Author's response to reviews

Title: A survey of referee participation, training and injury in elite gaelic games referees

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Author's response to reviews: see over
Dear Dr Graham,

I would like to thank the reviewers for their constructive comments and recommendations for improvement in relation to the above manuscript.

Thank you also for facilitating an extension to the deadline for return of the revised manuscript. I was delayed more than anticipated due to a longer period than usual of pre and post natal hospitalization.

I have addressed the recommendations made by each reviewer in turn in the accompanying response pages and have made the appropriate amendments to the manuscript in all sections, bearing in mind the necessity to be concise.

The major substantive revision to the paper stems from the recommendation that refereeing related injury rather than sport injury should be the focus of this paper. I have therefore filtered out the injuries which were not sustained in official duties and re-analysed the data on 48 injuries, which I have referred to as ‘Gaelic games injuries’. This has necessitated a significant revision of numerical results in tables and text. For clarity I have also included 95% confidence intervals in tables 2 and 3. The overall results and conclusions however remain the same and as recommended I have expanded the discussion section to compare results with previous studies.

I hope that this meets the approval of both yourself and the referees.

Yours sincerely

Catherine Blake
Belinda Gabbe

**Major Compulsory Revisions**

Please define “commitment” as you use it in this manuscript.
Commitment defined as time commitment.

It would be useful to give a quick summary in the introduction about what the referees do exactly that would put them at risk of injury. Sprinting, sharp changes of direction, body contact? Many readers will be unfamiliar with the Gaelic games and may not be able to picture what is involved. This would also be useful for comparing with other sports.
Inserted a section into background explaining the nature of Gaelic Football and Hurling and their demands.

In the methods, the length of recall needs to be established including any justification for this recall period and its validity.
This was an oversight and it has been clarified that this was in the past year (12 months).

The methods suggest that qualitative and quantitative data were collected but the analysis section does not describe how you handled the qualitative data.
Expanded the analysis section to include that answers to open ended questions and other voluntary responses were transcribed and underwent content analysis for common themes.

In the first paragraph of the discussion, you describe the prevalence of injury burden in this group but it reads as though this burden is all referee related. Clearly, injuries were sustained in other contexts and other forms of sports participation. If the manuscript is about referee injuries, then the prevalence of refereeing-related injuries should be the focus. Otherwise, it becomes murky as the question would be what the injury burden in the general population of this age group of males in Ireland actually is.
The prevalence of Gaelic-games related injury sustained in association with refereeing activity (match play, training and other official duties such as linesman and participation in referee fitness test in this cohort of referees) should be the focus of the manuscript. Therefore, the results have been revised to present these data. This constitutes a major revision to the numerical results in the tables and text. The discussion has been amended to focus on the Gaelic games injury rather than total sport injury burden.

Some mechanism of injury information would be useful to establish what elements of referee work lead to injury. In table 2, you refer to the mechanism of injury but this is not mechanism but context. For mechanism, you would want to know if the injury occurred during sprinting, falling, twisting, etc.
The data were revisited and injury mechanism was extracted from the open text descriptions of circumstances surrounding injury. This has been included in table 2.

**Minor Essential Revisions**

There is a published paper about Australian football umpire injuries which is old but could be useful for comparisons and providing a comprehensive literature summary. The citation is: Brukner P, Kahn K, Carlisle J. Comparison of significant injuries in AFL players and umpires. The Australian Journal of Science and Medicine in Sport 1991; 23 21-23
Thank you, paper sourced and discussed
Define GAA when used the first time in the methods
Definition provided

The definition of injury is “any injury……” It’s not really an injury definition, but more the threshold for reporting of an injury. Have other authors used this definition? Can you validate it?
Consensus injury definition in Gaelic games was lacking at the time of the study. Greater explanation provided in the text to justify use of the chosen criteria.

Paragraph 1 of the results refers to “no statistically significant differences” but since no statistical tests were used, you cannot use this. If you were using overlapping confidence intervals to establish the potential for significance, this should be stated in the methods and references provided for the appropriateness of this usage.
One way ANOVA, Chi square tests and Fisher’s exact tests were performed to explore differences between the three refereeing subgroups across a range of variables, but none were noted. It was felt that that this analysis did not contribute to the results, since there were small sample numbers in the subgroups and potential errors associated with multiple tests were also a consideration. The reference to statistical testing in the text should therefore have been removed and has now been rectified.

There appears to be some confusion about when to use the whole sample or the injured sample for calculating the percentages. When the percentage relates to a descriptor of injury such as the context (e.g. training vs. other) or region injured, it should be the % of the injured sample.
In some instances injury percentages were given as both as % injured sample and total respondents as it was felt that this might be of interest to readers. Rectified to remove unnecessary percentages.

