Author’s response to reviews

Title: Low back pain status in elite and semi-elite Australian football codes: a cross-sectional survey of football (soccer), Australian-Rules, rugby league, rugby union and non-athletic controls

Authors:

Wayne Hoskins (waynehoskins@iinet.com.au)
Henry Pollard (hpollard@optushome.com.au)
Chris Daff (chirodaff_013@hotmail.com)
Andrew Odell (boubblytang@hotmail.com)
Peter Garbutt (enhancehealthcare@iinet.net.au)
Andrew McHardy (golfinjury@optusnet.com.au)
Kate Hardy (katie.hardy@optusnet.com.au)
George Dragasevic (dragasev@tpg.com.au)

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Author’s response to reviews: see over
Dear the Editor,

Please find below our responses to the reviewer’s comments.

Regards,

Wayne Hoskins

**Reviewer 1**

Reviewer's report:

**Some studies show that LBP is related to socio-economic status (SES) – LBP being higher in lower SES. Can anything be said on the SES or education of the semi-elite codes? (Because the control group is of higher education)**

Please note that we did not collect data on socio-economic status or education, therefore it is difficult to make a comment. The non-athletic controls were drawn from a convenience sample of age matched male university students and office workers. Along with their football commitments, players at the semi-elite level typically perform university study or work. So although there may be differences in the education between the controls and semi-elites, this difference may not be as large as expected. However this is still a potential limitation of the study.

We have made comment in the manuscript (new paragraph 3 in methods) that the semi-elite players typically perform university study and/or work along with their football commitments, so the reader will now be aware that the differences in education may not be as different as suspected. If the reviewer wishes we can list this as a limitation of the study.

**Is the control group of students with an average age of 24(!) - Already rather old not a selective group?**

As stated above the control group was selected from a convenience sample of age matched male University students and office workers which may have altered the average age. However, as stated in table 1 all groups were matched for age, suggesting that group selection was satisfactory for this component. We have reproduced the ages from Table 1 below:

<table>
<thead>
<tr>
<th></th>
<th>Elite</th>
<th>Semi-elite</th>
<th>Non-athletes</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>23.3 (4.0)</td>
<td>23.6 (4.0)</td>
<td>23.9 (4.5)</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Please add some information on the difference between elite and semi-elite, are elite-players full-time paid – i.e. it is a job - and are semi-elite also paid or not? Do the semi-elite players have a job outside the football? Depending on the role of the football in their lives and carriers of course affect the potential effect of LBP.

The following has been included following the second paragraph in the methods section (page 7), which we hope is sufficient.
“It should be noted that elite players are professional or ‘full time’ with their football commitments and this provides their sole income unless income is also received indirectly through their football requirements (e.g. endorsements). Semi-elite players receive financial payment but this is not enough to make them professional and they typically perform university study and/or work along with their football commitments to supplement their income.”

**How was the study presented to the clubs and players – as a LBP survey or as a general health survey? Were the responses of the players confidential?**

The study was presented to the clubs and players as a low back pain survey, which has been added to the old paragraph 3 (new paragraph 4) of the methods section. The responses of the players remain confidential, which was also apart of our ethical committee requirements. This has been added to paragraph 2 of the methods section.

**I miss prevalences of LBP expressed as %. How many of the players had no LBP, moderate LBP of severe LBP. (should be in table 1)**

Table 1 presents the results predominantly from the Quadruple Visual Analogue Scale and as such prevalence cannot be presented as a %. However Table 2 presents the results of low back pain intensity (being none, mild or discomforting/distressing/excruciating). We have added the prevalence expressed as a % which we hope the reviewer will find sufficient.
Reviewer 2

1. Is the question posed by the authors well defined? Yes

No comment required

2. Are the methods appropriate and well described? With the exception of the analysis-section

Please note that the analysis section is a standard description of how the data was entered and analyzed. It was provided by our statistical consultant.

3. Are the data sound? Apparently

No comment required

4. Does the manuscript adhere to the relevant standards for reporting and data deposition? The statistical analysis-section and the tables presenting results do not, otherwise yes.

Please see the answers to questions 2 and 3 at the bottom of the reviewer comments.

5. Are the discussion and conclusions well balanced and adequately supported by the data? I do not understand the reported results and can therefore not judge this.

The data presents the possibility of an interesting association between the level of sports participation (none, semi elite and elite) on low back pain. This raises the possibility of a greater potential for low back pain in elite athletes. This is a unique finding but one that requires further study. The discussion and conclusion reflects this possibility and presents discussion of the limitations as well as the potential association. No discussion on causation is possible from this data set.

6. Are limitations of the work clearly stated? Yes

No comment required

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? As far as I can see.

