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The intergenerational effects of parental physical activity on offspring brain and cognitive development: a scoping reviewS. Valkenborghs^a, P. Dent^a, C. Stillman^b^aThe University of Newcastle, Australia^bUniversity of Pittsburgh, United States of America

Introduction: Maternal preconception and prenatal health behaviours (e.g., diet, alcohol consumption, smoking, etc.) impact offspring neurodevelopment. Physical activity (PA) has been linked to improved maternal health during preconception, pregnancy, and postpartum and reduced risk of pregnancy complications. PA not only helps to improve physical health but can also enhance brain health and cognition across the lifespan. Accumulating evidence in animal models suggests PA also has intergenerational effects on brain health and development. That is, parental PA levels—both preconception and during pregnancy—can affect offspring brain health. The extent of evidence of these effects in humans is unknown. This scoping review aimed to compile the human literature, identify knowledge gaps, and make recommendations for future human research in this area.

Methods: We conducted a systematic literature search of PubMed, MEDLINE, Embase, Cochrane Central, and PsycINFO for studies conducted in humans and published in English from database inception to 9th December 2021. Experimental or observational studies were included that reported data on parental PA exposure preconception (fathers and mothers) or prenatally (mothers only) in addition to data on offspring brain and cognitive development. Two reviewers independently screened studies for inclusion according to predetermined criteria. Data from included studies were extracted by one reviewer and verified by a second, including study characteristics, parental characteristics, offspring characteristics, parental PA exposure, offspring neurocognition, and key findings.

Results: Fourteen articles were included reporting results from six experimental (sample size $n=18-336$) and eight observational (sample size $n=65-74,971$) studies. All (100%) studies reported on maternal characteristics, whereas only one (7%) study reported on paternal characteristics (but not PA). Maternal PA exposure was prenatal only in 11 (79%) studies (100% of experimental studies and 63% of observational studies), while preconception and prenatal PA exposure was reported in three (21%) studies (38% of observational studies). Outcomes of offspring brain and cognitive development included brain activity (electroencephalography), neurodevelopment, communication, behaviour, verbal IQ, academic performance, and intelligence. Offspring follow-up was during the neonatal stage ($n=2$, 14%), infant stage (1-2y) ($n=7$, 50%), early childhood (4-7y) ($n=3$, 21%), late childhood (8-10y) ($n=2$, 14%), and young adulthood (17-21y) ($n=1$, 7%). Maternal PA exposure was positively related to offspring brain and cognitive development as neonates (2/2 studies) and infants (5/7 studies).

Discussion: Despite extensive evidence from animal models, little is known about the intergenerational effects of parental PA on offspring brain and cognitive development in humans, particularly paternal preconception PA. Emerging evidence is promising but more experimental and large prospective observational studies with offspring follow-up into late adolescence and young adulthood are needed. More objective and/or mechanistic assessments (e.g., event-related potentials, magnetic resonance imaging, neurotrophins, etc.) are also required as most existing evidence is based on subjective measures.

Impact and application to the field: While substantial literature from animal models indicates the benefits of PA on brain health and cognition can be intergenerational, evidence of such effects in humans is scant.

Conflict of interest statement: My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract.

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Parental influences on physical activity and sport participation amongst adolescent girls from Culturally and Linguistically Diverse backgroundsN. Dennaoui^a, G. Kolt^b, J. Guagliano^b, E. George^a^aSchool of Health Sciences, Western Sydney University, Australia^bSchool of Health Sciences, Western Sydney University, Australia

Introduction: Despite known health and social benefits associated with regular physical activity (PA), participation rates in PA and sport decline rapidly during adolescence, particularly for girls. Some literature suggests there are steeper declines in PA and sport participation among those from Culturally and Linguistically Diverse (CALD) backgrounds, particularly those of Middle Eastern backgrounds. Parents can play an important role in influencing PA and sport participation of adolescent girls (e.g., positive role modelling). However, limited research has been conducted on the influence that parents from Middle Eastern backgrounds have on their daughters' PA and sport participation.

Methods: A total of 18 adolescent daughters (mean [\pm SD] age = 15.5 ± 0.7 years) and 9 parents (7 mothers, 2 fathers; 45.11 ± 7.56 years) of Middle Eastern background residing Greater Western Sydney were included in this qualitative study. Semi-structured focus groups ($n = 5$) and individual interviews ($n = 4$) were conducted to explore the perceptions and attitudes regarding PA and sport participation of parents and adolescent girls from Middle Eastern backgrounds, with references to culture, religion, and family. A thematic analysis, using an inductive approach, was used to analyse the data. Data analysis was conducted using Quirkos software.

Results: Participants reported barriers and facilitators to girls' PA and sport participation. A total of three main themes, family, social support, and religion and culture, and 14 subthemes emerged. The theme family encompassed the following subthemes, gender roles and expectations, education as a priority, family responsibilities, and family reputation and representation. The second theme, social support included was identified as both a barrier and facilitator to PA and sport participation. For example, family, peers, and schools were identified as positive influences on girls' PA engagement, yet girls also perceived family to be a barrier at times, along with technology and social media. The theme of religion and culture comprised subthemes of religion as a barrier, appearance and clothing, interactions with the opposite gender, religion as a motivator, and cultural expectations and representation. Many of the factors associated with religion and culture were perceived to be both barriers and facilitators PA and sport participation.

Conclusion: The current study explored the perceptions of parents and adolescent girls from a Middle Eastern background, on PA and sport participation. Family, social support, culture and religion were identified as the main factors that shape both parents and adolescent girls' attitudes and perceptions towards PA and sport participation.

Impact/Application to the field:

- This study can be used to inform culturally tailored PA interventions for adolescent girls and their parents.

- Future research should consider actively engaging parents and highlighting elements of culture and religion to promote PA participation among Middle Eastern adolescent girls.

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Is pre-season physical screening a waste of time? Just ask the coaches

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Introduction: Coaches are usually central to team performance and player selection, however, their observations and judgements may be also be useful to the medical team where functional screening for injury prevention and recovery typically occur. This study aimed to assess whether soccer coaches' assessment of their players' physical skills is associated with the players' physical performance on formal performance testing during pre-season.

Methods: Soccer players were rated subjectively by two coaches independently. The coach's subjective rating applied their expert opinion to score different movements and skills of the soccer players (technical, tactical, physical and psychological). Each player was rated out of 100, as compared to the coach's perceptions of the world's leading players in those positions. The ratings were the mean of two coaches' observations to produce one rating for each participant. The Intra-class Correlation Coefficient (ICC) was utilised to assess the reliability of the inter-coach ratings. Player scores on four common functional tests were evaluated by team medical staff independently of the coaches' ratings. The four functional tests assessed were the Y-balance test (normalised anterior, posteromedial, and posterolateral), triple medial hop, triple forward hop, and hexagon agility test. Decision tree analysis was deployed to determine: 1) How closely coaches' ratings of physical aptitude are associated with functional testing scores. 2) What cut-off values best discriminate between higher and lower coach ratings.

Results: Sixty-three male professional soccer players (23.08 ± 1.34 years) from the Saudi Professional League volunteered to participate. The ICC values ranged from 0.73 to 0.79. for the coach ratings of physical skill, indicating good to excellent agreement between the coaches. The tree model demonstrated that functional performance scores and coach rating of physical skill agreed in 86% (54/63) of ratings, 88% precision and 91% recall. The confusion matrix shows that the algorithm using functional testing scores correctly rated 88.4% of players classified as high physical performers by their coaches, and 80% of lower-rated players. The decision trees provided cut-off scores where high physical performance ratings from the coaches were given to 42 out of 63 players. The cut-off scores that best discriminated between higher and lower coach ratings were; average bilateral anterior normalised Y-balance test greater than 63.7 cm, and average bilateral triple medial hop between 408.3 cm and 481.7cm; and average bilateral posterolateral normalised Y-balance test greater than 88.2 cm.

Conclusion: Qualitative judgement of physical skill by coaches closely matched independently measured functional performance tests in this study. Findings from this study could be used to assist in player selection and preparation criteria.

Impact and application to the field:

- Both general and sport-specific player capabilities can be evaluated through physical testing.
- Sporting teams should take advantage of the coach rating scales of soccer players to enhance player return to play post-injury.

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The impact of high intensity resistance training on low back pain disability: a systematic review and meta-analysis

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Introduction: Low back pain (LBP) is a leading cause of disability and lost work time worldwide. Exercise is recommended by clinical practice guidelines for reducing symptoms of LBP. Resistance training is commonly used due to the hypothesis that it improves function. High Intensity Resistance Training (HIRT) is used in some clinical settings with the aim of increasing strength to build resilience for functional movement, but no previous studies have established the evidence for this approach. We aimed to assess whether HIRT was as, or more, effective than other forms of rehabilitation or no intervention on reducing disability and pain in adult populations with LBP.

Methods: This systematic review and meta-analysis examined randomised controlled trials of adults with non-specific LBP of any duration. Trials were included if the primary intervention was HIRT (any comparator was acceptable) and if they included disability and pain outcome measures. Two team members independently completed all screening and data extraction. Four meta-analyses examined the effect of HIRT on disability, comparing HIRT to other exercise and to physiotherapy at discharge and 6-12 month post-treatment using standardised mean difference. Two meta-analyses investigated with effect of HIRT on pain, comparing HIRT with other exercise at discharge and 6-12 months post-treatment using mean difference. Standardised mean difference [SMD] (or mean difference [MD] when outcomes were consistent) were used for comparisons, and GRADE was used to assess the quality of evidence.

Results: Nine randomised controlled trials met inclusion criteria (n=821 participants). The risk of bias of the studies was low to moderate (PEDro scores 3-7/10, median 6), with weaknesses in the reporting of interventions, comparators and adverse events. HIRT interventions consisted of whole-body exercises, multimodal training or progressive resistance training. Moderate to high quality evidence from four meta-analyses found that high intensity resistance training is as effective as other exercise or other therapy for reducing disability in patients with chronic LBP (SMDs ranged from -0.16 to 0.06). High quality evidence from two meta-analyses found that high intensity resistance training was more effective at reducing pain when compared to other exercise (MDs 0.50 and 0.51) in chronic LBP, however the differences in pain reduction between interventions may not be