Reviewer’s report

Title: Delayed school progression and mental health problems in adolescence: a population-based study in 10,803 adolescents.

Version: 2 Date: 28 January 2014

Reviewer: Alexis Cullen

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This cross-sectional study investigates the relationship between delayed school progression and mental health problems in a general population sample of adolescents. The sample size is sufficiently large to be able to explore these associations (N=10,803) and a range of potentially confounding factors were examined. The results indicate that whilst delayed school progression is associated with mental health problems this relationship is rendered non-significant after adjusting for sociodemographic factors and life events. Minor revisions are recommended:

Minor essential revisions:

1. Abstract > Background: whilst I recognise that the authors have obtained DSP data for the entire school period (i.e., rather than current DSP only) the use of the term ‘subsequent’ here implies that this is a longitudinal study; although this is clarified in the following line I think it would best to omit this term.

2. Measurements > Mental health problems: regarding the validity of the Dutch SDQ, can the authors please indicate the age range here (i.e., has it been validated in participants as old as 18 – if not worth mentioning in the limitations).

3. Measurements > Poor school achievement: In the Discussion the authors state that a stringent cut-off for DSP was applied to include only children with a definite history of scholastic underperformance. Can the authors clarify whether this is additional to the procedure described in the Methods (i.e., using individual age 1.5 yrs greater than mean grade age); if so it should be included in the Method.

4. Results: paragraph 1: ‘Non-Dutch adolescents also perceived significantly more academic difficulties’, please rephrase as this is unclear. Does this mean that non-Dutch ethnicity was also associated with DSP?

5. Results: I can’t seem to find a statement regarding the prevalence of DSP in this sample? This is important as it sheds light on the possible reasons as to why a significant association was not observed (i.e., if DSP is actually quite common then perhaps it is not surprising that it is not a more robust marker of mental health problems) and is also relevant when considering the generalisability of the findings.

6. Discussion > first paragraph: similar issue to the abstract, whilst the first sentence confirms that this is a cross-sectional study, I think the use of ‘prior poor school achievement’ and ‘adolescent-onset’ overstates the case somewhat.
In reality the SDQ assesses problems over the past six months and so presumably overlaps with the assessment of DSP (i.e., the authors did not state that they excluded DSP occurring during the past six months). Additionally, there is no way of confirming that the adolescents examined did not have problems during early childhood and so ‘adolescent-onset’ is not accurate. I would recommend removing these terms.

7. Supplementary table: the table title indicates that these data relate to the analyses examining the association between all variables and DSP, however, the table heading says ‘Association SDQ’. Please clarify which is correct.

Discretionary revisions:
1. Abstract > Results: the abstract would be strengthened if the authors could clarify which potential confounders were included in the analysis, at least just in vague terms (e.g., sociodemographic characteristics and life events). Additionally, I would argue that the use of the term ‘risk factor’ in the Conclusions section of the abstract is too strong given the cross-sectional nature of the study, perhaps ‘marker’ would be more appropriate.

2. Potential confounders: would suggest rewording ‘.....the school survey addressing both poor school achievement and mental health problems’ to ‘.....the school survey which assessed both poor school achievement and mental health problems’ or something similar in order to clarify that this refers to what was assessed in the school survey (and not the literature).

3. Results: I think it would be worth reiterating the specifics of the analyses in the results section. For example, in paragraph 2 it would be helpful to clarify that the potential confounders examined in the adjusted model were those that were associated with both exposure and outcome and additionally led to a 10% change in the association between DSP and SDQ problems.

Minor issues not for publication:
1. Abstract > Method > line 3: ‘....was used to assess mental health problems and their associations’ makes it sounds as though multiple outcomes were examined when in fact only one outcome (i.e., SDQ abnormal score yes vs. no) was examined. Perhaps rephrase to make clearer.

2. Introduction > paragraph 3 > line 3: please change ‘school achievement as independent risk factor’ to ‘school achievement as an independent risk factor’.

3. Study population and methods > paragraph 2: The authors state that for the purposes of the study the group was divided into those preparing for polytechnic or academic training and those focussing on vocational training. These groups are not discussed again; however, a ‘low level of education’ was associated with SDQ problems (Table 1) which presumably relates to the vocational training group? Can the authors please employ the same group labels in the methods and results to make this clearer.

4. Results > paragraph 1 > last line: this should be changed to ‘mental health problems’.

5. Table 2: please confirm that the results relating to each potential confounder
are after adjustment for all other confounders (i.e., that all potential confounders were entered together).

6. Supplementary file: for school level (e.g., ‘LWOO’) please spell these out in full.

7. Supplementary table: ‘Harddrugs use last month’ please change to ‘Hard drug use last month’.

**Level of interest**: An article whose findings are important to those with closely related research interests

**Quality of written English**: Needs some language corrections before being published

**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.