligible studies should include the contents related to describing what INT is and/or is not. Twenty studies were initially identified during title and abstract screening, with two researchers (ML and MC) cross-checking all the 11 uncertain studies. Finally, 18 studies remained after full-text screening due to two studies not having data provided. The conceptual synthesis was conducted by the first author after extracting the data, which were then categorized into "essential attributes" as the first-order constructs and "dimensions" as the second-order constructs. Results were summarized based on "dimensions" emerged during narrative synthesis, which include three themes – INT contents, INT modalities, and INT outcomes. The operational defining work for INT were composed of three aspects: 1) INT is a holistic training concept incorporating general motor competence such as fundamental movement skills, locomotor movements, object control, etc., and specific strength and conditioning exercises, such as dynamic stability, (core-focused/muscular) strength, plyometrics, coordination, speed and agility, fatigue resistance, balance, weightlifting and strengthening exercises; 2) INT is delivered in a progressive way, with an age-appropriate and professional instruction considering individual needs and limitations of children and adolescents; 3) INT focuses on the development of confidence, motor skills, health- and skill-related fitness, injury prevention, cognitive abilities, to foster physical activity participation and support athletic-level sporting performance of children and adolescents. Future research is needed to provide a systematic review on INT as the intervention strategy based on the current synthesis findings.

D2.P11 Cervical range of motion in youth rugby players: a longitudinal study.

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Senior rugby union players have reduced cervical range of motion (RoM) when compared to non-players (Lark and McCarthy, 2007, Journal of Sports Sciences, 25:8). However, the age where changes in functional range of movement begin to occur in a players' career is unknown. Therefore, the aim of this study was to examine cervical RoM over three playing seasons in youth rugby players. Following ethics approval, seventy-one youth rugby players volunteered to take part in this study. Players initially represented under 8 (n=8), 9 (n=10), 10 (n=18), 13 (n=17) and 15 years (n=18) age groups. Cervical RoM in all planes of movement (Flexion-extension; right and left lateral flexion, left and right lateral rotation) was determined pre-(August) and post-season (March) for the 2017-2018 (S1), 2018-2019 (S2) and 2019-2020 (S3) playing seasons. Body mass, standing and sitting height for determination of peak height velocity (PHV; Mirwald et al, 2002, Medicine in Science and Sports and Exercise, 34:4, 689-694) and details of training frequency and any

non-rugby sporting activity were also collected. However, with the advent of COVID19 playing restrictions, post-season assessment for the 2019-2020 season could not be undertaken. Alternatively, cervical RoM measures were determined in May 2021 following removal of playing restrictions, facilitating assessment of CRoM following approximately 12 months of training cessation. Pre- and post-season data were analysed using repeated measure analysis of variance (ANOVA) for each age group. Decreases in left lateral flexion were observed between U9 and U10 (P=0.01) and U9 and U11 (P=0.01). Changes in right lateral flexion were of the same magnitude but were not significant (P=0.06). A decrease in extension RoM was observed for the U15 player cohort which, when players were considered as forwards and backs (at age U17), was due to decreases in forwards RoM only (P=0.03). Following lifting of playing restrictions the decrease in U15 players extension RoM returned to pre-COVID values. The results of this study suggest that decreases in cervical extension RoM observed in senior payers start to be observed in U17 age group forward players once position specific play has been introduced for a few years. However, following a period of reduced physical activity and non-impact-based training or competition, the large reductions in cervical RoM for forwards were able to return to pre U17 values. Future research should focus upon interventions to offset to the reduction in cervical RoM prior to the observed position specific decreases.

D2.P12 Immune response to exercise in sedentary individuals with class I/II obesity, with or without T2DM

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Referred to as the silent pandemic effecting ~ 2 billion adults globally, obesity status was identified as the independent variable to predict disease severity following the emergence of COVID-19. The severity of obese status is dependent on the accumulation of excessive adipose tissue and is the precursor to development of many non-communicable diseases such as cardiovascular disease, cancers, and Type 2 Diabetes (T2DM). Obesity, like T2DM is a health condition which for most is reversible through changes to lifestyle factors such as diet and exercise, though the immunological benefits of exercise in this demographic are less understood.

