PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Physical activity-related injuries among university students: a multi-center cross-sectional study in China
AUTHORS	Gao, Yang; Cai, Weicong; Gao, Lijie; Wang, Jingjing; Liang, Jiehui; Kwok, Heather; Jia, Cun-Xian; Li, Liping

VERSION 1 – REVIEW

REVIEWER	Håkan Bengtsson Linköping University, Sweden
REVIEW RETURNED	20-Feb-2018

GENERAL COMMENTS	First, I would like a more detailed description of the population. We're told that there were 4758 participants in the study but we are not told the total number of subjects that were considered eligible for the study and invited for participation. Second, I believe that a more in-depth discussion of the possible consequences of the retrospective data registration is warranted. It is for example plausible that an injured student would rate their level of PA higher if not injured since their level of PA might be affected by their injuries. Likewise, it is also plausible that students who are more often engaged in PA would be more likely to remember their injuries since injuries might have a bigger impact on these students. Third, I have not been able to understand how the different MVPA variables are calculated. I thought these were supposed to be the combination of MPA and VPA but according to table 2 MVPA is always greater than the combination of MPA and VPA. I would therefore need an explanation of how the numbers for MVPA are derived. I also have some minor comments: On page 5, a reference is missing for the statement about injuries among student in primary and secondary school (lines 14-22) On page 11 it is said that "Insufficient sleep duration elevated the risk for PARI". Since it is not possible to show any causality with this study design I believe that this statement is to bold and would suggest that it is re-worded. Similar on page 16 (lines 11-13) it is again argued that insufficient sleep elevates the risk of injury. I suggest that this is re-worded in line with the above comment

REVIEWER	Sander Bliekendaal Centre for Applied Research in Sports and Nutrition, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands.
REVIEW RETURNED	04-Apr-2018

GENERAL COMMENTS	This article describes epidemiological characteristics and risk factors of physical activity-related injuries (PARI) in Chinese university students. This seems te be the first large scale study in this topic and was conducted well. However, there are several issues that I would like to address regarding the manuscript. 1. The text needs editing. 2. The authors state that a cross-sectional study design was used. In my point of view a retrospective study design was used. In March and April 2017 information was obtained about personal characteristics (e.g. demographics) and injuries in the past 12 months. This retrospective nature of the study is unsuitable to identify potential risk factors. For instance, the authors conclude that a lower sleeping time is a risk factor for PARI. However, a lower sleeping time (when administered retrospectively) can also be a consequence of PAIR. I would suggest to erase the risk factor analysis in the manuscript. 3. The purpose of the study was to investigate the epidemiologic characteristics of PARI. Unfortunately, no data about the injury localizations and severity was presented. My suggestion is to add these items in the manuscript, if available. If not, than there should be a explanation why these items were not included in the questionnaires. 4. Regarding the statistics: the authors explain that parametric and nonparametric tests are used. However, it is unclear which data is normally or not normally distributed and which test are used on which data. Furthermore, table 2 presents medians and IQR's. This doesn't support the readability of the table and it is unclear whether this data should be presented as not normally distributed data. Please explain the characteristics of the data and specify which test are applied. 5. The difference between PAIR incidence between Shantou students and students from Jinan and Honk Kong is rather large. This may affect other results and a good explanation for this difference is missing. I suggest to specify some data at the level of the participating universities. It would be interesting to see whether all the Universities of Shantou have a higher incidence, or that this applies to single universities. 6. The authors explain the rationale that PARI is a major contributor to the reduction of physical activity. However, the data shows that the students with the most PARI in the previous year are the most physically active students. So, this rationale should be criticized. 7. A online questionnaires was used (page 6). And subsequently the questionnaires were given to the students (page 8). The latter suggests the use of hard-copy questionnaires. Please clarify this. 8. A total of 4758 students were involved in the study. Please include a respons rate of the questionnaires on the level of the participating universities. 9. Introduction (page 4-5): the part about health aspects and PARI doesn't combine well with the introduction of the student population

VERSION 1 – AUTHOR RESPONSE

1. First, I would like a more detailed description of the population. We're told that there were 4758 participants in the study but we are not told the total number of subjects that were considered eligible for the study and invited for participation.
[Response] We thank you for your comments. We have added further information on the study population accordingly. Please refer to changes on Pages 7.

