Author's response to reviews

Title: An investigation of motor learning during side-step cutting, design of a randomised controlled trial.

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Version: 3 Date: 8 July 2010

Author's response to reviews: see over
Groningen, July 8th, 2010

Subject: Revision Ms. No. 1590778641365298
Design of a randomized controlled ACL injury prevention study.
Anne Benjaminse, Koen A.P.M. Lemmink, Ron L. Diercks and Bert Otten

Dear Dr. Shipley:

Thank you for your e-mail dated June 4 2010. Please, find enclosed the revised manuscript. We have revised the manuscript by some major modifications based on the comments made by the reviewer. The revised sections are written in red color. The deleted sections are indicated with a strikethrough.

In addition, please find enclosed our point-by-point response to the comments raised by you. In the responses I have referenced the specific location in which we made changes based on the comments.

Thank you for the opportunity to revise the manuscript to make it acceptable for publication.

On behalf of the co-authors, sincerely,

[Signature]
Reviewer's report
Title: Design of a randomized controlled ACL injury prevention study.
Version: 2 Date: 19 May 2010
Reviewer: Jay Hertel

Reviewer's report:

Major Compulsory Revisions
Title: The title implies that this is a randomized controlled clinical trial with the primary outcome measure of ACL injury prevention when in fact this is a laboratory based biomechanics study. This must be made obvious to the reader. Please revise the title accordingly.

A: You are completely right. We have changed the title accordingly into: “An investigation of motor learning during side-step cutting, design of a randomized controlled trial.”

Abstract, Background: The focus of this investigation is to assess the role of implicit and explicit motor learning yet these terms do not appear in the abstract. Also, the purpose statement implies that you are sure that the training programs will result in improved dynamic stability of the knee, but this actually seems to be the question that is being asked in this experiment.

A: We have deleted the previous purpose statement and added your suggestion saying that the focus of the investigation is to assess the role of implicit and explicit motor learning in optimising the performance of a side-step cutting task.

Abstract, Discussion: There is quite a bit of ambiguity in this section. Statements such as “…suggested to be…”, “…may potentially reduce the ACL injury rate…”, and “…which should maybe more focus…” demonstrate the tenuous scaffolding of this study. This study is measuring biomechanical variables and the potential impact of this study should not be overgeneralized to injury prevention. The emphasis in this section should be on the ability of the intervention strategies being studied to change biomechanical variables, not injury rates.

A: Again, good comment. We have adjusted this. In the abstract-discussion section we have deleted “These are modifiable…” – “…incidence remains high.” Also, we noticed that the same trend was present in the Discussion section, we have therefore deleted “The goal of this research…..” – “….towards the individual needs.” We replaced this last section by “The purpose of this research project is to highlight the issue of motor learning in optimising sports performance.”

Methods, Study Design: Where does learning group (implicit, explicit, control) factor into your study design? Also, where do pretest (1st five trials) and posttest (last 5 trials) factor into your study design? It seems to me that your study has two between subject factors: learning group (implicit, explicit, control) and gender (male, female), and one within subject factor: time (pretest, immediate posttest,
The two different movement tasks being tested do not appear to be factors in your design but instead are dependent variable components.

**A:** There are indeed two between subject factors: gender and intervention group. And there is one within-subject factor: time, ie. t1, t2 and t3. I think this answers all your questions about the factors.

On the five trials, these are 5 baseline trials (in addition to the 30 trials) with no feedback. They do not factor in our study design are these are only five trials to investigate homogeneity across groups at baseline.

The two different tasks are indeed not a factor in our design, as we only capture the side-step cutting trial and the straight ahead trial is an extra trial to make the task reactive.

Methods, Study population, power analysis: Justification of the desired effect size of 0.38 is needed. This needs to be put into the context of the unit of measure to be of value to the clinical readership of this journal. Is the desired magnitude of difference of clinical consequence?

**A:** We have now changed the power analysis. We conducted the analysis again with the clinical relevant data from Hewett et al. (Hewett TE, Myer GD, Ford KR, Heidt RS, Jr., Colosimo AJ, McLean SG, van den Bogert AJ, Paterno MV, Succop P: Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: a prospective study Am J Sports Med 2005, 33:492-501.). You can read the explanation in the paragraph “Study population”.

Methods, Intervention: Table 1 lists a Control Group, however the details of what this group will do is not described in the text of the methods. Additionally, it is not clear why the control group will not return for the retention test. This seems to be very important in establishing the stability of these measures over time and necessary to truly understand the impact that the implicit and explicit learning interventions have on the outcomes being measured.

**A:** This was an error. The control group does return twice as well (one week and one month retention test). This is indicated now in Table 1 as well as in the text of the Methods, Intervention section.

Methods, Statistical Analysis: Several questions here:

1st paragraph: “...from the first five trials and compared to the last five trials will be analysed using an independent t-test.” How does learning group factor into your analysis? How does the retention test factor into your analysis plan? Also, how does gender factor into this analysis? This does not mesh with what is presented in the last paragraph of this section.

**A:** We looked at our statistical analysis again and concluded that an independent t-test for the first and last five trials is not the best analysis possible. Instead, the growth (slope) of the learning curve will be analysed. The retention factor is a within subject factor, analysed within the
MANOVA. The rewording of the statistical analysis can be read in the paragraph “Data acquisition and statistical analysis”.

Also, in this paragraph we refer to the primary outcome measures. Please be referred to the paragraph “Measurements” to see our primary and secondary outcome measurements.

-Last paragraph: Here a linear mixed model is described as the analysis with learning group, gender, and time being the factors of interest. The analysis plan needs to be described more clearly so that it coherently aligns with the study design.
A: The linear mixed model is deleted.

-How do the authors plan to deal with the issues of multiple comparisons? MANOVAs of related dependent variables? Bonferroni corrections?
A: Post-hoc Bonferroni adjustments will be conducted for the within, between and interaction effects. This is also added in the text of the manuscript in paragraph “Data acquisition and statistical analysis”.

-A CONSORT flow chart of your study design should be added.
A: Could you please indicate how you would like to see the CONSORT flow chart at this time as we haven’t conducted the study yet and therefore at this time we aren’t able to indicate how many subjects are lost to follow up or weren’t included in the analyses for example. Please let us know and we will add the chart accordingly.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests: I declare that I have no competing interests.