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Where are we headed? Evidence to inform future heading guidelines

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Introduction: Football is one of the few sports whereby the head is purposefully used as a key requirement of the game, with the skill of heading taught from a young playing age. There is current scientific and public concern over the uncertainty of short-, medium- and long-term consequences of heading on brain health. Hence, a precautionary approach to mitigate any possible risks is desirable whilst the evidence remains equivocal. One such approach is being proactive about developing and implementing strategies and guidelines that help reduce the burden (volume and intensity) of heading in young and beginner players, which requires integration of a multitude of topics to inform such strategies.

Objective: This narrative review explores the current evidence underpinning strategies that could be incorporated into future heading guidelines to reduce heading burden in players across all levels of football.

Methods: A four-step search strategy was utilised to identify all data-based papers related to heading in football. Eligibility criteria for inclusion: 1) original data; 2) study population included football players, 3) outcome measures included one or more of the following: number of headers, measurement of head acceleration during heading, or head injury incidence; and 4) published in English or an English translation available.

Results: In total, 62 papers were included. Evidence suggests that future heading guidelines should consider the following: 1) Developing a heading coaching framework which emphasises the technical proficiency of heading, 2) greater emphasis on small-sided games, particularly in young players, to limit the total number of headers per week. This is particularly focused on training for players who complete higher numbers of headers in games, whilst also reducing headers from goal kicks and punts. 3) Neuromuscular neck exercises integrated into general injury reduction exercise programs (such as FIFA 11+), 4) enforcement of rules related to deliberate head contact and 5) using lower-pressure match balls.

Conclusion: To mitigate the potential risk of heading on long term brain health, scientific evidence suggests that there are a number of pragmatic strategies that can be incorporated into future heading guidelines. It is also recommended that an implementation and evaluation plan which is co-designed by health professionals, researchers, coaches, players and other important stakeholders is developed in tandem to optimise the potential adherence to, and benefits from, any future heading guidelines.

Impact/Application to the field: This review is the first to outline the current evidence and make recommendations for the inclusion of different strategies into future heading guidelines to reduce heading burden in football players. These results can assist football governing bodies worldwide when drafting and standardising heading guidelines to protect the long-term brain health of current and future generations of players.

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Occupational risk factors for the development of disc herniation in physically demanding occupations: a rapid review

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Introduction: Herniation, also known as prolapse, of the intervertebral discs is a common cause of back pain and sciatica. Risk factors include genetics, trauma, and repetitive activity arising from recreation or working in physically demanding occupations. Disc herniation can limit mobility and the ability to handle and move objects, reducing the capacity to work. The aim of this rapid review was to identify and review studies that reported occupational risk factors for the development of intervertebral disc herniation in physically demanding occupations.

Method: This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), and methods were detailed in a protocol published in advance. PubMed, SPORTDiscus, CINAHL, and ProQuest databases were systematically searched using terms derived from four themes: 'disc', 'herniation', 'work', and 'risk'. Eligible studies were critically appraised with specific tools for each type of study design to assess their methodological quality, and a narrative synthesis of the findings was completed.

Results: Eleven articles were included that reported on physically demanding occupations and occupational tasks. Operators of earthmoving machines with high perceived workload, high vibration, and moderate spinal load were found to experience a greater 12-month incidence of lumbar disc herniation (9.6%) than drivers less exposed to these factors (2.3%; $p=0.012$). Results also revealed that retail workers exposed to biomechanical overload were at an increased risk of lumbar disc herniation compared to those not exposed (aOR=3.82; 95% CI 3.08-4.74). Truck drivers exposed to loading vehicles more than three times per day appear to have a higher prevalence of cervical disc herniation than those loading their trucks less than twice a day; however, this difference was not statistically significant (OR=9.0; 95% CI, 0.4-182.8). Occupational tasks including physical overload, handling heavy loads, self-reported hard work, and exposure to moderate and high levels of manual handling of loads were all associated with increased risk of lumbar disc herniation. Additionally, handling loads with trunk inclination appears to exacerbate the risk.

Discussion: Specific physically demanding occupations and tasks with a high physical workload, a high requirement for manual materials handling, and trunk inclination appear to place workers at increased risk of disc herniation. Occupations which are perceived as involving hard work also appear to increase the risk of disc herniation. Data reporting on cervical spine disc herniations is limited, with most of the research being on lumbar spine herniations.

Impact: The identified factors and tasks known to increase the risk of disc herniation must be carefully managed in staff with existing back pathologies and as part of return-to-work plans.

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A systematic review of participatory engagement in men's health promotion programs.T. Key^a, P. Sharp^{a,b}, C. Grandou^a, L. Wallace^a, C. Caperchione^a^aUniversity of Technology Sydney, Australia^bUniversity of British Columbia, Canada

Introduction: Health promotion interventions have struggled to engage men, with men being on average only 1/3 of intervention participants. Gender-sensitised programs aim to tailor interventions to the needs of men, however, to be effective men need to be involved in the design and delivery of these programs. Participatory engagement provides an opportunity for men and relevant stakeholders to be involved in the design and delivery of health programs. Increasing the use of participatory engagement aligns with recommendations from knowledge translation and implementation science to improve uptake of research in practice. How participatory methods are being used to tailor health programs for men has yet to be explored. The aim of this study was to understand how participatory methods are being used to tailor health programs to men.

Methods: A systematic literature search with no date restrictions was conducted across four databases. Included studies targeted adult (≥ 18 years) men's health-related behavioural change including physical activity, nutritional behaviour, smoking cessation, and/or alcohol reduction. Studies utilised both randomised and non-randomised designs. Risk of bias was assessed for randomised (ROB2 tool) and non-randomised (ROBINS-I tool) control trials. A qualitative analysis of study outcomes and the use of participatory methods was conducted with study variables being collected under 5 categories: study design, intervention, retention, engagement, results. Participatory engagement was mapped using the IAP2 Spectrum of Public Participation. This review adheres to the PRISMA guidelines, the AMSTAR-2 tool, and has been prospectively registered in PROSPERO (CRD42021257719).

Results: Database searches yielded 5025 articles, with 60 studies of 55 discrete interventions meeting the inclusion criteria. Most of the included interventions were theoretically grounded (65%) and the majority targeted a combination of physical activity and nutrition behaviours (67%) followed by physical activity interventions (11%), smoking interventions (9%), alcohol interventions (7%), nutrition interventions (4%) and smoking and alcohol interventions (2%). Of the included studies 65% utilised a randomised control design, 50% indicated that the intervention was tailored to men, and 53% studies indicated some type of participatory engagement with either men (end-users) or stakeholders. Based on the IAP2, participatory engagement methods utilized within studies included consultation (18%; e.g. interviews), involvement (2%; e.g. co-design), collaboration (27%; e.g. community-based facilitators) and empowerment (5%; e.g. community champions).

Discussion: While 50% of included studies reported that they were tailored to men, only 1 in 3 studies reported going beyond consultation to develop and deliver their health program with the men or relevant stakeholders. Further research is needed to understand how health researchers are engaging with end-users and stakeholders. This will help to develop an understanding of participatory engagement's contribution to successful implementation and sustainability of interventions.

Impact and application to the field: Findings from this research may be used to inform the use of participatory engagement methods in men's health promotion to improve engagement, implementation, and scalability of behaviour change interventions.

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Injury and illness profiles in short-course triathletes – A systematic reviewM. Crunkhorn^{a,c,e}, S. Guevara^{a,d}, M. Drew^a, G. Waddington^{a,b}, J. Périard^a, N. Etxebarria^a, L. Toohey^{a,b}, P. Charlton^{a,e}^aUniversity of Canberra Research Institute for Sport and Exercise (UCRISE), Australia^bThe Australian Institute of Sport, Australia^cQueensland Academy of Sport, Australia^dNew South Wales Institute of Sport, Australia^eTriathlon Australia, Australia

Introduction: A clear understanding of injury and illness aetiology and mechanisms in short-course triathletes (standard distance and below) provides a better opportunity to identify high risk subgroups of athletes within the sport and assist in the development and implementation of targeted prevention strategies.

The objective of this systematic review is to synthesise the existing evidence relating to the incidence and/or prevalence of injury and illness within short course triathletes, and to summarise reported injury or illness aetiology and risk factors in this population.

Methods: Studies reporting health problems (injury and illness) in able-bodied and para-triathletes, inclusive of all sexes, ages and experience levels, training or competing in short-course distances were included in this review. Studies were excluded if they reported health problems in non-triathlete populations, in unspecified or longer than short-course distances, did not include epidemiological data, were intervention studies, systematic reviews or non-scientific articles and were not published in English. Six electronic databases (Cochrane, MEDLINE, EMBASE, PsychINFO, Web of Science and SPORTDiscus) were searched using different key-terms. Risk of bias was independently assessed by two reviewers using the Newcastle-Ottawa Quality Assessment Scale. Data extraction was independently completed by two of the authors. Results were reported narratively following qualitative synthesis.

Results: The search yielded 7998 studies, with 42 studies eligible for inclusion. Twenty-three (55%) of the included studies investigated injury, twenty-four (57%) studies investigated illnesses, inclusive of five (12%) studies which investigated both injuries and illnesses.

Injury incidence rates ranged from 15.7-24.3 per 1000 athlete exposures, and illness incidence rates ranged from 1.8-13.1/1000 athlete days. Injury and illness prevalence ranged between 2-15% and 6-84% respectively, with these figures referring to the proportion of triathletes affected by a health problem across differing time periods. The most frequently reported health problems reported in short-course triathletes were: overuse, lower limb injuries that mainly occurred due to running; gastrointestinal and cardiovascular illnesses, mainly attributable to environmental factors (contaminated water); and respiratory illness, mainly caused by infection.

Discussion: The lack of high-quality prospective studies exploring the incidence, aetiology and risk factors for health problems in short-course triathletes has precluded the development of preventative strategies. Effective injury and illness prevention requires identification of accurate injury and illness incidence rates over entire seasons. Future research should focus on optimising performance through targeted