Author's response to reviews

Title: Risk factors of acute and overuse musculoskeletal injuries among young conscripts: a population-based cohort study.

Authors:

Henri Taanila (henri.taanila@uta.fi)
Jaana H Suni (jaana.h.suni@uta.fi)
Pekka Kannus (pekka.kannus@uta.fi)
Harri Pihlajamäki (harri.pihlajamaki@uta.fi)
Juha-Petri Ruohola (juha-petri.ruohola@mil.fi)
Jarmo Viskari (jarmo.viskari@mil.fi)
Jari Parkkari (jari.parkkari@uta.fi)

Version: 4 Date: 19 January 2015

Author's response to reviews: see over
Dear Editor,

Thank you for your e-mail including the comments on our manuscript entitled “Risk factors of acute and overuse musculoskeletal injuries among young conscripts: a population-based cohort study”.

We thank the reviewers for their constructive criticism and comments. We have revised the manuscript according to the reviewers’ suggestions in blue font. Our point-by-point responses below are given in italics in the same order as the suggestions given in your letter.

We hope that the revision and responses given are satisfactory and that the revised manuscript is acceptable for publication in the BMC Musculoskeletal Disorders.

We appreciate the opportunity to revise the manuscript and look forward to hearing from you soon.

Yours sincerely,

Henri Taanila
Author's response to reviews

Title: Risk factors of acute and overuse musculoskeletal injuries among young conscripts: a population-based cohort study.

Authors:

Henri Taanila, Jaana H. Suni, Pekka Kannus, Harri Pihlajamäki, Juha-Petri Ruohola, Jarno Viskari, Jari Parkkari

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Reviewer 1

Comments for the author

The topic itself is interesting and worthwhile. In general, the manuscript reads well and the quality of written English is good (from a non-native perspective) and the coherence is excellent. The design is strong and the sample size appropriate. Even though the paper is interesting and well written, I do, however, have some major issues (primarily statistical), which need to be addressed. Since these comments may lead the authors to reanalyze their data, specific comments are provided at a later stage in the review process.

Thank you for the careful review of the manuscript!

Major comments:

1) Statistics, page 8, Line 9-15: A Forward Likelihood Ratio method to identify the variables to be included in the multivariate adjusted Cox regression model. However, this approach may lead to estimates in the final model, which are biased away from the null, confidence intervals that tend to be narrow, and P-values to be small (For instance, see Steyerberg EW, Eijkemans MJ, Habbema JD. Stepwise selection in small data sets: a simulation study of bias in logistic regression analysis. J Clin Epidemiol. 1999;52(10):935-942.) Although the referenced article focus on logistic regression some parallels to cox regression may be drawn. I see it as a strong limitation that the final result is mathematically / statistically driven (P < 0.20) and not based on a clinically-oriented / research-oriented hypothesis. The authors must justify their use of stepwise procedures to compute their final result based on a multivariate regression (with references to relevant supportive statistical / epidemiological literature) OR reanalyze their data and base their hypothesis on a non-mathematical approach.

Thank you for the important comment! Naturally we had our own clinically oriented hypothesis considering adjustments in the multivariate models based on our and other’s previous risk factor studies (Taanila H, Thesis book: Musculoskeletal disorders in male Finnish conscripts: Importance of physical fitness as a risk factor, and effectiveness of neuromuscular exercise and counseling in the prevention of acute injuries, and low back pain and disability, Tampere University, 2013, p.27-30 Table 2)


Our model taking into account all conceptually compatible (for example BMI was not adjusted by waist circumference since both variables are markers of obesity) that were possibly significant variables (P < 0.20) in the initial univariate models was based on previous literature (Hosmer DW and Lemeshow S (1989): Applied logistic regression. Wiley, New York) and reviewer suggestions during review process of our previous articles (Taanila, Suni et al. 2010; Taanila, Hemminki et al. 2011; Taanila, Suni et al. 2012).

In addition, the reader is able to see how adjustments affect the risk factors when univariate results are presented parallel to multivariate results. As we may perceive, confidence intervals do not tend to narrow and surprising results do not emerge due to multivariate adjustments when compared to univariate results. The choice of certain physical fitness test variable to be the adjusting variable (e.g. standing long jump) was based on our previous risk indicator studies and the presented univariate analysis results.
2) The authors interpret the hazard rate ratio as a relative risk (for instance, page 12, line 4-6 or page 2, line 17-20). Since the outcome was frequent (27% sustained acute injury and 51% suffered from overuse), the risk is overestimated if a hazard ratio is interpreted as a risk. Please revise throughout the manuscript. (for additional information, please refer to Symons MJ, Moore DT, Hazard rate ratio and prospective epidemiological studies, Journal of Clinical Epidemiology 2002, 55: 893-988).