This randomised control trial (RCT) investigated the effects of a 12-week home based lifestyle intervention on the immune profile in the target demographic (age 18 – 55 years old, BMI > 30 kg•m^2 moderate intensity exercise < 150 min•week), regarding common immune biomarkers associated with obesity and T2DM status to identify possible cell signalling cascades of interest for future investigation.

Designed as an RCT pilot, participants will be randomly assigned to either the exercise and education group or the education only group. An age-matched physically active cohort will also recruited to provide baseline measurements for comparison to results from the intervention and control group. The research is organised and funded by Coventry University. The research has been granted ethical approval by Coventry University's Research Ethics Committee P121068.

Primary variables to be investigated are changes in serum cytokine profile, and plasma IgG, IgA, and IgM along with mass, waist to hip ratio, body composition, flexibility, basal metabolic rate, resting heart rate, resting blood pressure, VO_2max, VO_2peak, maximum power (Wmax), maximum heart rate (HRmax), HbA1c, HDL:LDL ratio, resting blood glucose, and resting triglycerides to identify key physiological changes. Secondary psychological variables include sleep quality (SQS), mental well-being (WEMWBS), exercise enjoyment (AFFEXX), and interpretative phenomenological analysis (IPA) derived from semi-structured interviews to understand changes following engagement with the intervention and contextualise the quantitative data.

Physiological data will be analysed in IBM SPPS ver. 26. Data will be described as mean ± SD. Significance will be accepted at $p < 0.05$.

Results and conclusion pending.

D2.P13 The effect of mat Pilates training on the balance ability of adolescent swimmers

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Swimming is a kind of sport without fixed support in an unstable state, which requires a high level of balance ability for athletes. This study aims to evaluate the effects of Pilates training on balance ability in adolescent swimmers, comprising dynamic (Y Balance Test, YBT) and static (Standing on one leg with eyes closed, SLEC) aspects. We analyzed 16 athletes who have won top 8 in China Youth Swimming Championship: 8 for males and 8 for females, with an average age of 15.3 ± 2.60 years, average height of 1.78 ± 0.90 m, and an average of 5.6 ± 2.10 years of experience in the sport. Participants were randomly divided into Pilates Group (PG) and Traditional Training Group (TG) and were trained 3 times a week during 10 weeks. We collected their balance ability data two days before and after the experiment, and conducted a 2 group (PG vs. TG) × 2 time (pre-test vs. post-test) repeated-measures analysis of variance (ANOVA). Results showed that there was a significant group x time interactions for both SLEC-L [$F(1,14)= 14.53$, $p = 0.002$, $\eta^2p = 0.52$] and SLEC-R [$F(1,14) = 15.27$, $p = 0.002$, $\eta^2p = 0.51$]. PG' s static balance improved significantly,SLEC-L improved from 15.75±6.02 (pre-test) to 80.25 ± 39.04 (post-test) and SLEC-R from 26.25 ± 10.69 to 88 ± 49.44 Compared to PG, TG elevation was not significant, SLEC-L improved from 25.06 ± 9.31 (pre-test) to 27.38 ± 7.98 (post-test), and SLEC-R improved from 29.44 ± 10.53 to 33.75 ± 11.55. The dynamic capacity of the left side of the TG improved from 0.86 ± 0.04 (pre-test) to 0.88±0.04

(post-test). Regarding YBT, there were significant group x time interactions on both left ($F(1,14)= 62.77$, $p < 0.001$, $\eta^2p= 0.82$) and right sides ($F(1,14)= 49.08$, $p < 0.001$, $\eta^2p = 0.78$). The PG improved dynamic balance ability from 0.81 ± 0.04 (pre-test) to 0.92 ± 0.03 (post-test) on the left side, and similar improvements on the right side ($p<0.05$).The dynamic capacity of the left side of the PG improved from 0.86 ± 0.04 (pre-test) to 0.88±0.04 (post-test), while the right side also showed a smaller improvement ($p<0.05$). Collectively, Pilates training could facilitate balance in young swimming athletes. It's suggested that incorporating Mat Pilates training into the daily regimen of outstanding junior swimmers could enhance both dynamic and static balance, thereby improving their athletic performances.

