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Name of Journal: *World Journal of Orthopedics*

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Manuscript Type: Editorial

Reviewer 505402

Reviewer: This manuscript is ready for publication.

Authors: Thank you. We appreciate your support

Reviewer 1220036

Reviewer: accepted after minor language changes

Authors: Thank you. We appreciate your support and have reviewed the manuscript for language changes.

Reviewer 364821

Reviewer: It's a interesting and practical research in clinical works. But it is an expensive toll. Both SEBT and YBT, which is the best option, still unclear.

Authors: Thank you. We have added a statement in the conclusion to address the authors opinion of the best option between the SEBT and YBT.

"It is of the authors opinion that, while both the SEBT and YBT are reliable tools, the YBT is easier to use from a clinician standpoint."

Reviewer 467045

Reviewer: The authors have conducted a comprehensive and well-researched review of different tests which can be used for injury prediction in sport. There are nearly 100 references and tabulated data to support the discussion.

Author: Thank you.

Reviewer: The main problem I find with this paper is that there are no images or photographs to show the configuration of the tests or the test being performed, and for that reason, I found it difficult to visualise some of the tests. For example, with the SERB Test, it is described as the subject reaching in eight directions whilst standing on one leg, and then later, there are strips of tape on the floor in a grid format and the 'subject reaches as far as possible in one reach direction.' For someone who is not already familiar with these tests (the general orthopaedic readership of WJO), it is difficult to visualise exactly how the test is performed. Therefore, I think that images or photos of the tests are needed.

Author: Thank you for the suggestion. We did not originally add photos as these are readily available and would potentially increase our figures by five. We have added new figures for the FMS, SEBT, YBT, DJST, and TJA; however, if the editorial staff does not want us to include these we will remove them.

There are also some sections which are unclear, mainly in the first half of the paper, as outlined below.

1. Abstract (p 1-2): The phrase 'this editorial' is mentioned three times and sounds a bit repetitive. The authors may want to change one of these to 'this study' or similar.

Author: Thank you for the response. We have changed one of the "this editorial" to "this paper".

2. Introduction, p 3: The authors have defined overuse and acute injury; however, the definitions in reference they cited are not general definitions but are the definitions used in that specific study. I question the use of 'identifiable mechanisms of injury' in the overuse injury definition. For example, in the case of stress fractures, many of the mechanisms are known. I would have said an acute injury is from a single specific traumatic event while an overuse injury is from a repetitive force over a period of time. Can the authors please comment on this?

Author: We completely agree with the reviewer in regards to the "identifiable mechanism of injury" in the overuse definition and that is why it is stated as "without an identifiable mechanism of injury". We also agree with the reviewer in

regards to an acute injury being from a single specific traumatic event in having stated that “acute, defined as a specific, identifiable mechanism of injury”. We believe that we have clearly stated these injury mechanisms in a very similar manner to what the reviewer has suggested.

3. Introduction p 3: The authors should consider explaining non-contact injury better here e.g. an injury not resulting from an externally applied force? An injury from inertial forces or muscular pull? Also, I suggest removing ‘may involve rotational force’ as it may also involve acceleration (TBI) e.g. TBI and may also be linear as well as rotational.

Author: The injury definitions used in this reference are the definitions used by the National Collegiate Athletic Association Injury Surveillance Program, which is the most successful public health initiative instituted in an athletics organization. Further, this program and the definitions used in to define injury have been in place since 1982. We believe these definitions to therefore represent an appropriate way to define injury in sport.

4. Introduction, p 3: In relation to the sentence ‘Pre-season movement screening tests...’ do the authors mean less effective in predicting contact than non-contact injuries? I’m not sure how the external mechanism in contact injuries makes the screening tests less effective.

Author: Yes we do mean that movement screening tests “less likely” to predict a contact injury. There is no way we can say for sure from the way that a person moves in a pre-season screening that they are at risk of sustaining a valgus force to their knee that will result in an MCL injury or that they will land from a jump and inadvertently land on another players foot, which causes their ankle to move into inversion and thus sustain a lateral ankle sprain or a fibular fracture. It is our opinion that any individual movement screening test that is being used to predict a contact injury is doing so inappropriately.

