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Examination of collegiate student-athlete concussion reporting intentions and behavior

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Examination of Collegiate Student-Athlete Concussion Reporting Intentions and Behavior
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Dear Dr. Weber Rawlins,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.
The editorial board kindly asks you to pay attention to reviewer #3's remarks related to missingness and replacement of missingness. These should be properly addressed in your revised draft or otherwise sufficiently rebutted.
If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript. Also, please ensure that the track changes function is switched on when implementing the revisions. This enables the reviewers to rapidly verify all changes made.

Your revision is due by Nov 21, 2019.

To submit a revision, go to https://www.editorialmanager.com/jctres/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Yours sincerely

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Reviewers' comments:

Reviewer #2: Thank you to the authors for providing a thoughtful and comprehensive manuscript examining factors impacting concussion-related disclosure. Although strong, there are a few areas that could be clarified for ease of reader comprehension. Please see below for specific comments.

General comments:
- There are several grammatical/spelling/etc. errors throughout the text of the manuscript.
- The authors reference self-efficacy and confidence throughout the manuscript as if they are synonymous constructs when in fact they are separate (albeit related). The survey also shows that only confidence was considered as part of self-efficacy. Therefore, it would be helpful for the reader if the authors operationalized "Self-Efficacy" as it pertains to this study as the term itself refers to more encompassing behavioral ability.

Abstract:
- The first sentence of the results is difficult to follow due to duplicate language. Consider simplifying to remove repetitive words when possible. The second sentence is much clearer for the reader to follow.

Introduction:
- Very well-written and clear. Makes a strong case for the need of improved concussion reporting.

Methods:
- Data Analysis:
- Line 143: The sentence states an average score with a minimum of 0, but isn't the scale 1-7?
- Lines 148-150: Were the student-athletes excluded from all analyses or just the analyses related to reporting behavior as opposed to intention?

Results:
- Lines 175-178: Similar to the abstract, there are several sentences that are a lot for the reader to follow. For example, "symptom reporting intentions of concussion reporting." Consider simplifying redundant language when possible for clarity.
- Line 203: The authors refer to knowledge and subjective norms as the most influential predictors of behavior; however, in the previous sentence, the authors talk about the significant influence of self-efficacy.

Discussion:

- Lines 233-234: Why isn't knowledge translating to behavior? The authors have an opportunity to discuss this phenomenon with their data regarding reasoning for reporting and other qualitative studies on the matter. Additionally, it is important to note how educational initiatives do not address these concerns.
- Lines 240-241: "has received control over the behavior itself" This is perceived behavioral control, not self-efficacy. Additionally, this is the first time "control" of any type has been discussed. The authors should consider larger discussion of the "control" factor and need for future research or removal in its entirety.

Reviewer #3: The submitted manuscript presents interesting data on self-report of concussion symptoms that is important to account for. However, the study has major issues with the overall sample size and accounting for missingness as these could significantly affect the conclusions that have been made.
Sample size representation and interpretation concerns: The authors report a large sample that was recruited but the final N used for the logistic regression analyses needs to be clarified. This should include what groups were used (were males, females and missing collapsed to represent one group?).
Finally, there is a major concern in how the missing values are replaced with a neutral value that needs to be justified.
Please see the comments below:
* Introduction: Line 31: if the symptoms the authors are referring to are physical signs and balance impairment, please clarify and refer to those specifically based on McCrory et al 2017.
* Methods and materials: Were the paper surveys circulated and collected blindly? There is no explanation of how the bias in data collection was managed between paper surveys given to the Division II sites versus the Qualtrics surveys given to Division I sites (Lines 69-71).
o Knowledge measure: What was the rationale behind not including the two questions in the concussion knowledge score (lines 91-94)?
* Data analysis: It would be best to cite the source analyses software used. Having stated that the authors used R project, they could simply cite R or R studio (if this was used) instead of R project. R project is simply part of R Studio.
o Additionally, accounting for missing values needs to be clarified. Why were the missing values replaced with a neutral number (stated as four; lines 143-145)? Why was the missingness not accounted for as NA = TRUE in R? The authors should clarify the rationale for using a neutral number.
* Statistical analyses: It is not clear what software was used to conduct the statistical analyses. The authors should specify the statistical analyses software used.
o AIC: in line 161, the relation of the term "complexity" is not clear. Are you referring to the model complexity?
* Results: Were there particular exclusion standards used to eliminate subjects? Did the elimination of the subjects use a certain completion threshold to ensure the exclusion? "Too many variables missing" seems vague, but there needs to be a specific protocol to establish why the subject was removed from the final analysis (line 167).
* Limitations: The authors claim that the current study reports the largest sample size to date. Is this referring to the total sample size for both Divisions together?
* Throughout the article, missingness is unclear or needs to be clarified for the specific context. For example, in table 2," missing" is used for "Age, Gender and Sport". The two questions I have here are: what does "missing" for "Age, Gender and Sport" mean? If the