This has now been corrected. We use now the term “hazard rate (HR)” throughout the Results section and also in other sections when commenting the present results. In other sections the term “risk” is used when appropriate.

3) Statistical analyses, page 8, line 1-7: Please describe the Cox regression in a more detailed manner:

- What was the time-scale?

   - 1-180 days. All subjects were planned to be followed for 6 months beginning on the first day of service, but some drop-out from the military or changed company (after initial basic training of 8 weeks) and this was taken into account when calculating exposure times (Fig. 1).
   - This has been mentioned in the end of Participants section in page 5. However, if necessary, we will add the time-scale also in Statistical analysis section.

- How did the authors validate the assumption about proportionality, -log-minus-log plots; Observed versus expected plots; other?

   Cox’s proportional hazard model assumptions were assessed by using the Schoenfeld residuals (Kleinbaum and Klein 2012). This has now been added to last paragraph of Statistical Analysis Section. This lead to exclusion of two variables (previous physical activity during the last 3 months before military entry and chronic impairment or disability due to prior musculoskeletal injuries) from the multivariate Cox’s proportional hazard models, because the null hypothesis was rejected (considering these variables risk for the injury changed significantly during the follow-up). Hence, the multivariate models were run without these variables including only the variables mentioned in the parenthesis of the Tables 2-5. The results did not change significantly after omitting these variables which can be seen when comparing the present results to previous results. Hence, the Results, Discussion and Conclusion sections remained mainly the same.

   Was the assumption for proportionality checked for ALL explanatory variables? If the rates are proportional for all variables, the use of cox regression is appropriate. If the rates are not proportional, the authors may consider using other regression models (for example: a generalized regression model using the pseudo values method, Klein et al. Analyzing survival curves at a fixed point in time. Stat med. 2007; 26(24): 4505-4519.) rather than the log rank method traditionally used if the assumption of proportionality is violated.

   The assumption for proportionality was tested for all explanatory variables using the Schoenfeld residuals (Kleinbaum and Klein 2012) in IBM SPSS Statistics 22.0.

- It remains unclear how the authors took into account the possibility for sustaining Al or OI amongst the non-injured. From my perspective, all conscripts were at risk for Al and OI at baseline and, as a consequence, the data should be analyzed using competing risks (See Putter H, Fiocco M and Geskus RB. Tutorial in biostatistics: competing risks and multi-state models. Stat Med 2007; 26: 2389-2430). Did the authors do this?
Thank You for the interesting reference! All conscripts were at risk for acute and overuse injuries at baseline. Naturally we could have chosen to focus only for acute or overuse injuries. However, we would like to introduce the predictors for both acute and overuse injuries in the real life setting where competing risk exists. In addition, we ran analyses by using cross-tabulations and Cox’s proportional hazard models to explore if a previous acute injury (acute injury antedated overuse injury during the follow-up) was a risk factor for sustaining overuse injury during the study period. Vice versa we ran analyses to explore if a previous overuse injury was a risk factor for sustaining overuse injury. These previous injuries were not risk factors for other type of injuries.

- Did the authors analyze time-to-first injury or did they include injury reoccurrences?

  Exposure times for acute and overuse injury incidence rates were calculated until onset of the conscript’s first acute injury and/or overuse injury, as expressed in the Statistical Analysis section.

  The secondary outcomes were defined as an incidence of time loss of at least 7 active service days due to acute (referred to as a severe AI) or overuse (referred to as a severe OI) injuries to explore predictors of injuries that debilitate service clearly.

  -This has been mentioned in Statistical analysis section.

  -Considering these secondary outcomes, also the injury reoccurrences were charted. Time losses due to previous injuries were taken into account when calculating the exposure times for these secondary outcomes.
Reviewer 2

General Comments, I wish to congratulate the authors on their article which I read with great interest. There are some concerns about criteria adopted for choosing the participants. I have listed some specific comments below for your consideration. Please regard them as constructive recommendations which you may want to improve the manuscript.

Thank you for your comments and review of the manuscript!

Specific Comments

- I suggest you to change the flowchart design. Try to use a central column with main information and small parallel rectangles (beside) informing the details.
  
  This has now been revised. We have now used central and beside columns.

- I think that the tables bring a ton of data. I suggest you to create and send tables with univariate analysis as supplemental files. Only show the results of the multivariate analysis in the manuscript.
  
  We and the other Reviewer would like to preserve also the univariate results in the main result tables. Hereby the reader may follow how adjustments by other variables affect the risk indicators.

- The Discussion section has 13 paragraphs. Summarize the Discussion section only discussing the main results.
  
  We have now omitted some paragraphs from the Discussion and made it more concise.

- Summarize the Conclusion section. There are more 200 words in the Conclusion section.
  
  The Conclusion section has now been summarized.

- Add as limitations the high lost follow up rate (938/1411, 33.5%).
  
  This has now been added as a limitation in the Discussion.

References:


