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Musculoskeletal screening for low backpain in gymnasts. A systematic review

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Purpose: Low back pain (LBP) is a common complaint amongst gymnasts and can have negative performance and health implications. LBP can develop due to the physical demands of gymnastic routines. The use of musculoskeletal screening measurements may inform the design of prevention based interventions.

Methods: Literature Search: A systematic literature search was conducted to obtain articles regarding screening tools and LBP from 7 databases from their inception to April 2021 (AMED, CINAHL, EBSCOhost, MEDLINE, Cochrane Database of Systematic Reviews, SPORTDiscus and PEDro). The following terms were searched in all text, abstract and title: (i) Gymnastics AND Lower Back Pain. Reference lists of articles were screened. Study selection: Studies were included if they were (i) full text, (ii) in English language, (iii) used a screening tool, (iv) a gymnastic population, (v) LBP was reported in comparison to gymnasts with no LBP. Studies that utilised laboratory equipment such as force platforms were excluded as they were deemed limited in practical application. Data extraction: Two reviewers independently extracted the following: study design (prospective or retrospective), level of evidence, location of testing, inclusion and exclusion criteria, participant characteristics (age, sex, height, weight); screening tool and/or physical measurements recorded; reliability and validity of screening tool and/or physical measurements, method of LBP collection including retrospective/prospective LBP assessment, LBP definition, statistical analysis of LBP, percentage of missing data or withdrawals, outcome measures and identification of confounders.

Methodological quality: A 20 point scoring system was used for a previously published review on dance screening and injury (Armstrong and Relph, 2018) following permission and was adapted for LBP.

Results: Searching identified 352 studies and titles and abstracts were reviewed to determine which articles required a full text review ($n = 20$). Two articles were eligible for inclusion.

Cupisti et al. (2004) investigated 67 female rhythmic gymnasts and LBP free gymnasts demonstrated lower body weight ($P < 0.05$), BMI ($P < 0.05$), fat body mass ($P < 0.05$) and

waist circumference ($P < 0.01$) than those with LBP. Sweeney et al. (2019) investigated 67 female gymnasts and reported a negative left Thomas test was associated with LBP ($P = 0.03$) and therefore gymnasts with a positive test were less likely to report LBP. Cupisti et al. (2004) achieved a score of 11 and Sweeney et al. (2019) 12 for methodological quality.

Conclusion(s): Limited research exists regarding which screening measurements may relate to LBP. Body weight, BMI, waist circumference and the Thomas test were the only significant findings of the review. With only 2 studies, future research into other screening tools is required, as is more inclusion of male gymnasts and these studies should investigate LBP outside of a laboratory environment to increase their practical application to a sporting environment.

Impact: Body weight, BMI, waist circumference and the Thomas test should be considered in screening protocols when aiming to reduce development of LBP in female gymnasts. These measurements should be prioritised from a LBP prevention perspective when working with gymnasts and can be implemented by coaches and physiotherapists as appropriate.

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