D2.P14 Correlation of body composition and lipid profile in active adult between 30-50 years old of Bogotá

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Scientific evidence suggests that moderate to vigorous physical activity in leisure time can benefit health; conversely, people who engage in continuous physical activity in the workplace may have adverse effects on different health outcomes (Cristi and Rodriguez, 2014, Rev Med Chile, 142, 72-78). The objective of this study is to correlate body composition and lipid profile in an active adult population between 30-50 years of age in Bogotá - Colombia. The study methodology consisted of a quasi-experimental design, with a correlational scope. The sample consisted of 50 active individuals between 30-50 years (28 women and 22 men) classified using the International Physical Activity Questionnaire (IPAQ). After the approval of the institutional ethics committee, the application of the inclusion and exclusion criteria and the signing of the informed consent, the body composition was measured by tetrapolar electrical bioimpedance, and blood lipid profile analysis was performed using the Accutrend Plus equipment by taking a blood sample from the right index finger, obtaining capillary blood with lancets for the analysis of total cholesterol and triglycerides with Accutrend Cholesterol and Accutrend Triglycerides strips. For the study of the data, a univariate analysis was carried out, using descriptive statistics with measures of central tendency and dispersion. The level of statistical significance was set at a value of $p<0.05$, in addition the Pearson statistic was applied for the correlation. Results: The sample consisted of 50 active individuals with an average age of 38.23±7.02, weighing 66.52±11.7 kg; height 1.67±0.1 cm; BMI of 23.89 ± 3.2. Faced with the correlation of variables, moderate-high associations of kilograms of muscle mass with BMI ($r=0.605$ $p <0.05$), systolic blood pressure ($r=0.481$ $p<0.05$) and low percentage of fat ($r=-0.573$ $p<0.05$) and a low correlation between kilograms of muscle mass with total cholesterol ($r=-0.048$ $p=0.74$) and triglycerides ($r=-0.21$ $p=0.14$) were evidenced. Conclusions: We can conclude that the kilograms of muscle mass as a variable of body composition presents moderate to high correlation indices with BMI, fat percentage and systolic blood pressure, however, there is no evidence of a correlation with the lipid profile in active adults between 30 and 50 years.

D2.P15 Experiences and perceptions of exercise provision among individuals with Cystic fibrosis and their healthcare professionals

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Physical activity (PA) is recommended as part of routine Cystic Fibrosis (CF) care, which should include assessment of exercise capacity, exercise prescription and monitoring, PA support and promotion [1]. However, there are no guidelines for the staffing or competency requirements for exercise provision in CF care. There is an increase of exercise professionals working in healthcare, although roles, responsibilities and titles vary across the UK. This study aimed to explore experiences and perceptions of exercise provision among people with CF (PwCF) and their healthcare professionals (HCPs) to identify the status of the exercise-science based workforce in the NHS. Participants were recruited via social media and established networks (Cystic Fibrosis Trust, Association of Chartered Physiotherapists in CF). PwCF (≥18yr) and HCPs receiving and delivering CF care in the UK completed separate online questionnaires relating to exercise provision in CF, as part of a clinical service evaluation, ethical approval was therefore not required. HCPs (n=29) representing adult (n=17), paediatric (n=10) and combined (n=2) CF centres across England (n=22), Scotland (n=2), Wales (n=3) and Northern Ireland (n=1) responded, with one not providing their region. Individuals responsible for exercise provision within their centres completed the survey, 4 were exercise professionals of various job titles (CF Exercise Therapist, Exercise Practitioner, Physiotherapy Technical Instructor, Physiotherapy Technician), the remaining 25 were CF physiotherapists. Physiotherapists were responsible for exercise provision in 23 centres whilst specialised exercise professionals were reported in 6. Qualitative responses suggest that having dedicated exercise professionals may improve services; "Specialist exercise practitioner to focus on exercise testing/exercise prescription/health promotion" (HCP, 19). Respondents reported wanting further