category "sport" had "missing" values, what was the rationale for it being included (n=0 for Division I and n=15 for Division II)? This is confusing especially for sport as "missing" can mean anything and needs to be clarified for why it was used. In general, how was the "missing" category used for all analyses?
* Gender: Was all the data for both predictor and criterion variables collapsed by gender? Gender plays a very important role in general for concussion and qualitative studies with self-report. How can you show that these variables were different by gender?
* One of the biggest concerns throughout this paper that is also reflected in the data provided in Table 3 is the replacement of "missing" values with a neutral value that the authors have reported to use (also highlighted above under data analysis). Unless this protocol is justified with previous literature, replacing with neutral values or means is not appropriate. There are several ways to work with "missing" values and multiple statistical software account for this. In Table 3, the median reported for each variable category is around the neutral value. The authors should clarify how the data analyses used haven't affected the means, standard deviation and medians for all variables.
* Finally, it would be important to understand and expand on how such a self- report can be successful given the attrition rate in the paper.
* The authors only report the role of clinicians and athlete's role of reporting to clinicians. However, the athletic trainers play a vital role in athletes reporting concussions. How will the authors account for this missing piece in the current study?

Author's rebuttal

Reviewers' comments:

Reviewer #2: Thank you to the authors for providing a thoughtful and comprehensive manuscript examining factors impacting concussion-related disclosure. Although strong, there are a few areas that could be clarified for ease of reader comprehension. Please see below for specific comments.

Thank you, we appreciate your review and believe the comments have strengthened the manuscript.

General comments:

- There are several grammatical/spelling/etc. errors throughout the text of the manuscript.

Thank you, we have read through the manuscript and have corrected errors.

- The authors reference self-efficacy and confidence throughout the manuscript as if they are synonymous constructs when in fact they are separate (albeit related). The survey also shows that only confidence was considered as part of self-efficacy. Therefore, it would be helpful for the reader if the authors operationalized "Self-Efficacy" as it pertains to this study as the term itself refers to more encompassing behavioral ability.

We have aimed to differentiate these terms and included the following sentence to define "self-efficacy": "self-efficacy (e.g., the student-athlete's belief regarding his/her ability to report a concussion." (Lines 41-42)

Abstract:

- The first sentence of the results is difficult to follow due to duplicate language. Consider simplifying to remove repetitive words when possible. The second sentence is much clearer for the reader to follow.

We have aimed to clear up the duplicate language throughout the manuscript. The first sentence of the abstract now states: "Clinicians rely on student-athletes to self-report concussion symptoms, but more than 50% of concussions go undisclosed." (Lines 7-8)

Introduction:

- Very well-written and clear. Makes a strong case for the need of improved concussion reporting.

Thank you.

Methods:

- Data Analysis:

- Line 143: The sentence states an average score with a minimum of 0, but isn't the scale 1-7?

Thank you for observing this. We have updated the sentence: "Knowledge, attitude, subjective norms, self-efficacy, social identify, athletic identity, symptom reporting intention, and concussion reporting intention item responses were averaged separately across items (minimum of 1 and maximum of 7 for each)." (Lines 141-144)

- Lines 148-150: Were the student-athletes excluded from all analyses or just the analyses related to reporting behavior as opposed to intention?

We have updated the sentence to indicate that these individuals were only excluded from the behavior analysis stating: "Student-athletes that reported that they had not experienced concussion related symptoms in the past 365 days were labeled as "no event" and were excluded from analyses for behavior only, since they did not have an event to report or conceal." (Line 152-155)

Results:

- Lines 175-178: Similar to the abstract, there are several sentences that are a lot for the reader to follow. For example, "symptom reporting intentions of concussion reporting." Consider simplifying redundant language when possible for clarity.

Thank you, we have made edits throughout the manuscript. We have also updated the specific sentence, which now reads: “Knowledge, attitudes, and self-efficacy significantly predicted symptom reporting intentions.” (Lines 179-180)

- Line 203: The authors refer to knowledge and subjective norms as the most influential predictors of behavior; however, in the previous sentence, the authors talk about the significant influence of self-efficacy.

We have clarified that one was measure of symptoms reporting behavior, while the other measure of concussion reporting behavior. We have updated the specific sentence to highlight that results were associated with concussion reporting behavior analyses - stating: “Knowledge and subjective norms were the most influential predictors of concussion reporting behaviors.” (Lines 205-206)

Discussion:

- Lines 233-234: Why isn't knowledge translating to behavior? The authors have an opportunity to discus this phenomenon with their data regarding reasoning for reporting and other qualitative studies on the matter. Additionally, it is important to note how educational initiatives do not address these concerns.

We have added the following information: “Knowledge may not be translating to behavior because many social factors may also influence concussion reporting.” (Lines 237-238)

- Lines 240-241: "has received control over the behavior itself" This is perceived behavioral control, not self-efficacy. Additionally, this is the first time "control" of any type has been discussed. The authors should consider larger discussion of the "control" factor and need for future research or removal in its entirety.

Thank you for pointing this out, we have removed the part of the sentence discussing control. The sentence now reads: “If student-athletes are confident that their injury is a concussion, are sure of steps required once a concussion has been identified, and that reporting is required of them, this may increase their action of reporting.” (Lines 242-245)

Reviewer #3: The submitted manuscript presents interesting data on self-report of concussion symptoms that is important to account for. However, the study has major issues with the overall sample size and accounting for missingness as these could significantly affect the conclusions that have been made.

Sample size representation and interpretation concerns: The authors report a large sample that was recruited but the final N used for the logistic regression analyses needs to be clarified. This should include what groups were used (were males, females and missing collapsed to represent one group?).

Finally, there is a major concern in how the missing values are replaced with a neutral value that needs to be justified.

We appreciate the reviewer's comments and thorough review. We have addressed each concern below and believe the edits have greatly improved the manuscript.

Please see the comments below:

** Introduction: Line 31: if the symptoms the authors are referring to are physical signs and balance impairment, please clarify and refer to those specifically based on McCrory et al 2017.*

We thank the reviewer for this comment. We have updated the sentence to state: "However, for less visible or physical symptoms, such as headache or "feeling in a fog", clinicians must rely on student-athletes to self-report symptoms." (Lines 33-34)

** Methods and materials: Were the paper surveys circulated and collected blindly? There is no explanation of how the bias in data collection was managed between paper surveys given to the Division II sites versus the Qualtrics surveys given to Division I sites (Lines 69-71).*

Thank you. Authors have examined whether paper surveys and online surveys are appropriate to examine similarly. We have added clarification in the following sentence: "Previous studies suggest that paper and electronic surveys elicit similar responses.[23-26]" (Lines 71-72)

o Knowledge measure: What was the rationale behind not including the two questions in the concussion knowledge score (lines 91-94)?

The rationale for not including the two questions in the concussion knowledge score is because high variability presents in responses and the scientific literature does not fully support a "correct" response. We have included the last sentence in the paragraph to state: "Responses had high variability and scientific literature and medical consensus do not yet fully support a "correct" response.[1,28]" (Lines 95-96)

** Data analysis: It would be best to cite the source analyses software used. Having stated that the authors used R project, they could simply cite R or R studio (if this was used) instead of R project. R project is simply part of R Studio.*

Thank you, we have updated the sentence to state: “Data analysis was conducted using RStudio, Inc. (v 3.3.3, Murray Hills, NJ).” (Line 141)

o Additionally, accounting for missing values needs to be clarified. Why were the missing values replaced with a neutral number (stated as four; lines 143-145)? Why was the missingness not accounted for as NA = TRUE in R? The authors should clarify the rationale for using a neutral number.

We appreciate this comment. We performed all analyses with recommendation from a statistical consultation with expertise in survey data management. Following this consultation, it was determined the Fisher-Yates method of replacing missing data with neutral values was acceptable (Bennet et al, 1984; Poh et al, 2010; Yates, 1933). We also believe that since the neutral values were near medians that this decision was too supported. We have added the following sentence for the reader to the methods section: “Based on findings by Bennet et al[34], Poh at al[35] and Yates[36], after statistical consultation, and since the neutral values were near the medians, we believed the Fisher-Yates method of replacing missing values with the neutral number was appropriate.” (Lines 146-149)

** Statistical analyses: It is not clear what software was used to conduct the statistical analyses. The authors should specify the statistical analyses software used.*

We included which statistical software utilized in the Data Analysis section and included the following sentence: “Data analysis was conducted using RStudio, Inc. (v 3.3.3, Murray Hills, NJ).” (Line 141)

o AIC: in line 161, the relation of the term "complexity" is not clear. Are you referring to the model complexity?

We have clarified this sentence stating: “Akaike Information Criterion is an estimator of the goodness of fit or quality to account for model complexity.” (Lines 164-165)

** Results: Were there particular exclusion standards used to eliminate subjects? Did the elimination of the subjects use a certain completion threshold to ensure the exclusion? "Too many variables missing" seems vague, but there needs to be a specific protocol to establish why the subject was removed from the final analysis (line 167).*

Participants were removed from analysis if more than one survey sections were missing. We have included this information on lines 170-172 stating: “Ninety-six student-athletes were excluded from analysis because too many variable fields were missing (i.e., missing more than one survey section)”.

