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Potential limitations of the Functional Movement Screen: a clinical commentary

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INTRODUCTION
Athletic injury and its sequelae remain a primary concern of sports professionals globally. As a result, screening athletes to predict injury is of great interest, especially if the screening/testing procedure is non-invasive, effective, and efficient. One such procedure of increasing popularity is the Functional Movement Screen (FMS), which, in 2007, was reported to predict injury in American football players in a single season.1

The FMS attempts to identify fundamental movement patterns that simultaneously measure range of motion, stability, and balance1 and shows moderate evidence for acceptable reliability when deriving a composite score.2 The FMS attempts to take a comprehensive approach to assess human movement and encourages clinicians to look beyond impairments and isolated single joint motion and explore more comprehensive movement patterns representative of those used in daily activities and sport. Considering the growing popularity of the FMS both clinically and in research literature, its merits warrant closer analysis.

STATE OF THE EVIDENCE
A composite score of ≤14 on the FMS is commonly considered the threshold below which an individual is at potential risk of injury. The following paragraphs highlight potential limitations in using this value including lack of consistency among studies; poor sensitivity; and poor post-test decision-making capacity.

The composite cut-off score of ≤14 was first identified by Kiesel et al,4 in their study of 46 NFL athletes. Chorba et al5 performed a follow-up study in 38 Division-I female athletes using the same cut-off score. Both studies were performed in small, homogeneous populations, which limits application across populations. For example, the cut-off score is likely to change in athletes of different sports, genders, skill levels, and maturity levels. The composite score dilemma is further compounded by studies suggesting an alternative cut-off score of ≤17 for studies unable to identify any composite cut-off score associated with injury.6 The inability to replicate consistent findings in subsequent studies undermines the utility of the proposed single cut-off score of ≤14.

A further issue presents itself because the FMS is defined as a ‘screen’, a term typically reserved for tests of high sensitivity. A meta-analysis of six studies evaluating the FMS as an injury prediction tool reported a sensitivity of 0.24 (95% CI 0.15 to 0.36) and a specificity of 0.85 (95% CI 0.77 to 0.91).6 Translated, a sensitivity of 24% suggests that the FMS will be positive in only 24% of athletes eventually suffering an injury. In other words, using the FMS cut-off score of ≤14 will overlook 76% of those who will eventually become injured. This same meta-analysis, calculated the negative likelihood ratio (LR−) to be 0.87 (95% CI 0.82 to 0.92).6 As a screening tool with a reported LR− of 0.87, the FMS fails to rule out a potential injury in individuals scoring >14. These statistics indicate that the FMS is not an effective screen.

An additional caution when promoting the FMS as an injury screen is the variable definition of injury used in studies to date. Epidemiological data about injury is entirely dependent on the definition of injury. Variable injury definitions place individuals in different injury classifications making it difficult to compare findings across studies. For the original Kiesel et al4 study, injury was defined as those on the injured reserve list for at least 3 weeks. In contrast, Chorba et al5 defined injury as (1) occurring as a result of participation in an organised intercollegiate practice or competition setting and (2) requiring medical attention or advice from a certified athletic trainer, athletic training student, or physician. Thus, these two studies produce very different results given their variable definitions of injury.

CLINICAL IMPLICATIONS
To date, methodological limitations and accuracy statistics (sensitivity and LR−) associated with the FMS are enough of a concern that it cannot confidently be used as a screening tool to predict athletic injury. The FMS as a screening tool has been studied primarily in small homogeneous populations meaning that the clinical usefulness should be limited to those same populations. However, even in these limited populations, the sensitivity and LR− are not at a level where the FMS can correctly be labelled a screen. Furthermore, recent studies of the FMS suggest use of a single FMS composite score may be flawed given each individual test of the FMS is relatively independent, each emphasising its own unique construct.7 Whether the FMS as a whole or in part is useful as an outcome measure to assist with return to play decisions remains to be seen and should continue to be investigated. As sports medicine clinicians, we must continue to investigate new, innovative theories through the rigour of high-quality methodological studies, which can substantiate their use. Until such investigations are produced and replicated, clinicians should exercise caution prior to widespread implementation of the FMS into clinical practice as an injury prediction tool.

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REFERENCES

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