No comment required

8. Do the title and abstract accurately convey what has been found? As with statement # 5: I don’t know.

The title of the manuscript reflects the main findings of the study. We have included the word ‘status’ in the title to clarify this further. It now read: Low back pain status in elite and semi-elite Australian football codes: a cross-sectional survey of football (soccer), Australian-Rules, rugby league, rugby union and non-athletic controls. The low back pain status is players of differing skill is compared to sedentary controls.
9. Is the writing acceptable? Yes

No comment required

Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore)

As a non-football player, I muse about over the term “non-athlete” as a person not playing football!

There is a possibility of the controls being active in other sport, although it was a part of the inclusion criteria that they not participate in a football code at the elite or semi-elite level (which is stated in methods). There is no other major sports in Australian with established elite and semi-elite level competitions so it is extremely unlikely that the controls participated in a level of athleticism that could be called ‘semi-elite’.

The result section might benefit form a more stringent form, for example using subheadings or other type of division in the text to create an overview.

We are not sure how to alter this to suit the reviewers requirements. The section is only 2 paragraphs and 3 tables. Therefore it is difficult to place subheadings in the text. If the review can suggest some headings we would be happy to place them in the text.

Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached)

I am sorry, I am not very constructive now, but I simply do not understand the last paragraph in the method section and the corresponding tables. Therefore, I can not suggest relevant changes. May be it is due to my lacking statistical abilities, but then there probably other readers out there with the same problem.

The last paragraph in the methods section is a standard description of how the data was entered and analyzed. It was provided by our statistical consultant. It conforms to standard journal manuscript requirements.

1. Table 1: what are the p-values illustrating? Trend? Difference between which groups? If they are not for trend, you should not write in the discussion, that “the trend was more evident....”

The p value is for differences between the three groups. Agreeing with the reviewer we have removed: This trend for was more evident in the elite participants who are more likely to attribute sporting activity to the cause of their LBP. This has now been replaced with: The difference was more evident in the elite group compared to the semi-elite group. We postulate that the higher intensive of play may be associated with the increased low back pain status.
2. Table 2: What is the reference point? You write aggregating “all other levels” – does that mean one cell compared to the other 8? If so, it does not make sense to me.

The all other levels is us combining the discomforting, distressing and excruciating components of the questionnaire. This was done as there was a only a very small minority of players expressing distressing or excruciating pain (which we have documented), making comparison and statistical analysis easier.

We referred the question regarding statistical methods and reporting to our statistician Emeritus Professor Don McNeil. The answer is also relevant to following question. He provided the following answer:

The question relates to the concept of an odds ratio for data with more than two categories. In epidemiological literature it is conventional to use logistic regression to fit data with a binary outcome and determinant variables that can be categorical with any number of categories, in which case the default method is to omit one of these categories (the so-called referent categories) so that the resulting regression coefficients for each of the other categories are the natural logarithms of the odds ratios relating each category to the omitted category. This parallels the result for ordinary linear regression where you have a continuously varying outcome (such as the time in days it takes for an injury to heal) and a categorical determinant such as the football code.

To fit the linear model in this situation, it is conventional to omit (the dummy variable for) one of the groups, in which case the regression coefficient for each other group is the time taken to heal in addition to the time taken for the omitted (referent) group. In statistical terms (as explained, for example, in Chapter 6 of the book "Modern Applied Statistics using S" by W Venables and B Ripley, Springer (I think) 2002, 4th edition) this method uses what are called "treatment contrasts". But there are other kinds of contrasts, and it often makes more sense to use what are called "sum contrasts", which gives the result in terms of the difference between each category and the overall mean. (These are also explained in Venables and Ripley's Chapter 6).

For logistic regression you can also use "sum contrasts", and in this case the coefficients are the natural logs of the odds ratios for the risk of the adverse outcome for each group compared with all other groups combined. If there is a natural referent group (such as a general well-defined population of athletes with a specified level of fitness for which you also have data) then it would make sense to use this group as the referent group, in which case the reviewer would understand what you are doing. However, I believe that it makes more sense in your case to compute an odds ratio for each group compared to all other groups combined, and that is what you have done. Of course you have not used logistic regression, simply because you can get the results more directly using formulas.

Also, if you have more than two outcome categories (such as none,
moderate, or severe injury), then you must use the method you have used, because there is no other method for computing an odds ratio.

Reading your manuscript, it is perfectly clear what you have done, so I'm not sure what more you can say, other than to give the extra references.

3. Table 3: What are the odds ratios of? The LBP being due to sport? In that case, how can you have an odds ratio for the ones without LBP? And again: what is the reference?

Please see the answer above for the explanation.