2. Second, I believe that a more in-depth discussion of the possible consequences of the retrospective data registration is warranted. It is for example plausible that an injured student would rate their level of PA higher if not injured since their level of PA might be affected by their injuries. Likewise, it is also plausible that students who are more often engaged in PA would be more likely to remember their injuries since injuries might have a bigger impact on these students.
[Response] We have further discussed the possible consequences. Please refer to changes on Pages 3 & 4.

3. Third, I have not been able to understand how the different MVPA variables are calculated. I thought these were supposed to be the combination of MPA and VPA but according to table 2 MVPA is always greater than the combination of MPA and VPA. I would therefore need an explanation of how the numbers for MVPA are derived.
[Response] At the individual level, the MVPA value (min/week) of each participant is the combination of MPA and VPA values. Table 2 presents descriptive statistics (median & IQR) at a group level. Given that PA levels (including MPA, VPA, and MVPA) were not normally distributed, the median for MVPA may not be equal to the sum of medians for MPA and VPA. The below table is a simple example for your reference:
Student VPA
(min/week) MPA
(min/week) MVPA
(min/week)
A 20 100 120
B 50 30 80
C 30 60 90
D 20 40 60
E 70 90 160
F 100 40 140
G 40 110 150
Median 40 60 120
IQR (20, 70) (40, 110) (80, 150)
Moreover, the means and SDs for 20 PA-related variables were available on supplementary table 2-1.

I also have some minor comments:
1. On page 5, a reference is missing for the statement about injuries among student in primary and secondary school (lines 14-22)
[Response] The relevant manuscript is under peer review and has not been published yet. We have therefore added "(Data not published yet)" at the end of the statement. Please refer to changes on Page 6.

2. On page 11 it is said that "Insufficient sleep duration elevated the risk for PARI". Since it is not possible to show any causality with this study design I believe that this statement is to bold and would suggest that it is re-worded.
[Response] We have revised it accordingly. Please refer to changes on Page 13.

3. Similar on page 16 (lines 11-13) it is again argued that insufficient sleep elevates the risk of injury. I suggest that this is re-worded in line with the above comment
[Response] We have revised the statement accordingly. Please refer to changes on Page 18.

Reviewer: 2
Reviewer Name: Sander Bliekendaal
Institution and Country: Centre for Applied Research in Sports and Nutrition, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands.
This article describes epidemiological characteristics and risk factors of physical activity-related injuries (PARI) in Chinese university students. This seems to be the first large scale study in this topic and was conducted well. However, there are several issues that I would like to address regarding the manuscript.
1. The text needs editing.
[Response] We thank you for your comments. The manuscript has been edited by a native English-speaking colleague.

2. The authors state that a cross-sectional study design was used. In my point of view a retrospective study design was used. In March and April 2017 information was obtained about personal characteristics (e.g. demographics) and injuries in the past 12 months. This retrospective nature of the study is unsuitable to identify potential risk factors. For instance, the authors conclude that a lower sleeping time is a risk factor for PARI. However, a lower sleeping time (when administered retrospectively) can also be a consequence of PARI. I would suggest to erase the risk factor analysis in the manuscript.
[Response] We did a literature search in Medline. Most studies with the similar study design to our study stated that “it was a cross-sectional study”; few studies called themselves as “a retrospective cross-sectional study”. We therefore prefer to keep our statement in a concise and common way as “a cross-sectional study”, though some data were retrospectively collected.
Though a cross-sectional study cannot provide cause-effect relationship between risk factors and a health outcome, it is commonly used to preliminarily identify potential risk factors of a health outcome, due to its advantages (such as low cost, can be done in a short time).
Given that our study cannot provide the cause-effect relationship, we have stated the limitation (Page 3-4) and tuned down our tone in results and discussion.

3. The purpose of the study was to investigate the epidemiologic characteristics of PARI. Unfortunately, no data about the injury localizations and severity was presented. My suggestion is to add these items in the manuscript, if available. If not, than there should be a explanation why these items were not included in the questionnaires.
[Response] We did not collect detailed information of each PARI episode online due to the following reasons: 1), this study aimed to investigate the epidemiologic characteristics and preliminarily identify potential risk factors of PARI occurrences. The main outcome is having PARI or not; 2), this study serves as a baseline of a mixed study supported by the National Natural Science Foundation of China (Grant No. 31640038). According to our proposal, participants who reported three PARI episodes (i.e. multiple injuries) at the baseline will be face-to-face interviewed about the detail of each PARI reported, including date, time, venue, activity involved, cause of injury, injured body part, injury type, injury severity, etc. Those data, along with other measures, will be used in the second step of the large study. Since we won’t ask the injury details among those who suffered PARI episode(s) in the past 12 months, we do not think it is suitable to add such information in this manuscript; 3), we conducted a pilot study, in which a class of students were asked to report the detail of the latest PARI if any. They complained much on the questionnaire length, we therefore decided on the current version to recruit enough participants and keep a high response rate.