training in exercise provision (n=22), with 6 not wanting further training and 3 unsure. PwCF (n=74, 43 female) from England (n=54), Scotland (n=17), Wales (n=3) completed the survey. When asked if their CF centre has a dedicated exercise professional (in addition to physiotherapists) 26 respondents did, however, 28 were unsure and 20 reported not having an exercise professional. PwCF (n=43) reported that having exercise professionals within their care team would useful with 5 respondents thinking it would not be useful. There is a growing number of exercise professionals working in CF care and although these roles appear to be valued there is a lack of standardisation. Both PwCF and their HCPs reported a desire for further training for existing staff and/or the addition of exercise specialists to improve exercise provision in CF care.

Reference

1. Williams et al. (2022) doi:10.1177/14799731221121670.

D2.P16 Shuttle Time for Seniors: The Impact of an 8-Week Structured Badminton Training Intervention on Markers of Healthy Ageing and Evaluation of Lived Experiences

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Maintaining physical function, independence, and quality of life are important facets of successful ageing. Given unprecedented growth in the older adult population, promoting healthy ageing is a public health and economic priority. Sport as a physical activity opportunity for older adults is not widely explored and research focused on developing and evaluating the efficacy of age-appropriate sports interventions is sparse. As such, the present study evaluated the efficacy of an introductory 8-week badminton intervention, designed specifically for older adults on physical and psychological factors important to healthy ageing. Following ethics approval and informed consent, this two-part study employed a mixed methods approach, where in the first part 43 participants (14 female; mean±SD; age: 70±7 yrs.; height; 170±9 cm; body mass 77±14 kg) were assigned to either a control group (N = 20) or an intervention group (N = 23) and completed pre-post assessment of functional fitness, cognitive function, badminton-specific skill and self-efficacy for exercise. Participants in the intervention group completed the Shuttle Time for Seniors (STS) programme, designed specifically for this study. In the second arm of the study, focus groups with 18 participants were conducted to understand the lived experiences of the STS intervention. Objective data were analysed using two factor mixed model ANOVA and inductive thematic analysis was used to evaluate information gathered in the focus groups. When compared to control, participants that completed the intervention increased upper body strength (P=.022; g=.32), aerobic capacity (P=.005; g=.34), coincidence anticipation time (P<.006; g>.56), short serve performance (P=.008; g=.910) and self-efficacy for exercise (P=.004; g=.503). Objectively improved physical and cognitive function were corroborated by an increase in perceived benefits in thematic analysis of focus groups. Furthermore, participants indicated that the intervention was appropriate and well-structured for the target population, where the age-appropriate opportunity to participate in badminton, with likeminded people of similar ability was a primary motivator to engagement. Participants indicated that further coaching on technical and tactical elements would facilitate longer term engagement. Despite a willingness to continue playing badminton, participants indicated that the lack of badminton infrastructure as a primary barrier. In summary, a structured intervention of badminton is effective for promoting healthy ageing, but despite STS being a facilitator to engagement in the sport of badminton, there is a need to overcome important barriers to long term engagement.

D2.P17 The association between physical outputs and match outcomes across different playing styles for a professional second-tier football team across two complete seasons

