Author's response to reviews

Title: Health promotion in primary and secondary schools in Denmark: Time trends and associations with schools' and students' characteristics

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Author's response to reviews: see over
Dear editor and reviewers

Thank you for your comments regarding the manuscript "Health promotion in primary and secondary schools in Denmark: Time trends and associations with schools' and students' characteristics" submitted for publication in BMC Public Health. In this letter you'll find a point-by-point response to the comments. Specific changes are written in bold face.

Kind regards,
Kirsten Nabe-Nielsen

Reviewer 1
This is a cross sectional study aiming at elucidating time trends in the type and number of health promotion activities in Danish primary and secondary schools and to investigate the characteristics (of schools?) associated with participation in these activities. The survey is based on data from questionnaires filled out by students and headmasters at two time points, thus giving the opportunity to look at associations and time trends. The study is part of the WHO-coordinated Health Behavior in School-aged Children (HBSC) study, which is conducted every fourth year among 11-, 13-, and 15-year-old children. The methods are described, and strength and limitations of this method is clearly stated. As the method is given as part of the HBSC survey it is unclear, why which questions and cut points for analysis were chosen. Clarification to the background, research question, methods and perspective will enhance the enthusiasm for the manuscript. Attention to the following will strengthen the manuscript.

Major Compulsory Revisions

1) In the abstract and the introduction (last paragraph) it is not clear how to interpret the many versus few health promoting activities.
   a) Please state whether this number is per year or any different time span.
   b) Likewise it would clarify the second aim in the abstract to mention characteristics of schools and not just characteristics (at the end of first paragraph in the background section in the abstract)

   1a) We have added: "...health promoting activities during the preceding 2-3 years..."

   1b) We have made the following change: "The second aim was to investigate which characteristics of schools and students that are associated with participation in many (≥3) versus few (0-2) health promoting activities."

2) In the introduction (fourth paragraph) the authors imply the relevance of their study to public health practice and research. It would improve the usefulness of the manuscript if this important issue were addressed in the end of the discussion in form of perspectives.

   The following paragraph has been added to the discussion, and we—point by point—comment on the issues mentioned in the introduction:

"Perspectives
With reference to the study's relevance to public health practice and research as mentioned in the introduction, we find no signs of an alarming decrease in engagement in health promotion at the..."
school level which warrants immediate action. However, the (significant) decline in anti-smoking activities and the (insignificant) decline in sex education indicate that future attention is necessary. As we did not find convincing predictors of participation in health promoting activities the results of the present study cannot be used for selecting schools that are in need of e.g. instrumental or economical support in order to initiate health promotion. Cross-cultural studies with comparable data from different countries may determine whether the similarities between the schools, as observed in the present study, are due to the societal context within which the Danish schools operate. Finally, as this study does not support a hypothesis of a strong selection into health promoting activities, we suggest that this concern should not keep researchers from initiating non-randomized intervention studies in the future while still taking appropriate account of potential confounding factors.

3) In the material and methods section:

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| 3a) | The questionnaire for the headmasters has been changed from year to year, and it has not necessarily been intended that it should include the same items from year to year. In the Material and Methods section, we explain that:  
"We calculated the total number of activities that each school engaged in (range 0-6; to obtain comparability, the response option 'Alcohol and/or drug abuse' was excluded in the sum as this information was only available for 2006)."

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| 3b) | We have added the following sentence to the paragraph:  
"As we did not have a predefined definition of what constitutes few and many health promoting activities, the median was chosen as cut-point in order to obtain two groups of approximately equal size."
We could have chosen to use another cut-point, e.g. ≥5 activities, however this group would become very small then (n=19 in 2006 and n=12 in 2010). Another choice could have been to analyze variables associated with low participation in health promoting activities and then used the cut-off point at <2 (n=16 in 2006 and n=9 in 2010). Again the results would be (even) smaller groups than by dichotomizing by the median.

As a response to this peer-review, we analyzed the data using linear regression models with the same...
results as described originally. One exception is, however, that the percentage of ethnic minorities is significantly associated with the number of health promoting activities (beta=0.016; 95% CI: 0.000-0.032, p=0.046). However, as this result appears post hoc and because the remaining results seem robust regardless of the choice of analysis, we prefer not to stress this new finding in the manuscript.

To reflect the above considerations, we have added the following sentences to the results section:

To perform a post hoc investigation of the sensitivity of the results in relation to the choice of statistical method, we performed the same analyses using a general linear model with number of health promoting activities as continuous outcome. The results of the general linear model mimicked the results of the binary logistic regression. Thus, the results are rather robust in relation to the statistical method used.