4. Regarding the statistics: the authors explain that parametric and nonparametric tests are used. However, it is unclear which data is normally or not normally distributed and which test are used on which data. Furthermore, table 2 presents medians and IQR's. This doesn't support the readability of the table and it is unclear whether this data should be presented as not normally distributed data. Please explain the characteristics of the data and specify which test are applied.
[Response] We have revised the statistical analysis section accordingly. Please refer to changes on Page 10. As the PA data was not normally distributed, we therefore used median and IQR to describe their distribution. We also provided their means and SDs in the supplementary table 2-1.
5. The difference between PAIR incidence between Shantou students and students from Jinan and Honk Kong is rather large. This may affect other results and a good explanation for this difference is missing. I suggest to specify some data at the level of the participating universities. It would be interesting to see whether all the Universities of Shantou have a higher incidence, or that this applies to single universities.
[Response] We have further analyzed our data at university level according to your suggestions. Both the participating universities in Shantou had similar high PARI incidence rates (30.1% and 35.4% respectively). We have added the result in discussion. Please refer to changes on Page 22. Based on available data and results, we cannot give a good explanation for the difference, which we have acknowledged in the manuscript.

6. The authors explain the rationale that PARI is a major contributor to the reduction of PA. However, the data shows that the students with the most PARI in the previous year are the most physically active students. So, this rationale should be criticized.
[Response] In this study, we found that active students were more likely to suffer from PARI. Their PA levels might have reduced due to the injuries (according to suggestions from previous studies). However, we could not capture its dynamic changes, as PA data were measured only once in this study. We have discussed the relationship between PA and PARI in this manuscript, please refer to changes on Page 3-4.

7. A online questionnaires was used (page 6). And subsequently the questionnaires were given to the students (page 8). The latter suggests the use of hard-copy questionnaires. Please clarify this.
[Response] We have revised the statement. Please refer to changes on Page 9.

8. A total of 4758 students were involved in the study. Please include a response rate of the questionnaires on the level of the participating universities.
[Response] We have added it in the manuscript accordingly. Please refer to changes on Pages 7.

9. Introduction (page 4-5): the part about health aspects and PARI doesn't combine well with the introduction of the student population
[Response] We could not find much relevant information of PARI and its consequences among this population, though we searched the literature once again.

VERSION 2 – REVIEW

REVIEWER	Sander Bliekendaal Centre for Applied Research in Sports and Nutrition, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands
REVIEW RETURNED	06-Jun-2018

GENERAL COMMENTS	First, I would like to complement the authors with for adjustments that they have made. The readability of the manuscript improved significantly. In my point of view this is an interesting manuscript about the epidemic of PARI in a large sample of Chinese students.

	Fortunately, the authors elaborate that this study is part of a larger project and additional study's will be published. Furthermore, I have some suggestions that might help the authors to improve the manuscript: 1. In Introduction (p5), adding a paragraph that describes injury incidence in a variety of sport active populations might be an interesting addition to this paragraph. Besides, the authors refer to 'a series of studies on PARI'. It would be interesting to read the overall goal(s) of the project here as well, by example: 'for the purpose to ….. we have been conducting …'. 2. The retrospective nature of the study is mentioned to "limit causal and temporal inference in this study" (p3). However, this limitation is solely elaborated regarding the determination of PA levels. The study design also limits the risk factor analysis. Because the risk factor analysis constitutes a large part of the results I would suggest to include this in the limitations paragraph. A different approach may be to change terminology (relations/associations instead of risk factors). For example, in the discussion (p17) the authors state that "were all significantly and positively related with PARI". In my point of view this latter approach fits the study design best. 3. In the discussion (p18) it is stated that "males were more vulnerable to PARI than females, which is highly consistent with other research". However, there is also literature that show the female gender is consistently a risk factor for injury. This part of the discussion maybe needs some extra attention. Furthermore, I have some minor suggestions that might help to improve the manuscript: 1. Abstract (p2): delete "were invited and". 2. Article summary (p3): delete "team" or "group" 3. Introduction (p5): delete '", and et al.". end sentence for example with ", and contusion" 4. Study participants (p7): delete 'final sample' and 'non-PE'. 5. Ethics approval (p9): what is "the session"? Maybe change sentence above into: "During an plenary session explanatory statements and consent forms ….". 6. Statistical analysis (p10): please check: should the selection criteria not be: Alpha in < 0.10 and alpha out > 0.15 ? 7. Results : a. p11: change: "… members (3.3%) …. Chronic condition (10.4%)", b. p11: change "higher risk" into "higher incidence" c. p12: table 1: ate "Age (x+/-s, years) …" remove space after first bracket d. p12: change "were more prone' into "and they sustained more PARI events"