5. Functional movement screen, p 4: The sentence commencing with ‘The FMS is purported...’ I think needs to be reworded. What is fundamental movement and what is a clearing test?

Author: Fundamental movement is a term used by the developer of the FMS to define movements considered to be fundamental to athletic participation – they include things like squatting and stepping. Clearing tests are again a term used by the developer of the FMS to indicate a test they have developed to test if there is

pain in a movement that is similar to the fundamental movement being assessed. For example with the shoulder fundamental movement there is a clearing test that assesses a shoulder impingement. This sentence has been revised to read as “The FMS is purported to measure fundamental movements **necessary for athletic performance** and comprises 7 individual movement patterns and 3 clearing tests to, **which are tests associated with each movement pattern to** determine the presence of pain (Table 1)”

6. Functional movement screen, p 5: The sentence ‘The benefits of the FMS...’ appears to be unfinished.

Author: Thank you. We have revised the sentence to read as “The benefits of the FMS are that it is quick, inexpensive, and easy to administer”

7. Functional movement screen, p 6: Please insert ‘for example’ in the brackets where ‘n=34 for females 50-54 years old.’

Author: Thank you. This has been revised as suggested.

8. Functional movement screen, p 6: Does Table 2 on p 3574 refer to Reference 14? Can the authors please make this clearer?

Author: Yes it does refer to reference 14. We have added the reference number after this sentence as well.

9. Functional movement screen, p 7: I’m not sure what the authors are saying with the comment on the deep squat versus the other six movement patterns. Do they mean the deep squat has content validity while the other six patterns do not? Why are the biomechanics of the other six patterns unknown?

Author: The biomechanics of the other six patterns are unknown because they have not yet been assessed via high speed kinematic analysis based on the current literature.

10. Functional movement screen, p 7: The phrase ‘the lower of the 2 sides is used, and all patterns are equally weighed’ is unclear.

Author: Thank you. We have updated this sentence for clarity to: “In this scoring algorithm, for those patterns performed bilaterally, the **lower score of the right and left sides** is used, and all patterns are equally weighted.”

11. Functional movement screen, p 8: It would be helpful to have a brief sentence explaining the implication of the lack of unitary construct. Also, the phrase 'above 14 or 14 or less' is not clear.

Author: Thank you. We have added the following explanation to a lack of unitary construct: "the results were consistent with Kazman et al.^[20], demonstrating a lack of unitary construct; this suggests that the summed score does not reflect one latent measure or one single result.."

We updated the sentence to move the dichotomized explanation to be after the summed score for clarity: "The single summed score (dichotomized as less than or equal to 14 vs. greater than 14) has been reported in several prospective cohort studies about the validity of the FMS to predict musculoskeletal injury"

12. Functional movement screen, p 9: Please write ROC in full when first used.

Author: Thank you. We have updated this as suggested.

13. Functional movement screen, p 11: Can the authors please make clear if they mean the study on the American football players or their own paper in the sentence on 'this review'?

Author: By "this review" we were referring to our own paper. We have updated to read as "this editorial" to be more clear that we are referring to our own paper.

14. Y Balance Test, p 11, last line: The word 'shows' might be more appropriate than 'suggests'.

Author: Thank you. This has been updated as suggested.

15. Drop jump screening test, p 19: The definition of DJST is not clear: is the vertical jump after the landing part of the test? Also, the authors should provide a brief explanation for 'normalised knee joint separation.'

Author: Yes the vertical jump height is part of the test. Here is the sentence identifying this: "The Drop Jump Screening Test (DJST) is a clinical used to assess dynamic knee valgus on landing from a 30.48 cm height and immediately exploding into a vertical jump". Additionally, we have added the following for clarification: "normalized knee joint separation distance (calculated as knee separation distance/hip separation distance"

16. Landing error scoring system, p 22: Can the authors please state what RT and iLESS stand for in the text?

Author: RT is stated as “real time scoring of four jumps using a modified version of the LESS (LESS-RT)”. The key here is that RT is real time. The iLESS is defined as “real time scoring using a single jump and the iLESS scoring”. The key here is that iLESS is a single jump.