** Limitations: The authors claim that the current study reports the largest sample size to date. Is this referring to the total sample size for both Divisions together?*

We have clarified this in the sentence by adding “total”. It now reads: “Although data from this study included one of the largest total samples to date and from the widest variety of collegiate student-athletes, data from student-athletes are only from two sites in a single geographical location.” (Lines 293-295)

** Throughout the article, missingness is unclear or needs to be clarified for the specific context. For example, in table 2," missing" is used for "Age, Gender and Sport". The two questions I have here are: what does "missing" for "Age, Gender and Sport" mean? If the category "sport" had "missing" values, what was the rationale for it being included (n=0 for Division I and n=15 for Division II)? This is confusing especially for sport as "missing" can mean anything and needs to be clarified for why it was used. In general, how was the "missing" category used for all analyses?*

Thank you for making this point. Demographic data are listed as “missing” due to an error with data collection. We neglected to collect this information for all participants. We decided to continue forward with the project because results still provide insightful and novel information. We have added this sentence to the Limitations: “Secondly, our demographic results include missing results due to error and future research should include full demographic data and include a diverse sample.” (Line 297-299)

** Gender: Was all the data for both predictor and criterion variables collapsed by gender? Gender plays a very important role in general for concussion and qualitative studies with self-report. How can you show that these variables were different by gender?*

Thank you for this suggestion. At the time of study, little was known about the influences of sex and concussion reporting. Sex, although interesting, was not central to the purpose of this study since it is a demographic factor and we sought to explore the Theory of Planned Behavior and identity. Thus, we did not include sex as a model predictor in this study. We believe this study provides novel and important information for clinicians as it is one of the largest total samples to date, and applicable information necessary for effective concussion education. The recommendation to explore demographic predictors is a good one, but we believe these analyses should be explored separately as it strays from the intent of this paper.

** One of the biggest concerns throughout this paper that is also reflected in the data provided in Table 3 is the replacement of "missing" values with a neutral value that the authors have reported to use (also highlighted above under data analysis). Unless this protocol is justified with previous literature, replacing with neutral values or means is not appropriate. There are several ways to work with "missing" values and multiple statistical software account for this. In Table 3, the median reported for each variable category is around the neutral value. The authors should clarify how the data analyses used haven't affected the means, standard deviation and medians for all variables.*

Thank you. As described above, our analyses were completed with a statistical consultation. Following consultation and review of the literature, we determined that the Fisher-Yates method of replacing missing values with the neutral response was appropriate. We have also added notations to the tables 3 and 4 to help readers better interpret these descriptive statistics (states: "Note: The neutral number (four) replaced missing values which accounted for less than 1%." Lines 410, and 413)

** Finally, it would be important to understand and expand on how such a self- report can be successful given the attrition rate in the paper.*

While participants were lost due to missing data, we believe these results are still novel and adds important findings to the concussion literature. We believe that this study could benefit from a larger, diverse sample which we have addressed in the limitations and have stated: "Although data from this study included one of the largest total samples to date and from the widest variety of collegiate student-athletes, data from student-athletes are only from two sites in a single geographical location. Student-athletes at these two sites may not accurately reflect knowledge, attitudes, subjective norms, self-efficacy, social identity, and athletic identity, intentions and behavior of all or the majority collegiate student-athletes. Secondly, our demographic results include missing results due to error and future research should include full demographic data and include a diverse sample. Also, our sample included Division I and II sites. Future research should aim to examine knowledge, attitudes, subjective norms, self-efficacy, social identity, and athletic identity, intentions and behavior in Division III student-athletes as well." (Lines 293-302)

** The authors only report the role of clinicians and athlete's role of reporting to clinicians. However, the athletic trainers play a vital role in athletes reporting concussions. How will the authors account for this missing piece in the current study?*

We agree that athletic trainers play a vital role in athlete concussion disclosure. When we write about clinicians, we include athletic trainers in this description. To further highlight this, we have included sentences such as: "This has clinical importance in that clinicians, including athletic trainers and team physicians, should aim to increase student-athlete knowledge, attitudes, and subjective norms, but most importantly their belief in carrying out actual concussion reporting due to our findings." (Lines 222-225)

2nd editorial decision

22-Nov-2019

Ref.: Ms. No. JCTRes-D-19-00016R1
Examination of Collegiate Student-Athlete Concussion Reporting Intentions and Behavior
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Dear authors,

I am pleased to inform you that your manuscript has been accepted for publication in the Journal of Clinical and Translational Research.

You will receive the proofs of your article shortly, which we kindly ask you to thoroughly review for any errors.

Thank you for submitting your work to JCTR.

Kindest regards,

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Comments from the editors and reviewers: