Author's response to reviews

Title: Patterns of clustering of six health-comprising behaviours in Saudi adolescents.

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Author's response to reviews: see over
Response to Reviewers and Editor’s Comments

Editor

Many thanks for the helpful and constructive comments. We have now included the Ottevaere et al (2011) reference as suggested by reviewer 1 and have also carefully checked and improved the style of written English throughout the paper.

Reviewer 1

Thank you very much for your important and insightful comments.

1) The authors mention that previous studies have differed in the number and types of health-related behaviours and that these studies have not included a wide range of behaviours. However, the presented shortcomings of previous studies could be similarly applicable to the study at hand; this study also differ from the reviewed previous studies in type of behaviours, except for physical activity and smoking, in number of behaviours, and it does not include a significantly wider range of behaviours than previous studies (the reviewed studies ranged from 2-5 behaviours, whereas the current study included 6 behaviours). Hence, here it would be important to present a stronger argument; how does the current study contribute to or strengthen the current literature?
Response: We have revised the introduction to clarify and explain how the current study goes further than previous studies in terms of the types of health-related behaviours included in our analysis. We also state that most studies only included two behaviours in their clustering analysis and that the methods of analysis used in our study are more advanced to those used previously (see lines 73-136).

2) On what theoretical grounds were the studied behaviours included in the current study? What was the goal of the cluster analysis?

Response: As outlined in the revised introduction two theories informed the selection of the health behaviours, namely the Problem Behaviour Theory and the Gateway Theory (see lines 74-84; 116-119). Moreover, we tried to present a broader range of adolescent behaviours in the analysis including toothbrushing to physical fighting (see lines 118-130).

The HACA is a rigorous methodological tool that can be used to highlight the multidimensional relationships between health-related behaviours. It gives more stable solutions to clustering compared to other analysis methods [see Methods lines 213-229 and Discussion lines 297-306].

3) Overall the introduction should be strengthened in terms of theoretical background, and more elaborately stating the gaps in literature, which the current study aims to fill.
Response: We have now revised and extended the introduction in terms of the theoretical background and gaps in the literature. (see lines 108-136)

4) The following article may also be of interest to the authors and possibly be useful in extending their background literature:


Response: Many thanks for recommending this useful paper which we have now included in our paper.

5) A short presentation of the stability analysis of HACA would be optimal

Response: We have now explained in more detail about the stability of the cluster analysis (see Methods lines 219-229 and Results lines 266-269).

6) Why did the authors not perform a further validation of the clusters, that is, for example compare the clusters on external variable(s) that were not included in the clustering procedure?

Response: Correlation coefficient between cluster variables was used as a measure of validation of the clusters. For example, it showed significant positive correlations between low fruit consumption and low physical activity (cluster 1), and between
smoking and physical fighting (cluster2) (see Methods lines 222-224 and Results 266-269).

7) In line with results presented by the authors in Van Nieuwenhuijzen et al. [4] study, why was clustering analysis not performed separately for the two different age groups in the sample (13-14 and 17-19 years old)?
Response: Separate cluster analysis by demographic (age) and socioeconomic factors will be published elsewhere using different statistical analysis in a separate forthcoming paper. The scope of this paper was to give a broad overview of how the six behaviours clustered together among adolescents using an innovative statistical method (HACA).

8) What percentage of the sample was included in each cluster?
Response: Hierarchical Agglomerative Cluster Analysis (HACA) was used to identify the stable cluster solutions and concern about the interrelationships of specific types of behaviours in each cluster regardless of the number of subjects in each cluster.

9) Was there some particular reason why the clusters were not analysed based on demographic characteristics, parent’s occupation, and/or the school?
Response: As explained in point 7 above we intend to publish a separate paper on the determinants of the clusters.
Minor Essential Revisions

10) Please amend first sentence in abstract; “Clustering of multiple health-compromising is usually associated with increased risk of cardiovascular diseases and cancers.”

Response: The first sentence in the abstract has now been amended (see lines 42-43)

Reviewer 2

Many thanks for the positive and helpful comments on our paper.

11). This is an interesting descriptive manuscript addressing a relevant and timely issue. The manuscript is well written and the Introduction section clearly presents the research question and objectives. However, I think the authors should provide in the Introduction section evidence supporting the association between the selected studied risk factors and health outcomes in adolescence.

Response: Many thanks for these constructive comments. We have now extended the introduction to cover the association between the selected studied risk factors and health outcomes in adolescence. (see lines 108-124)

12). The main of shortcoming of the manuscript is the lack of attention to the description of the prevalence and associated factors of the different combinations of the six health health-compromising behaviours.
Response: Thanks for this comment. The prevalence of the different combinations of the six health-compromising behaviours will be published in subsequent paper. The aim of this paper was to assess how the behaviours clustered together in stable cluster structures using the advanced HACA analytical methodology.

13). Also some methodological aspects should be clarified. Should the authors provide in the methods section a clear description of the reason for selecting 22 among 55 schools? The participation rate is surprisingly high and deserves a comment.

Response: We have now clarified in the methods section details of the sampling technique and response rate. The sample schools were randomly selected from 515 intermediate and secondary schools in Riyadh. (see lines 147-185). The high participation rate was a consequence of approaching students directly in their school environment (see lines 310-312).

14). Finally, I would suggest i) expanding the discussion section particularly addressing the pathways linking each of those risk factors, and also clustered risk factors, with health outcomes in adolescence; ii) list and comment the main study's limitations.

Response: Pathways linking clustering of the six behaviours with health outcomes in adolescents is important, but it is beyond the scope of this study. We have revised the study limitations (see lines 313-323).