17. Conclusion, p 30, Line 10: The word ‘review’ is probably more appropriate than ‘editorial’ here.

Author: Thank you. We have chosen to leave the word editorial here as to be consistent throughout the manuscript.

Reviewer 736909

Reviewer: This is a comprehensive review of 6 tests that supposedly predict injury in various groups of trainees. It inevitably becomes a large document (51 pages in Word) which makes it somewhat cumbersome. It seems to have been submitted as an editorial, but as I stated, it is a review in its own merit, and it is up to the editors to decide whether and how it might be incorporated in the journal, including whether it should be shortened or broken into 2 or 3 or after addressing my further comments possibly 6. In spite of the fact that there is a core tip, the abstract, in my opinion should summarize the data including conclusions, and not just describe what the review does.

Author:

Reviewer: The core tip is not concise, and in fact does not really justify reading so many pages.

Author: Thank you. We respectfully disagree in that we believe the core tip is precisely accurate in that it is imperative for clinicians to assess the validity of any tool before deciding to adopt it as part of a pre-season injury screening tool.

Reviewer: While I am not in a position to know or to check every source they quote, I quite agree with the authors' conclusions that much is lacking regarding the use of these tests. In fact I think it would benefit the reader to have a diagram of the basic concept of these tests: 1) find a test that predicts injury 2) find a way to intervene based on the prediction (by performing some intervention on subjects at risk or by preventing them from participating) & 3) prove that using

the test and intervention is effective. If you don't pass 3, you really haven't done anything. Regarding 3) I don't think the authors have stated enough yet. I think the review could benefit from a simple diagram relating to each of the 6 tests.

Author: While we totally agree with the reviewer to date there is not enough information in the literature to find a test that predicts injury in a valid and reliable manner let alone find a way to intervene based on the prediction. That is exactly what the researchers are trying to do right now, but to date we cannot prove that using the test and intervention are effective.

Reviewer: I think there is literature out there that actually disproves some of the tests, e.g. Kodesh E et al. in *Journal of Sports Science and Medicine* (2015) 14: 515. I know this submission probably preceded the quotation I present, but there may be more studies disproving the predictive effect.

Author: We agree with the reviewer and we have included studies that do in fact disprove the predictive effect of these screening tests. We have added the Kodesh reference as well. Thank you for the suggestion.

Reviewer: There is not enough discussion on specific injuries, mechanisms & multiple variable models. While it makes sense that measures of ankle instability should predict sprains, why should other measures predict an overall injury incidence? And if ankle instability predicts future sprain, how is it related to previous sprain, and should the history not be at least as important as the measurement. Should each test be related to the specific epidemiology of the subject it is used to predict injury on?

Author: We do agree with the reviewer that history is very important for prediction of future injury and affect performance on movement screens (see Chimera et al., 2015 reference); however the focus of this paper was to discuss the validity and reliability of clinical movement screens to predict injury. While it would be great to be able to say without a doubt that each test is related to a specific epidemiology the fact is that these screens are not yet being used for this purpose.

Reviewer: Further discussion should relate to the overall statistics of injury prediction and prevention. To what extent do the authors believe injury prediction is possible? What percentage of the variance in injury can be accounted for by history, and measurable factors? And of the measurable factors, what fraction is modifiable? This would throw some light on whether it really does make any sense to continue this endless search for predictors. I also think

that more stress should be put on to what extent each one of the tests is proprietary, in that like FMS, people have to use their equipment and pay for training.

Author: We believe we have addressed the overall statistics of injury prediction based on the current body of available literature; however, the statistics on injury prevention really are lacking in the literature. We believe that there are modifiable risk factors for injury prevention and that those modifiable risk factors are in areas like inappropriate movement patterns such as those that are proposed to be highlighted via the movement screens discussed in this paper; however, the purpose of this paper was to discuss the validity reliability, and usefulness of clinical movement screens. The suggestion from the reviewer is outside of the scope of this paper and in its own right likely deserves a full paper dedicated to things like modifiable injury risk factors. The word proprietary has been added to the FMS and the YBT.

Reviewer: Beyond the above, I think the manuscript is written well in good English. There are a few typos, nothing that can't be corrected.

Author: Thank you.