Author’s response to reviews

Title: Associations between sport participation and knee symptoms: a cross-sectional study involving 3,053 undergraduate students

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Author’s response to reviews:

Danilo de Oliveira Silva, PhD
BMC Sports Science, Medicine and Rehabilitation

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Dear Dr. de Oliveira Silva,

The authors would like to express our gratitude for you and the reviewers’ constructive advice. We have amended the manuscript according to your comments, as described in the point-to-point responses below. The changes in the manuscript has been highlighted in yellow. To facilitate your review, we have included the cover letter and point-by-point responses as a word document in the supplementary materials with identical content as below.

Thank you so much for considering our manuscript for publication. We look forward to hearing from you soon.

Yours sincerely,
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Editor Comments:

I would like to commend the authors for an extensive revision of their manuscript. I believe we can afford one more round of revisions to make sure your manuscript is at the best it can be. Reviewer 2 made excellent recommendations that will further improve the quality of your manuscript if you are willing to address them. Thank you for your compliments. We have amended the manuscript according to the comments from you and reviewers. Please refer the details below.
I suggest you to focus a paragraph of your discussion towards your findings that symptoms in other regions of the body are associated with the risk of current knee symptoms it would be great. Please, try and bring previous published reports to that discussion. I see this as a strong clinical implication of your manuscript.

Thank you for your suggestion. We have compared our finding with previous reports and discussed its clinical implications as below (Discussion, paragraph 9; Page16, line 6 to page 17, line 3):

“Undergraduates with current knee symptoms/injuries have an increased risk of having pain in other body regions (e.g., neck, shoulder, elbow, wrist/fingers, upper back, lower back, hip/thigh and ankle). This finding concurred with previous research that workers with knee pain often experienced other concurrent musculoskeletal pain (ranging from 27.1% to 45.0% depending on the body region).[1] Similarly, high prevalence of co-existing knee and neck symptoms have been reported in a general adult population.[2] While concomitant musculoskeletal complaints and knee pain are common among older adults,[2] our findings suggest that concurrent knee and other joint pain is pervasive among undergraduates. Since altered range of motion or motor control at one joint can adversely affect the function/performance of other joints along the kinetic chain in the upper and lower extremities [3,4], the presence of knee pain/injuries can lead to compensatory biomechanics at other joints during sports or daily activities. To prevent or manage concomitant knee and other joint pain, it is necessary to comprehensively detect kinetic chain deficits (e.g., muscle activation sequencing) in upper and lower limbs. Proper kinetic-based regimens (including flexibility, strengthening, endurance, and proprioception training) are needed to restore the optimal muscle activation sequencing and to prevent excessive loading to particular joints.[4]”

References

Reviewer 1

The authors should be commended for revising and improving the manuscript. I only have a couple more general comments and suggestions:

Thank you for your compliment. We have addressed your comments as below:

Page 5, line 13 - Page 6, line 4: I do not feel like this paragraph is needed, but leave to the authors to keeping or removing it.

Thank you for your comment. We would like to keep this paragraph because it acknowledges relevant prior research and points out the knowledge gap. We have shortened the paragraph to make it more succinct (Background, Paragraph 5; Page 5, line 14 to 19).
Statistical analyses: If possible, make it a more concise description.
Thank you for your comment. We have shortened the statistical analysis paragraphs (Methods, paragraph 3; Page 8 line 1 to page 9, line 5).

Discussion: Same comment to the discussion, it is a bit longer than it should be.
Thank you for your comment. We have trimmed the discussion by deleting the explanation on the impact of combat sports on knee pain.

Discussion: I suggest to present the limitations at the end of the discussion.
Thank you for your suggestion. We have re-arrange the discussion section to place the limitations at the end. (Discussion, paragraph 10; Page 17, line 17 to page 18 line 17)

Reviewer 2
I commend the authors in responding to all comments adequately, and obtaining assistance with language editing. The definitions of participation, knee symptoms are much clearer throughout. However, I have a few persisting issues with some sections:
Thank you very much! We have addressed your comments below.

Abstract Conclusions
"Certain sports types and high levels of competitiveness in sports were associated with knee symptoms." As per previous comment, high levels of competitiveness may imply that there were multiple levels of competitive sport you asked about and compared. But this was not the case, it was compared to recreational players. Suggest editing this sentence to shortened version of what is in the results section (i.e. "self-rated competitive" and adding compared to recreational players)
Thanks for your advice. We have modified the Abstract Conclusions.

“Participation in certain sports types were associated with current knee symptoms. Compared to self-rated “recreational” players, self-rated “competitive” players were more likely to have current knee symptoms.”

Introduction
Page 4, Line 18: "Early life knee pain is known to last for years, and youth knee pain or sports-related knee injuries may increase the risk of future knee osteoarthritis, poor quality....

Better use of appropriate references, and succinct. However, "early life knee pain is known to last for years" could be reworded. Knee pain in children and adolescents often persists
Thank you for your advice. We have revised the sentence accordingly (Background, paragraph 3; Page 4, line 18).

Page 6, Line 7
…. the present study aimed to: (1) investigate the relation between sports participation hours and current knee symptoms among undergraduates; and (2) determine whether the number of sports engaged and/or self-rated competitiveness in sports were associated with the risks of experiencing knee symptoms among undergraduates

As per previous comment to be consistent include your aim of investigating the type of sport
Thank you for your advice. We have amended the sentence as below (Background, paragraph 6, Page 6, line 3):
“…, and (2) determine whether the type and number of sports engaged, and/or self-rated competitiveness of sports engaged were associated with the risks of experiencing knee symptoms among undergraduates.”

Methods
I do not think the large addition of text to explain the skip logic is required. With the addition of the survey in Appendix 2 I think this should be suffice, and it should be logical to the reader that pending on answers different questions would be asked in this type of survey. However, if Reviewer 1 and the Editor feel strongly that this should be included, then include.
Thank you for your suggestion. The authors agree that the survey in Appendix 2 should be sufficient for readers to understand the skip logic. We have deleted that part of text (Methods, paragraph 2; Page 6, line 19 to page 7, line 18).

Results
Page 10, Line 13: "Fifty-six point eight" - when writing numbers as text do not need to include decimal, round up
We have amended that part accordingly (Results, Paragraph 2; Page 9, line 16). Thank you!

Discussion
Page 12, Line 12: This is the largest population-based study to evaluate the associations between the type, number or competitive level
Suggest inserting comma after "number"
Thank you for the suggestion, we have added the comma accordingly (Discussion, paragraph 1; Page 11, line 16).

Page 14, Line 9-15: (comment on combat sport paper injury mechanisms)
This section I did not comment on prior, but on second read it doesn't fit with the aims or results of the paper, and gets off topic. This could be completely removed, or if this paper cited the knee injury/symptom rates this would be more useful information to compare to the current study. I.e. could you pull the prevalence of knee symptoms for combat sports only from current study and compare to their study?
Thank you for your suggestion. Considering Reviewer 1’s comment on shortening the Discussion section, the authors decided to remove this paragraph.

Clinical implications paragraph:
I think you should consider speaking generally here, and use the term knee injury/symptoms as you have now mentioned that you cannot discern between acute vs chronic injuries
I.e. To lower the risk of sports-related knee symptoms/injury
I.e. sports. Undergraduates should be aware of the potential risk of increased knee symptoms/injury if they participate in combat sports
Thank you for the advice. We have changed the term accordingly (Discussion, paragraph 9; Page 17, line 6 to line 15).

“To lower the risk of sports-related knee symptoms/injuries, proper preventive strategies (e.g., proper protective gears for combat sports, screening for history of knee injuries, and/or sports injury prevention education) should be introduced to undergraduates, especially those participating in high-risk sports. Undergraduates should be aware of the potential risk of increased knee symptoms/injuries if
they participate in combat sports, soccer, yoga, and basketball. They need to monitor their knee symptoms/injuries and modify their exercise intensity or frequency, if necessary. Third, the higher rate of knee symptoms/injuries among self-rated competitive athletes highlights the importance of allocating more resources to prevent and rehabilitate knee disorders in athletes of high-risk university sports teams.”

Page 19, Line 1-3: I do not understand what you mean by this sentence
Additionally, undergraduate with knee symptoms may not benefit from multiple-sport participation, if their sports competitiveness and participation hours remain unchanged.
And even so, I am not sure you can make this strong statement re multiple sport participation
We agree that this statement might be too strong. We have removed this sentence to prevent confusion (Discussion, paragraph 9; Page 16, line 6 to page 17, line 15).

General comments:

The findings of symptoms in other regions of the body being significantly associated with risk of current knee symptoms is quite interesting and may warrant discussion. You could perhaps comment on this in the clinical implications paragraph. I.e. undergraduates with current knee symptoms/injury have an increased risk of having pain in other body regions (i.e. …). This extends previous research (i.e. look up subsequent musculoskeletal injury papers - known relationship between lower-limb musculoskeletal injury and increased risk of another injury)… therefore injury prevention strategies for undergraduates may include optimising management of other musculoskeletal injuries…
Thank you for your advice. We have commented this finding in Discussion, paragraph 9; Page16, line 6 to page 17, line 3.

“Undergraduates with current knee symptoms/injuries have an increased risk of having pain in other body regions (e.g., neck, shoulder, elbow, wrist/fingers, upper back, lower back, hip/thigh and ankle). This finding concurred with previous research that workers with knee pain often experienced other concurrent musculoskeletal pain (ranging from 27.1% to 45.0% depending on the body region).[1] Similarly, high prevalence of co-existing knee and neck symptoms have been reported in a general adult population.[2] While concomitant musculoskeletal complaints and knee pain are common among older adults,[2] our findings suggest that concurrent knee and other joint pain is pervasive among undergraduates. Since altered range of motion or motor control at one joint can adversely affect the function/performance of other joints along the kinetic chain in the upper and lower extremities [3, 4], the presence of knee pain/injuries can lead to compensatory biomechanics at other joints during sports or daily activities. To proper prevent or manage concomitant knee and other joint pain, it is necessary to comprehensively detect kinetic chain deficits (e.g., muscle activation sequencing) in upper and lower limbs. Proper kinetic-based regimens (including flexibility, strengthening, endurance, and proprioception training) are needed to restore the optimal muscle activation sequencing, and to prevent excessive loading to particular joints. [4]

References
3. Verrelst et al., Kinematic chain-related risk factors in the development of lower extremity injuries in


I also wonder whether you can make some more cross-cultural comparisons, and specific sport comparisons to US college data from their national injury surveillance papers. I.e. they have papers separate for various sports. This may be difficult in the way that the data is collected and presented, however, this piece of work should be acknowledged given college age students are comparable to your population.


Thank you for your advice.

A series of large-scale surveillance studies in the US have investigated the injury rates of different body parts among collegiate students participating in different sports. Considering their contribution to the understanding of collegiate sports injury, we agree that they should be included in the discussion. However, since the definition of injury (occurred during practice or competition, required medical attention and restricted sports participation for 1 or more days), exposure time (one section of practice or competition, regardless of time spent) and target population (elite student athletes) in those studies vastly differ from our study. It prevents direct comparisons of injury rates between their findings and ours, which also limit the comparisons of cross-cultural differences. Despite this disparity, we note that several sports have been found to have higher injury rates, which is similar to our findings. We have included this piece of information in our Discussion (Discussion, paragraph 4; Page 13, line 6 to line 8):

“Similarly, several injury surveillance studies on US collegiate athletes reported that knee injury rates were the highest among those participating in wrestling, American football, soccer and basketball.(1-6)”


