Author’s response to reviews

Title: Explaining gender differences in non-fatal suicidal behaviour among adolescents: a population-based study

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Author’s response to reviews: see over
Dear Professor Maes,

Thank you very much for the helpful comments on our manuscript and the possibility to revise our work and resubmit it to BMC Public Health. In the following letter we will now include a point-by-point response to each reviewer (the according changes in the manuscript are marked in yellow):

**Comments of reviewer 1 and corresponding answers and changes in the manuscript:**

Reviewer 1 suggested commenting on the possibility of self-report bias in relation to the mood stages of adolescents and in relation to their gender. We considered this suggestion and added some sentences regarding a possible self-report bias in the limitations, discussion section (see p. 10).

Reviewer 1 suggested to also commenting on the possibility of similar results in adolescent self-harm. As the association to self-harming behaviour in adolescents was commented from two of the reviewers, this certainly is a very useful comment and very important additional research question. However, the psychosocial correlates of self-harm from this sample have already been published by Brunner and colleagues (2007) and had similar results regarding their gender distribution and the role of mediating emotional and behavioural problems. We also performed the analyses we did in this manuscript for self-harming behaviour and got the same results: the differences in psychopathology were responsible for almost all of the gender-differences. We therefore decided to include one sentence regarding earlier results on self-injurious behaviour from this sample into the discussion section (see p. 8).

Reviewer 1 wanted to know whether the authors think that the age selected reflects a peak of suicidal behaviour and whether at a later age boys may be more similarly affected with increases in conduct disorder? We therefore added some data and also suggestions on this question into the discussion section (see p. 8).

**Comments of reviewer 2 and corresponding answers and changes in the manuscript:**

Reviewer 2 asked to discuss that the explained information (Pseudo R²) is clearly far below 100% and that thus suggesting that other factors could not been taken into account in the explaining paradigm. As reviewer 2 is certainly right, gender and psychopathology are not able to explain the whole model of suicidal behaviour. Nevertheless, psychopathology is able to explain most of the gender differences. We have taken a further sentence to distinguish these two patterns in the discussion section (see p. 10). However, we would like to state that explaining 30% of the information is a high percentage or rate and more than many models are able to explain in the field of psychiatry/psychology.

**Comments of reviewer 3 and corresponding answers and changes in the manuscript:**

Reviewer 3 touched the important topic of intention and motivation behind adolescent suicidal behaviour. She also asked about additional measurement of deliberate self-harm. As we already assessed and published nonsuicidal self-harm in our survey, we added some hint to the prior publication into the discussion section (see p. 8).
The additional question on deliberate self-harm may also show, that students were probably able to distinguish between self-harm (with a meaning of cutting or burning) or self-harm (as a suicide attempt). We noted that in the method section and also corrected the translation of the questions, because we thought that the questions of the survey would have been much clearer in German that they were in the English manuscript (see p. 5). Unfortunately, we did not include a separate question asking for the concrete motivations underlying deliberate self-harm or suicide attempts which would certainly have been very interesting.

Additionally, she wanted to know 1) whether online lifetime behaviours were included, 2) whether motivations were included in the questionnaire, and 3) whether methods being used were recorded. Unfortunately, we were not able to include questions on motivations and methods in the assessment as this was a large school-based survey and questions on suicidal behaviour could not have been too detailed on this topic. We, of course, agree with reviewer 3 that it would have been of great value to have assessed these data.

Reviewer 3 wanted to have a clear description of prevalence rates of suicidal behaviour in the text of the result section. Therefore, prevalence rates of self-harming and suicidal behaviour were reported included in the text of the results section (see p. 6) and deleted in the text of the discussion section (see p. 7) and in table 1 (see p. 17).

She also asked if we were able to control for depression and anxiety. In the regression model, all emotional and behavioural problems had been controlled by the YSR scales. Depression and anxiety particularly were controlled for by the YSR Scale 3 (anxious/depressed).

