Reviewer's report

Title: Mental health problems in the 10th grade and non-completion of upper secondary school: the mediating role of grades in a population-based longitudinal study

Version: 2 Date: 14 October 2013

Reviewer: Saskia van Dorselaer

Reviewer's report:

General comments:
Well written paper with clear use of language. Good Summary of the results. I recommend to accept this paper for publication with minor revision.

#1 Background
Discretionary Revision: The authors state that the association between mental health problems and educational outcome through different pathways is not well studied. No references are given. Is it not studied at all? In the discussion there are some references on this topic (under 'Mental health and subsequent educational achievement'). Please integrate these references more in the Background-part of the article.

#2 Minor Revision: (Last paragraph) 'The risk literature for externalising and internalising problems and academic attainment provides clues about potential common causes, such as sociodemographic factors and health behaviour [13, 15, 16].' Please tell more about the content of these references, e.g. which health behaviour is related to mental health problems and how they relate to the health behaviour measured in this paper.

#3 Discretionary Revision: (Last sentence) 'Thus, adjusting for these predictors is important when causal models are tested.' This sentence is more appropriate for the method section.

#4 Methods
Minor Revision (first and second paragraph): In this paper only the four studies between 2000 and 2004 were used. Why mention the one in 1999 and include it in the overall N of 15,966? Now the authors give information about a part of the sample that was never used in the first place. It would be more straightforward to count only the sample which was used and report the response for that.

#5 Minor/major Revision (second paragraph): the authors say on several places (e.g. in the discussion) in the manuscript that little is known about the 12% that did not accept linkage of information. However without the linkage it is easy to analyze the differences between students who did and those who did not accept the linkage of information on age, gender, SDQ-scores, grade point at grade 10
and give a short report on these differences. Although it is only a small proportion who did not accept the linkage, I think this should be part of the description of the sample. Therefore I would like to see such an analysis described in text.

#6 Measures, The Norwegian School System (very welcome information for the understanding of the paper and method):
Minor Revision (first paragraph): I think the sentence 'As early as 1920, the principles of a common school for all were adopted [17].', is too detailed and could be left out.

#7 Measures, Mental health problems
Minor Revision (last paragraph): 'On a 0–20 scale, this corresponds to a difference of 2, which is the difference we use in all regression and mediation analyses.' I understand from this sentence that the SDQ-scores are not calculated on a 0 to 20 scale but with steps of 2, so 0-2-4-6 etc. Is this correct? In different parts of the document the data of the SDQ is described differently. In the part on 'Statistics' I read: 'Direct and indirect effects were studied for a 2-point increase in SDQ score, from 4 to 6 for internalising problems and from 6 to 8 for externalising problems; these intervals were chosen within the main range of the respective distributions.' In the tables it is as "per 10% of range" This is very unclear to me. Please write more clearly how SDQ-scores are used in analysis.

#8 Measures, Sociodemographic factors and family background
Minor Revision (second paragraph, last sentence): 'Members of the Sami population, the indigenous population from northern Norway, are thus defined as ethnic Norwegians if at least one of the parents is born in Norway.' This sentence is abundant since in the first sentence of this paragraph the definition of ethnic minorities is given as 'those having both parents born in a country other than Norway.'

#9 Statistics
Minor issues not for publication: Word missing in the sentence "To determine whether the patterns between mental health and non-completion of upper secondary school were the same in both general and vocational tracks, we re-ran the logistic regressions and causal mediation analyses by stratification on type of track.

#10 Results, background characteristics
Minor Revision (first paragraph): Please add the differences between vocational and general tracks in Table 1.

#11 Minor Revision (second paragraph): Please use small p for p-values and not capitals. (unless this is journal policy)

#12 Major revision (second paragraph): For a good mediation analysis it is necessary to establish the association between all components of the mediation. I miss the association between SDQ and grades. Maybe an extra table is needed with this association and the one between grades and completion as described in this paragraph. I would be satisfied with a description in text.

#13 Results, The association between psychiatric problems in the 10th grade, health behaviour in the 10th grade and non-completion of upper secondary school

#14 Minor Revision: "The association between psychiatric problems in the 10th grade, health behaviour in the 10th grade and non-completion of upper secondary school". Please do not use the term psychiatric problems but mental health problems here. This is measured with the SDQ-selfreport and although the authors discuss the linkage between SDQ and psychiatric problems, I think the term is too strong here.

#15 Minor revision: First paragraph: A lot of information not in the table. If you turn table 2 the information on the difference between voactinal and general track fits in the table.

#16 Minor revision: Third paragraph " The ORs for externalising problems in this model were reduced in both genders [boys; 1.27 (1.21–1.33) and girls; 1.31 (1.24–1.39)]." Please add: but still significant.

#17 Minor revision: last paragraph: "In the final model (Model 3), smoking, alcohol use and physical activity remained independent predictors for non-completion of upper secondary school (Table 4a and b, Model 3)." Alcohol use and physical activity were only significant for boys. Please make this difference.

Results, The mediating role of grade points when analyzing etc.

#18 Minor revision (last paragraph): "However, the sensitivity analysis for direct effects of externalising problems showed low robustness (##< 0.2 for girls and ###< 0.1 for boys)." It is not discussed what the consequences of these findings are for the interpretation of the results. Please give more information, here or in the discussion.

Discussion, methodological strengths and limitations
#19 Minor revision (Second paragraph): "Even though we might have a selective loss to follow-up". If you do additional analysis as mentioned before, more can be said about this, here.

#20 Minor revision (Second paragraph): "Nevertheless, early conduct problems have been found to be associated with lower IQ and attention difficulties, with the result that the difficulties faced by children with conduct problems were exacerbated by lower average IQ and higher rates of attentional problems [31]." If this is true, more differences would be found between the role of externalizing problems and school drop-out between the different educational tracks. This is not the case. Please reflect on this.

Discussion, Our results according to previous findings etc

#21 Minor issues not for publication:
"Externalising problems (conduct problems and hyperactivity–inattention) may reflect a cumulative effect of inattention and learning across the schooling career, and may have an impact on the acquisition of academic skills. Conduct disorders lead to repeated disciplinary actions, which are likely to affect students’ engagement with schooling and to influence their grades. Internalising problems (symptoms of depression, anxiety and peer problems) are likely to disrupt students’ overall social functioning and perceived competence, leading to diminished motivation, but may be less associated with academic skills." Another possibility is that externalizing problems have a more stable nature, they tend to stay over a longer period of time during adolescence and even through adulthood, whereas internalising problems may have of shorter term nature and may disappear when an individual changes school (peer problems).

#22

Table 1
Minor issues not for publication: Please remove the text "sample drop out rate (32,4)". It is confusing since it regards the total sample and not boys and girls and this exact information is also written in the text.

After 'Father's income at age 16' and 'Mother's income at age 16' there is an * but this is not explained. Explain or remove the asterix.

Table 2 to 4
Minor revision: Please mark significant differences between Completers and non-completers in the table, tests (t-test, Spearman Rank test, logistic regression analysis) and level of significance in subscript. A reader should be
able to read a table without much of the additional text.

Table 5 P < 0.005 should be p< 0.05?

**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