3c) In 2006, 19% of the schools had reported that the 'access to food' corresponded to the school's needs, and in 2010, 23% reported that the 'access to healthy food' corresponded to the school's needs (p for difference 0.579). It is true that there is a qualitative difference between having access to food in general, and then having access specifically to healthy food, and we would expect the frequency of reporting 'yes' to access to food would be lower than the frequency of reporting 'yes' to access to healthy food'. As the actual influence of these changes is speculative, we have added a rather neutral comment on this limitation (also including the other mentioned differences between the questions in 2006 and 2010):

"The slight changes in the questions in the headmasters' questionnaire may have influenced the comparability of the data over time (e.g. with respect to the facilities for health promotion the response option 'access to food' (2006) changed to 'access to healthy food' (2010); the time frame for health promoting activities; and omission of the response option 'alcohol/drug abuse')."

3d) Thank you for leading our attention to this error. The variable is trichotomized as it appears in Table 2: "Very/somewhat affluent", "Like the average", "Not at all/not so affluent" (has now been corrected in the text, and the order in which the response options appear have been changed so that they follow the same order as in the table)

3e) To clarify how leisure-time physical activity was measure, we have added the seven response categories:

"The seven response categories were 'every day', '4-6 times a week', '2-3 times a week', 'once a week', 'once a month', 'less than once a month', and 'never'. The variable was dichotomized into '4 times a week or more' versus 'Less than 4 times a week'. The choice of cut-point (i.e., ≥4 times/week vs. <4 times/week) was determined in order to obtain two groups of similar size while at the same time—as far as possible—adhering to the guidelines for vigorous physical activity among children."
Minor Essential Revisions

4) In the material and methods section:
   a) Study design and population: results of participation rate and response rate might be more suitable for the start of the result section.
   b) Social climate (2010): the statement in parenthesis "(none of the participants used the last two response options)" is better suited for the result section.

4a) We believe that a description of response rates relates to the presentation of the material. It is not totally clear from the instruction to authors where BMC Public Health prefers that this information occurs. In a new, comparable paper from this journal (BMC Public Health 2014, 14:1216), response rates are included in the Material and Methods section.

4b) We have now provided this information in a table note (Table 2).

5) Discussion (fourth paragraph): the authors speculate, that the lack of association between students health behavior and schools health promotion, might be explained by that the fact, that participation in health promotion activities have improved the health behavior of students. Would it not be possible for the authors to verify that by looking into the data of student’s health behavior in 2006 compared to 2010?

Unfortunately, the HBSC consists of a new sample at every survey, which means that we can follow the time trends at the national level (if we assume that the schools are representative for all Danish schools) but we cannot follow the development at individual schools.

6) Table 1 and 2: Headings for tables are too long... I would prefer a simple and clear heading like “Differences between Danish HBSC schools in 2006 and 2010” and the rest of the text as notes UNDER the table. The same goes for table 2: “Differences between schools that participate in few vs. many health promotion activities” and the rest of the text as notes UNDER the table.

Table 1 and 2) The sentence about information only from 9th graders is now a table note.

Table 1) We think that the information about significant values applies to the whole table, and is therefore best suited in the heading.

Table 2) The explanation of OR and 95 CI is now a table note.

7) In the discussion (second paragraph) the authors write “We have no comparison for the remaining types of health promotion” - how is that, when the study is part of the European HBSC?

The project leader from the Danish part of the HBSC has explained that indeed there exists a standardized questionnaire for the headmasters. However, this questionnaire is not in use in many of the participating countries, including Denmark. Thus, unfortunately we cannot obtain comparable data from other HBSC-schools.

8) Discussion (last paragraph): “School headmasters’ responses to questions about their school’s participation in health promotion may be subject to a wide variety of individual interpretation” This is a very important weakness of the questionnaire to address. The validity of the main question is strongly dependent on the quality of data for this main exposure. It could be interesting with the Authors’ view on how this part of the method could be improved in further surveys.

We have added the following text to the discussion: "The validity of the measure would have been improved, for example, by explicitly defining what is meant by the term 'project' and by being more precise about the time frame (especially the term 'last couple of years', which was used in 2010, is open for individual interpretation). However, to grasp the potential comprehensiveness of schools' participation in health promotion, questions about specific activities, duration of the projects, participants, and methods need to be inquired."
9) I am a little confused what reference style is used. The first reference mentioned in the introduction has number 4? How come that is not number 1, which does not occur until the end of the discussion? Also I think that reference number 21 is not referred to in the text? Please check the correctness of your reference use.