Reviewer 3 wanted some clarification of the analysis we chose to understand the interaction between gender, psychopathology, and adolescent suicidal behaviour. As mentioned in the statistical analyses section we used logistic regression analyses to estimate how much the probability of suicidal behaviours can be predicted by gender and/or emotional and behavioural problems.

Reviewer 3 wanted some clarification of the methods used in the study, because she missed measurement of adolescent risk-behaviour. As this was a large survey on adolescent mental health the assessment did also include several risk behaviours. After a long discussion we have decided that we would prefer not to take more risk behaviours into the manuscript. The reason is that we tried to answer one defined research question with this work. That question was whether differences in psychopathology would explain the well known gender differences in adolescent non-fatal suicidal behaviour which had previously been hypothesized by some authors. Of course, there are several risk behaviours like substance abuse, sexual risk behaviour, and excessive consumption of media etc. that are also associated to self-harming and suicidal behaviour, but the presentation of these correlations was not the aim of this work. Additionally, we know that the gender distribution is quite different in other risk behaviours such as substance abuse or pathological internet use for example. We hope that this decision will be acceptable by the reviewers and the editorial team.

Reviewer 3 suggested relating our findings to other epidemiological studies on adolescent self-harming behaviour. We had already tried to keep our findings closely related to previous
research before, but tried to extend this according to the suggestions of reviewer 3. For example, this was done in the first paragraph of the discussion section (see p. 7) and there are related studies in paragraph 2 and 3 (see p. 8-9).

Reviewer 3 suggested entering p-values in the tables, and also some sociodemographic variables as possible predictors for suicidal behaviour. We think that p-values represent the probability of erroneously rejecting a priori formulated null hypotheses when they are actually true. Since we did not formulate such null hypothesis before data collection, p-values should be interpreted with caution. We feel that reporting confidence intervals instead of p-values for the regression coefficients is more appropriate for the explorative manner of our study. However, if there is still a strong request to enter p-values in the table, we will be able to do so. Sociodemographic variables were not included in the regression models, because we focused on the question of explaining the gender differences in suicidal behaviours by psychopathology. Since we did not expect any gender differences in our basic sociodemographic variables they cannot contribute to the explanation of the gender differences in suicidal behaviours. That was the reason for putting them into the sample description, but not into the regression model.

Minor revisions of reviewer 3 were on:

Reviewer 3 found the final section on sample size in the study population and design section confusing and required clarifications. We therefore gave more detailed information on the study sample (students who were absent on the day of assessment, students who did return their questionnaires, students who had missing data) in order to give a better understanding on the final sample of adolescents (see p. 4).

Page 5: it would be useful with a section on sample size and power analysis in the statistical analyses component. We did not perform any power analysis because the study was explorative and not confirmatory. Our aim was to estimate prevalences and correlations with the highest possible precision limited only by our resources.

Reviewer 3 suggested changing the sentence “The Bayes Information criterion (BIC) allows comparing models according to their estimated....” to “The Bayes Information criterion (BIC) allows comparison of models according to their estimated....”. We accordingly did this (see p. 6).

Reviewer 3 suggested changing the sentence starting “Females students had significantly higher scores in the scales withdrawn, somatic complaints, anxious/depressed.....” to “Females students reported significantly higher scores on the scales measuring withdrawal, somatic complaints, anxiety/depression.....”. We also changed this sentence according to her suggestions (see p. 6).

Reviewer 3 required clarification in terms of what was meant by ‘total score’ in the same sentence. Here, the YSR total score for the total amount of emotional and behavioural problems was meant which is now clarified in the sentence (see p. 6).

She also suggested changing the following sentence “This model is also the one with the smallest BIC and therefore the one that we should use...” to “This model is also the one with
the smallest BIC and therefore is the one that we should use...”. This was done accordingly (see p. 7).