VERSION 2 – AUTHOR RESPONSE

Reviewer's Comments to Author:
Reviewer: 2
Reviewer Name: Sander Bliekendaal
Institution and Country: Centre for Applied Research in Sports and Nutrition, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands
Competing Interests: None declared

First, I would like to complement the authors with for adjustments that they have made. The readability of the manuscript improved significantly. In my point of view this is an interesting manuscript about the epidemic of PARI in a large sample of Chinese students. Fortunately, the authors elaborate that this study is part of a larger project and additional study's will be published. Furthermore, I have some suggestions that might help the authors to improve the manuscript:

1. In Introduction (p5), adding a paragraph that describes injury incidence in a variety of sport active populations might be an interesting addition to this paragraph. Besides, the authors refer to 'a series of studies on PARI'. It would be interesting to read the overall goal(s) of the project here as well, by example: 'for the purpose to ….. we have been conducting …'.
[Response] We thank you very much for your comments. We have revised our manuscript accordingly. Please refer to the third paragraph of the 'Introduction' section (Page 6).

2. The retrospective nature of the study is mentioned to "limit causal and temporal inference in this study" (p3). However, this limitation is solely elaborated regarding the determination of PA levels. The study design also limits the risk factor analysis. Because the risk factor analysis constitutes a large part of the results I would suggest to include this in the limitations paragraph. A different approach may be to change terminology (relations/associations instead of risk factors). For example, in the discussion (p17) the authors state that "were all significantly and positively related with PARI". In my point of view this latter approach fits the study design best.
[Response] We have added a paragraph in the 'Discussion' section to acknowledge the study limitations, please refer to Pages 23-24. In the second sentence of this paragraph, we have added "in the risk evaluation analyses" after 'limit causal and temporal inference' to clarify the issue. We totally agreed with you on your view on 'terminology'. We have changed most "risk factors" in our manuscript into the more accurate description as you suggested. We still kept a few "risk factors" in our manuscript. However, we have added "possible" before each "risk factors" left to tune down the tone.

3. In the discussion (p18) it is stated that "males were more vulnerable to PARI than females, which is highly consistent with other research". However, there is also literature that show the female gender is consistently a risk factor for injury. This part of the discussion maybe needs some extra attention.
[Response] We totally agreed with you. We have tuned down our tone by changing it into "highly consistent with most previous studies"

Furthermore, I have some minor suggestions that might help to improve the manuscript:
1. Abstract (p2): delete "were invited and".
[Response] We have deleted it accordingly.
2. Article summary (p3): delete "team" or "group"
[Response] We have deleted it accordingly.
3. Introduction (p5): delete '", and et al.". end sentence for example with ", and contusion"
[Response] We have deleted it accordingly.
4. Study participants (p7): delete 'final sample' and 'non-PE'.
[Response] We have deleted it accordingly.
5. Ethics approval (p9): what is "the session"? Maybe change sentence above into: "During an plenary session explanatory statements and consent forms ….".
[Response] We have changed it accordingly.
6. Statistical analysis (p10): please check: should the selection criteria not be: Alpha in < 0.10 and alpha out > 0.15 ?
[Response] We have checked, we used α=0.10 for in and α=0.15 for out criteria.
7.Results :
a. p11: change: "… members (3.3%) …. Chronic condition (10.4%)",
[Response] We have changed it accordingly.

b. p11: change “higher risk” into “higher incidence”
[Response] We have changed it accordingly.
c. p12: table 1: ate “Age (x+/-s, years) …” remove space after first bracket
[Response] If removed, the sign of the average (i.e., $\bar{x}$) cannot be fully represented.
d. p12: change “were more prone’ into “and they sustained more PARI events”
[Response] We have changed it accordingly.

VERSION 3 – REVIEW

REVIEWER	Sander Bliekendaal Amsterdam University of applied Sciences, Centre for applied Research in Sports and Nutrition
REVIEW RETURNED	18-Jul-2018

GENERAL COMMENTS	I would like to compliment the authors with the improvements that have been made in the manuscript.