Thank you for leading our attention to this problem. The references occur in alphabetic order in the reference list, thereby follows the mixed order in the text. We have revised the references in the text. Reference no 21 (now 15) occur in the paragraph "Questionnaire for student".

10) Introduction, second paragraph (line 65): I believe the word “of” is lacking between “frequency” and “different”

Thank you

11) Discussion, first line: a “0” is missing in 2006.

Thank you
## Major compulsory revisions

The article presents interesting data. The quality of the paper would be substantially improved by including a background for why the research questions are of importance and why and how it is expected that school profiles will vary by school and student characteristics, e.g. ethnicity and school size. In its current version it is for example not easy to understand why teachers’ sick-leave is addressed nor students’ truancy. Further, the school characteristics addressing social capital are also hard to interpret the relevance of. The paper will benefit from a more narrow focus of analyses where each component included is argued for, i.e. why and how is it expected that the component will contribute to the understanding of the relationship between school health promotion activities and student behavior.

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<th>We have made the following changes in the introduction, where we comment on each of the included independent measures in order to argue for their relevance:</th>
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<td>&quot;Furthermore, only few studies have described what characterizes schools that engage in health promotion. Factors that have been investigated are school compositional characteristics (e.g. number of students or percentage of White students), and socioeconomic indicators (e.g. discretionary dollars per pupil) [11; 12]. None of these studies were conducted in Scandinavia, and therefore we wanted to investigate whether schools’ engagement in health promoting activities also related to these school characteristics (i.e., school size, ethnic composition, and affluence) in a Danish context.</td>
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<td>Also the social environment/school climate and headmasters’ attitudes about the school food environment has been mentioned as crucial factors for health promotion at the school level, along with a health enhancing physical environment, e.g. access to healthy food choices in the school canteen or necessary facilities for sports [8; 13; 14]. Therefore, we also wanted to investigate how measures of the social climate among teachers and students, respectively, and the availability of school facilities for healthy food choices and physical activity, were related to schools’ engagement in health promoting activities. We also argue that competing problems at the school and in the local area, e.g. in terms of sick leave, truancy, crime, and vandalism would be given priority over health promoting activities. For this reason, we expect that the occurrence of such competing problems would reduce the frequency of health promoting activities although such problems are likely to appear hand in hand with poorer health-related behaviors. In contrast, we expect that a socially and economically resourceful neighborhood would be associated with a higher frequency of health promoting activities in addition to the school curriculum. Finally, students’ characteristics may both be indicative of the need for health promoting activities (i.e. unhealthy behaviors) and a result of such activities (i.e. healthy behaviors). We employ a rather broad health concept, as we include both ‘classic’ risk factors (diet, smoking, alcohol, and physical activity), a risk factor for sexually transmitted diseases (sexual intercourse), and a risk factor for poor mental health (exposure to bullying). “</td>
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Further, a more comprehensive literature review is needed as more studies addressing the relationships between school characteristics (including policy and physical/structural components) and student level health behavior exist.

| We agree that there is a vast amount of literature on determinants of student level health behavior including the effect of health promotion interventions. However, what is lacking is literature on what determines schools’ initiation of health promotion, and we have only identified very few studies that analyzed this issue. Due to this comment from the reviewer, we have made an additional literature search on determinants/predictors (of) health promotion (in) schools, and have included another two references (Denman S 1999; Deschesnes et al. 2003). |

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Finally, more critical reflections as to why no relationship was observed between school characteristics and student level behaviors are needed. Among them a more critical analysis of the measures employed as they are fairly generic and diverse.

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<th>To respond to this issue, we have added the following paragraph to the Discussion section:</th>
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<td>&quot;We did not find a significant association between the aggregated measures of the students' characteristics and the frequency of health promoting activities at the school level. There are several potential explanations for this finding. First, as mentioned in the introduction students' characteristics may be both a cause (i.e. unhealthy behaviors) and a consequence (i.e. healthy behaviors) of schools' engagement in health promoting activities and thus any differences may level out. Second, it may be speculated that schools' health promoting activities are initiated because of political incentives and to promote a good reputation. Third, low statistical power may be contributing to the lack of statistically significant differences between the groups. However, this is not likely to be an important explanation as the figures show that the students' characteristics are rather similar when comparing schools engaging in few and many health promoting activities. Fourth, although we aimed at analyzing students' characteristics directly related to the outcomes under study, i.e. dietary habits, level of physical activity, smoking, binge-drinking, sexual habits, and exposure to bullying, we may not have captured the characteristics of the students relevant for school's engagement in health promoting activities.&quot;</td>
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