Page 7, 2nd paragraph: I don’t understand the sentence starting “The additional effect of gender to the emotional and behavioural problems...”. Firstly, it is a very long sentence, but it is also not clear what is being reported here. This sentence at the end of the results section was rewritten accordingly to make it clearer (see p. 7).

Reviewer 3 suggested to change the sentence starting “boys tend to act out their personal problems and therefore more likely to show...” to “boys tend to act out their personal problems and therefore are more likely to show...”. This was done accordingly (see p. 8).

Reviewer 3 found the sentence “additionally, in case of problems, females tend more to communicating and help-seeking behaviours but also often show ruminative thinking and increased attention to these problems which consequently can lead to an impairment of their mental state and therefore is seen to be a cause for gender differences especially in internalizing problems by some authors” confusing, and suggested that it had to be rewritten. We agree with reviewer 3 and also are thankful for her suggestion: “I think the authors are trying to say that some research has demonstrated that females are more likely to communicate their problems to others and to engage in help-seeking behaviours but at the same time they are also more likely to ruminate about problems they encounter which can affect their wellbeing.” This proposed text was much clearer and exactly what we tried to say. Therefore, we included this reviewer’s formulation in the manuscript (see p. 8).

According to reviewer 3, one full stop after the references was removed (see p. 9).

Reviewer 3 wanted the sentence starting “the main purpose of this study was to analyse...” to be replace by a sentence like “the main purpose was to investigate any potential gender differences in emotional and behavioural problems and the extent to which these are predictive of adolescent suicidal behaviour/thinking.” We did this accordingly (see p. 9).

Page 8, final paragraph: the sentence starting “our results clearly demonstrate that gender alone does only explain 2.3-3.7% of the information of non-fatal suicidal behaviour, while emotional and behavioural problems explain 23,2-30% of the information” should be rewritten to more clearly state what is meant by ‘information’. In addition the comma in 23,2 should be changed to a full stop which was done accordingly. With information we mean the Shannon information log(p) that is used by the pseudo-R² mentioned in the statistical analyses section. For the interested reader, we changed the corresponding citation [29] to an article with a more explicit explanation of how the pseudo-R² is a measure of explained information.

The sentence “overall the results of our study support the view that girls clearly are at higher risk for experiencing non-fatal...”, was rewritten to say “overall the results of our study support the view that girls clearly are at higher risk of engaging in non-fatal...” according to suggestion of reviewer 3 (see p. 10).
Reviewer 4 suggested that the paper could be improved by including a discussion about childhood adversities and suicidality as e.g. childhood sexual abuse is reported to be more prevalent in girls as well, which could also explain gender differences. He also suggested discussing neurobiological gender differences in emotion processing that may account for differences in psychopathology. We very much appreciated these helpful suggestions and inserted the reviewer’s comments into the discussion section (see p. 8-9).

Reviewer 4 asked for some information if there was an “opt-out” procedure for parents who would not want their children to participate. There was no special opt-out procedure for parents but written information 4 weeks prior to the study, but parents were engaged to talk to their children about the study and call the research team in case of any concerns.

Reviewer 4 suggested to change the wording in the sentence “Boys usually tend to act out their personal problems and therefore more likely show aggressive (externalizing) behaviours while girls more often show auto-aggressive (internalizing) symptomatology.” in order to pronounce the fact, that this is to be understood as hypothesis. This was clarified in the sentence in the discussion section (see p. 8).

He again suggested discussing the possible role of traumatic experiences as possible “missing link” between gender, psychopathology and suicidality. Therefore, another sentence regarding the importance of possible missing links between gender and psychopathology was included in the discussion section (see p. 10).

We again would like to thank the reviewers for the interesting and useful ideas, comments, and suggestions which certainly helped us to improve the manuscript. We are looking forward to your decision on this manuscript, and we hope it will find acceptance for publication in BMC Public Health.

Yours sincerely,

Michael Kaess, MD