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A team's strategies and tactics can play an important role in determining the outcome of a match (Yiannakos and Armatas, International Journal of Performance Analysis in Sport, 6, 2006); however, only one study is known to have examined physical outputs and match outcomes in professional football (Rhodes et al. 2021, International Journal of Environmental Research and Public Health, 18, 9913). The purpose of this study was to measure the association between physical outputs (distance, decelerations, accelerations) and match outcomes (win, draw, lose) in professional football. This research also, for the first time, examined whether the same association is influenced if a team adopts a possession or transition-based playing style. With institutional ethics approval, 36 elite-outfield football players from an English Championship team participated in the study. Total distance, accelerations and decelerations were collected for all individual players during each match using a wearable GPS system (Vector, Catapult, Australia) and analysed using Catapult software (Openfield, 1.21.1). The playing style (possession-based or transition-based) and formation (4-3-3, 3-4-3, 3-5-2, 4-2-3-1) utilised for each match were documented over the 2020–2021 and 2021–2022 seasons. Differences in distance, accelerations, and decelerations across matches with win, draw and loss performance outcomes were examined using Hedges' g corrected effect size. A univariate ANOVA was conducted to analyse the effects of the parameters on match outcomes. Results showed no significant differences between match outcomes for each physical output metric. There was a trivial effect size shown for all conditions except decelerations, with win/lose having a moderate effect size (g =

0.53). When playing a possession-based playing style, no significant difference or non-trivial effect size was found for any physical output and match outcome. When playing a transition-based playing style there was a moderate effect size found for win/draw ($p = 0.38$, $g = 0.90$) and win/loss ($p = 0.98$, $g = 0.64$). This paper makes an important contribution to the knowledge base surrounding physical outputs and their associations with match outcomes. Additionally, this paper examines different playing styles and how these impact physical metrics during match play. These findings have important implications for practitioners who are supporting a team that play a transition-based playing style. This research provides evidence for utilising intense deceleration actions as a physical KPI during match play for teams adopting a transitional playing style. Subsequently, training interventions should be adopted to physically prepare players to complete and sustain these intense deceleration actions during match play.

D2.P18 The impact of exercise intensity on inhibitory function among young male adults with obesity: an event-related potential (ERP) study

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As one of the crucial subcomponents of cognitive function, inhibitory function plays a critical role in maintaining a healthy weight and preventing the acceleration of obesity (Lavagnino et al., 2016, Neuroscience and Biobehavioral Review, 68, 714-726). However, several studies have shown that inhibitory control is impaired in obese individuals (Prickett, Brennan and Stolwyk, 2015, Obesity Research and Clinical Practice, 9(2), 93-113). Increasing number of studies have found that acute aerobic exercise could facilitate inhibitory function, but the impact and underlying mechanisms of exercise intensity on inhibition among obese adults are still unclear. This study aimed to explore how the intensity of acute aerobic exercise affected behavioral (reaction time and accuracy) and neural (N2 and P3 average amplitudes) measures of inhibition. The present study was approved by the institutional review board. Eighteen obese young male adults [body mass index (BMI): 34.60 ± 4.21 kg/m^2, aged 24.50 ± 5.13 years (Mean ± SD)] participated in a series of 30-min, acute aerobic stationary cycle exercise with various intensity levels, including low [40%-50% maximal Heart Rate (HRmax)], moderate (65%-75% HRmax), and sitting rest sessions separated by one week in a counterbalanced order. Fifteen-mins following each session, the Flanker task and EEG recording were performed. A 3 session (low-intensity vs. moderate-intensity vs. control) × 2 congruency (congruent vs. incongruent) repeated-measures analysis of variance (ANOVA) was utilized to analyze data. Results showed that there was no significant difference in Flanker task performance among three sessions. Participants in the congruent condition exhibited shorter reaction time (474.39 ± 9.92 ms vs. 543.73 ± 12.34 ms) ($P < 0.001$) and higher accuracy (97.90 ± 0.90 % vs. 94.90 ± 1.20%) ($P < 0.001$) than those in the incongruent condition. Increased N2 amplitude (-0.54 ± 0.78 μV vs. 0.92 ± 0.87μV)($P < 0.05$) and decreased P3 amplitude (-0.49 ± 0.87 μV vs. 1.86 ± 0.86 μV) ($P < 0.05$) were observed in the moderate-intensity session than in the control session. The results of the present study indicated that moderate-intensity acute aerobic exercise only impacts neurophysiological performance of the inhibitory function in the study population. Specifically, more attentional resources in earlier processing stage and more efficient perceptual discrimination as well as conflict resolution processing in the late phase were allocated.

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