In the method of treatment, there is a statement that “physiotherapy was required” – I think this should be modified to “a physiotherapist was consulted” or else define who determined that this treatment was “required”. It’s a small point but worth clarifying.
Agree that personal choice determined consultation and not all consultations were prescribed. Text has therefore been changed to ‘consulted’

In the author’s contributions, who is CS? This doesn’t appear to correspond to any authors.
Typographical error, should read CG for Conor Gissane.
Carlo Castagna

Major Compulsory Revisions

I have noticed that the age span of the GS referees is very wide ranging from 28 to 55 years. That is quite higher than that I usually observe in elite level soccer referees. I am wondering if the authors may develop a reasoning or introduce their data through an age perspective to explain the high injury rate noticed. This has been included in the discussion related to overall prevalence, overuse and recurrent injuries.

In the “Results” section the authors reported a statement of significance in differences. Anyway they did not provide in the “Statistical analysis” the way they achieved that and the level of significance used. One way ANOVA, Chi square tests and Fisher’s exact tests were performed to explore possible differences between refereeing subgroups across a range of variables, but none were noted. It was felt that that this analysis did not contribute to the results. There were small sample numbers in the subgroups and potential errors associated with multiple tests were also a consideration. The reference to statistical testing in the text has been removed.

Injury definition: I would suggest the authors to create a rationale for the definition they used for injury. Greater detail and justification included in the text.

I would suggest the authors to provide if possible more details about the validation of their questionnaire. Face and content validity examined through the pilot phase. More detail included in the text.

Any relationship between activity (training/refereeing) commitment and injury rate? Data not sufficient to explore this accurately, acknowledged in the text.

I would suggest authors to take into consideration the average age of the GS referees in order to develop their reasoning about injury occurrence. Included in discussion

Minor Essential Revisions

In “subjects recruitment” please fully explain GAA as that was its first citation. Explanation provided in text.

Discretionary Revisions

What were the professions undertaken by GS referees in order to allow them such a free time for their sport commitments? Occupational details were not collected, so it is not possible to comment on this. In practice most elite level (inter-county) games take place at weekends, while the club level games take place at weekends or on weekday evenings during the spring to autumn period. It would not be uncommon for these referees to officiate at both levels on any given week, while having full time employment.

In order to improve the paper quality I would suggest authors to develop if possible a paragraph addressing future studies. Also can they give some practical suggestions in order to guide injury occurrence reduction? Included in discussion
Mario Bizzini

It would have been good to have some description of the game, and also on the officials. Not all the readers will probably know Gaelic football & Hurling. Greater detail provided in background section on the nature of the games and on the referees.

Even considering the potential inaccuracy of the retrospectively collected data, it would have been also of interest to present (estimated) injury incidence rates for match and training. We revisited the data to explore this and while it would be possible to extrapolate match exposure from the weighted average range of games/week reported, there are limitations. These include variances in frequency of competition activity over the year, which have not been captured, while there is also a difference in the duration of game play at different levels of competition (60 mins at club/county level and 70 mins at intercounty level).

As regards training exposure, the data collected were mainly frequency of different training type per week. Duration of endurance training and sprint training were recorded, but data concerning duration of strength training and gym activity are limited.

Given these limitations, on balance it was felt that the nature of the data collected would not allow a reasonably accurate estimate to be made. This limitation acknowledged in the manuscript.

With a mean age over 40 years, and with a considerable exposure time in matches and training, one would expect not only a certain risk for acute injuries, but also a high proportion of overuse problems. This aspect (likely because of the nature of the questionnaire used) was not addressed in the study, and this should mentioned under the “limitations”. Injury mechanism was extracted from questionnaire responses and inserted into table 2. Thirteen percent were reported to stem from overuse and 25% were reported to be a recurrence of a previous injury. The possible relationship between overuse and recurrent injuries and both age and the level of exposure of the referee cohort has been included in the discussion.

Same consideration for the response rate (to the questionnaire): 80% is good (but of the remaining 20% we don’t know), but this is another point to be mentioned under the “limitations”. Now acknowledged in the text as a limitation of the study.

In the discussion, some comparisons are made with a study on soccer referees of the FIFA selection 2006. It is to note that this group stated to officiate less than 40 matches per year in average, whereas most of the Gaelic referees stated to officiate 3-4 times per week. This is quite a difference in match exposure time, which would be of interest to discuss. More attention given to this in discussion.

I would suggest to expand the “limitations of the study” paragraph with the above mentioned issues. Limitations expanded in manuscript.

For the discussion, the comparison with the soccer referees could have been a bit more detailed, and additionally few other papers could have been taken into consideration: Have included more detail in discussion as suggested. Thank you for additional references – these have been integrated.