

clinically meaningful ($\leq 1.5/10$). No studies investigated acute or sub-acute LBP.

Discussion: This review found that high intensity resistance training is as effective as other treatment or other exercise to improve disability outcomes for people with chronic low back pain, and potentially more effective at reducing pain symptoms than other exercise. Limitations of this review were that there was a small evidence base (9 studies) and only three included studies with interventions that comprised 100% HIRT, as many were multimodal or graded intensity programs.

Impact and application to the field: HIRT should be considered by clinicians in the treatment of LBP. This review highlights a need for further studies to determine optimum HIRT dosage, as well as investigate acute and sub-acute LBP populations.

Conflict of Interest: We acknowledge we have no conflict of interest of relevance to the submission of this abstract

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(P100157)

Trends and determinants of organised sports participation in immigrant and Australian children: A nine-year follow-up

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Introduction: Organised sports participation brings health benefits to children and adolescents, including physical, psychological, and social health. **However, there is a scarcity of research on specific population groups such as immigrant children. This study aimed to** examine trends and determinants of organised sports participation among children of immigrant parents from low-and-middle-income countries (LMIC), high-income countries (HIC), and Australian children.

Methods: Data were from the birth-cohort the Longitudinal Study of Australian Children aged 6-15 years with follow-up between 2010 and 2018. Organised sports participation was measured using two items about regular participation in team and individual sports. Multilevel binominal logit modelling was used to assess the determinants of organised sports participation across groups.

Results: Both team and individual sports participation increased between 6 and 11 years and declined between 11 and 15 years across all groups. Children of immigrant parents from LMIC (OR 0.65; 95% CI 0.57-0.74) and HIC (OR 0.82; 95% CI 0.76-0.89) had lower odds of team sports participation than Australian children. Children of immigrant parents from LMIC had lower odds of team sports participation (OR 0.79; 95% CI 0.69-0.90) than children of immigrant parents from HIC. Female children, high screen time, high psychological difficulties, increased number of siblings and low socio-economic position were identified as determinants of a lower team and individual sports participation.

Conclusion: The present study identified disparities in organised sports participation among children of immigrant parents and Australian children. Our findings can potentially inform strategies to promote equity in organised sports participation of children of immigrant parents from LMIC. Special considerations such as government support (e.g., grants), language support for immigrants with limited English language proficiency and community awareness programs may benefit.

Impact/Application:

- Strategies such as community grant assistance for immigrant families may be of benefit, focusing on children of immigrant parents from LMIC

- Special considerations such as gender-specific strategies to target female children and cultural differences should also be considered in sports participation

Keywords: Team sports, Individual sports, Immigrant, Children, LMIC, HIC

Declaration of interest statement

No conflict of interest.

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(P100163)

Quantifying trunk stability and establishing evaluation criteria during core training using inertial sensors: a research protocol

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Introduction: Emerging evidence suggests core stability is an important factor in high performance in sports. Although many clinical assessments of core stability exist, there is a lack of consensus on the most effective core exercises and their impact on specific sports strength and conditioning. The objectives of this study are to 1) determine a simple method to objectively quantify the trunk stability during core training, and 2) to evaluate the credibility of the core assessment criteria) using both qualitative and quantitative aspects.

Methods: The first part of the study established a method for quantitatively evaluating trunk stability using several inertial sensors (SABEL Sense), a 3D motion capture (OptiTrack), and a data analysis system (Motive). SABEL Sense is a wearable inertial sensor consisting of a tri-axial accelerometer, gyroscope and magnetometer developed within the SABEL laboratory at Griffith University. The motion capture (Mocap) data was recorded by 3 cameras (Flex3; OptiTrack) placed on the ground, and 12 cameras attached to a 3m height frame. The second part of the study evaluated core assessment criteria (pelvic tilt and rotation angles, etc.) during core training. Sixteen male healthy sub-elite soccer players (middle of the season) between 20 and 39 years old participated in this study (Institutional ethics approval no is 2022/135).

The participants performed three basic core training: plank, side plank, and one-legged bridge, and trunk stability was analyzed during these three training. These assessments consisted of both static and dynamic components. The static training required the participant to hold a neutral spine position for 20-seconds. The dynamic training required extending/abducting their leg five times with constant-tempo (70 bpm). Different ankle weights were used during the dynamic assessment (zero, 2kg, and 4kg) in each leg while trunk stability was recorded.

Results: Strong correlation between the Mocap data and inertial sensor data demonstrated that accurate measurements using inertial unit alone were possible. The average pelvic tilt angle calculated from the Mocap data during static plank showed a mean value of 17.0 degrees (10.8-21.1). The relative angle change during plank with right leg extension using zero, 2kg, and 4kg ankle weight showed a mean value of 16.5 degrees (16.3-16.8), 19.7 degrees (15.6-22.0), 17.7 degrees (17.5-17.9) respectively. These values correlated with those obtained using inertial sensors.

Conclusion: Wearable inertial sensor is a useful tool same as the Mocap assessment and it is practical to evaluate core stability as a field

level assessment. The relative change of pelvic tilt angle was difference in moving the legs and tends to increase pelvic angulation when increasing ankle weight.

Impact/Application to the field: The method might be useful for prevention of various musculoskeletal conditions such as low back pain and muscle strain, and for assessing the effect of rehabilitation. In addition, this method will help establish an evaluation criterion for trunk stability.

A conflict of interest statement: The authors of this abstract have no conflicts of interest to declare.

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Movement variability in runners with a current or recent musculoskeletal injury: a systematic review

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Introduction: The abundant degrees of freedom available in movement result in the inherent variations observed in the performance of a repetitive task, i.e., movement variability. Emerging evidence suggests that identification of deviations in gait parameters of pathological vs. healthy runners could advance our current understanding of overuse injury mechanisms in running related injuries. To date the relationship between running biomechanics, variability and injury remains unclear. The purpose of this review was twofold: (1) to examine the impact of musculoskeletal injury on running gait variability; and (2) to identify potentially maladaptive variations in movement variability by identifying any common deviations that occur in injured populations.

Methods: Medline, CINAHL, Embase, Cochrane library and SPORTDiscus databases were searched until February 2022. Studies were eligible for inclusion if they: (a) examined adult participants (≥ 18 years old) with a current or recent history of lower limb or lumbopelvic injury; (b) collected running 3D biomechanics data; (c) compared movement variability data for at least one dependent variable to a control group; and (d) provided a statistical between-group analysis of variability outcomes. Exclusion criteria were neurological conditions that may impact gait or upper body injuries. Due to methodological heterogeneity, a meta-analysis of results was not performed in this review.

Results: Seventeen cross-sectional and retrospective case-control studies were included in the summative synthesis. Significant ($p < .05$) differences in variability outcomes were identified in 73% of runners with current injury-related symptoms and 43% of runners who were asymptomatic or had recovered from a recent injury, when compared to a control group. The most common deviations in movement variability identified in the injured groups were: (1) high and low knee-ankle/foot coupling variability and (2) low trunk-pelvis coupling variability.

Discussion: The results suggest that runners with current injury symptoms often display altered gait variability compared to runners who are injury-free. Pain and ankle instability may drive the neuromuscular system to explore alternative movement strategies in these runners, to reduce painful input or protect the injury site. Potential maladaptive running gait strategies identified in this

review were high/low knee-ankle/foot and low trunk-pelvis coupling variability. Relatively high/low variability is proposed to perpetuate overuse injuries related to running, so these findings are of relevance to clinicians who manage active populations. Further comparison of results was limited due to the diverse underlying theoretical injury models and by the substantial number of biomechanical variables used to measure variability outcomes across the studies.

Impact/Application to the field (can be 1-2 dot points):

- Runners who continue to run with injury symptoms often employ altered and potentially injurious movement variability strategies when compared to those who are injury-free.
- Specific maladaptive variables identified in this review can help to direct future researchers investigating the impact of injury on running variability and address the issue of outcome heterogeneity in movement variability research.

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The effect of the Hiroshima GENKI Exercise on the bone strength and cognitive function in elderly people

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Introduction: In Japan, women account for 66% of those requiring nursing care, mainly due to bone weakening such as bone fractures and joint diseases, and dementia (MHLW, 2021). Exercise trainings in elderly people increase bone density and improve cognitive function, contributing preventions in these diseases. Therefore, the purpose of this study was to verify the effects of "Hiroshima GENKI Exercise," which can be performed by elderly people while sitting in a chair, on bone density and cognitive function in elderly people.

Methods: 49 Japanese elderly females (age: 74.5 ± 11.9 years) were randomly divided into the experimental and control groups. The intervention group underwent the Hiroshima GENKI exercise for 60 min once a week over the course of 3-month. The Hiroshima GENKI exercise was designed to apply mechanical loads and vibration to the bones of the whole body. This training was performed through supervised sessions (group training). The Total Score, Delayed Recall, Working Memory, Judgement and Visuospatial Function were measured by using a Gazefinder that Eye Gaze Measurement Instrument, a well-established screening tool for cognitive function. The speed of sound (SOS) as a quantitative ultrasound parameter of bone was measured before and after the 3-month training.

Results: All cognitive function indicators and SOS did not differ between the groups at the before the 3-month training. After the training, the intervention group significantly increased the Total Score of cognitive function and SOS of bone strength ($p < .05$). No significant changes in the cognitive functions of Delayed Recall, Working Memory, Judgement and Visuospatial Function were found in the intervention group.

Discussion: The Hiroshima GENKI Exercise improved total cognitive scores and SOS. A previous study reported that implementation of the same exercises over a 4-month period in persons requiring nursing care showed significant increases in SOS and walking speed (Yanaoka et al.,