Reviewer's report

Title: A correlation study between the incidence of chronic pain and academic pressure in adolescents in China (Shanghai)

Version: 2
Date: 18 February 2015
Reviewer: Viveca Östberg

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The questions posed in this manuscript are well-defined, timely and important, i.e. the occurrence of somatic pain in adolescents, and how school pressure may impact on these complaints. This study has gathered data from almost 3000 adolescents in the Chinese context and can thereby provide a valuable contribution to this field of research.

Major essential revisions

The outcome - Chronic pain

Considering that the aim is to estimate the prevalence of four types of pain through questionnaire responses the wording of the questions should be stated in ‘Methods’, including the time frame used (e.g. pain occurring within the last x months). That the pain measured here, with the chosen limits regarding time frame (3 months?) and occurrence (at least once a week), is to be regarded as ‘chronic’ needs to be argued for. Other similar studies have used terms such as pain, recurrent pain or somatic complaints.

The manuscript claims that chronic pain in adolescence is especially common in China and perhaps due to excessive school demands. This is interesting and may very well be true. In the Discussion, first paragraph, it is stated that “The survey results showed that the incidence rates of headache, abdominal pain, NSP, and LBP were 30.3%, 20.9%, 32.8%, and 41.1%, respectively, which were significantly higher than the results of international research surveys”. Two references are given (conducted on Flemish and Dutch adolescents respectively) but the measures used in these are not discussed in terms of comparability and no specific information is given. The percentages found in China are indeed high but so are they in many Western countries. This can be seen in, for example, data from the Health Behaviour in School-aged Children study (HBSC) conducted in over 40 countries, including questions on head ache, abdominal pains and back pain. A related issue is constituted by the fact that the percentages for pain are highly dependent on definitions. In many studies using HBSC data the limit for somatic complaints has been set at several times a week, instead of once a week, which heavily reduces the prevalence. A more nuanced and precise discussion concerning the prevalence of pain in Chinese adolescents, compared to the situation in other countries, would add to the discussion in the ms.
Study design and treatment of independent variables

The study design is on the one hand straightforward but nevertheless difficult to follow due to inconsistencies. In Table 1 the prevalence rates for males and females and the differences by gender (odds ratios) are presented. The subsequent analyses focus on the association between “Burden of learning” and pain. Table 2 presents a list of eight so-called “Direct Indicators of burden of learning” which than are included in regression models in Table 4 analysing each indicators association with the four pains separately. However, the variables presented in Table 2 are not the same as in Table 4. Table 4 includes four of the eight variables in Table 2 (probably due to lack of significant associations), together with two completely new variables (not earlier introduced). The labelling of indicators differ between tables, and it is not always clear what the variables stand for neither in Table 2 nor Table 4 (e.g. “Live up to the expectations of my parents” can mean that the student want to live up to expectations, actually does live up to expectations or believe that it is important generally to live up to expectations). In the same way the so-called “Indirect indicators of burden of learning” are presented in Table 3 and further analysed in Table 5. In Table 3 two unexpected variables are shown (e.g. can smell smoke; drink alcohol), and Table 5 only uses one of the nine variables from Table 3 together with a new one. The new one is “Do you often play a musical instrument, such as piano or violin?” which might add to the burden but may also in theory be stress-relieving. Among the variables in Table 3, presenting the indirect indicators, four variables deal with eyesight such as wearing glasses. This is based on a belief that hard-working students might get impaired vision but no reference supporting such a claim is presented in the ms. If this claim is not well-founded, and since no associations with pain were found, I suggest that these variables can be omitted from the ms. Furthermore, the multivariate analyses control for family history of chronic pain and earlier studies showing the heredity of chronic pain need to be referred to. In sum, I think the ms would be improved by focussing on a smaller number of well-defined and carefully chosen variables, that do not overlap, and that these variables are used and presented in all relevant tables throughout the ms.

Minor essential revisions

Methods: It would aid the understanding if the Methods section included information not only on grades but on ages (due to differences in educational systems between countries), and if all information related to the sample and non-response were moved here (i.e. the two first sentences, and the second paragraph, under ‘Results and analysis’). Regarding the sample, of the original 3000 questionnaires 2849 were successfully retrieved, and the reasons for uncompleted questionnaires are thoroughly presented. However, the analytical sample is 2587 and the reasons behind this larger reduction is not clearly stated (the response rate is still high though, 86.2%). Furthermore, the methods section lacks a more thorough account of the dependent variables.

Results: When presenting the results in the text, concerning differences between
groups, it is preferable to refer to the odds ratios instead of referring to the percentages in a specific group (since the latter means that the reader must keep the other percentages, in the comparison group, in mind).

The role of sleep: Sleep is used as an independent variable. However, sleep problems and somatic complaints may co-occur for a number of reasons. For example, pressure and stress may affect both sleep and somatic complaints, and somatic complaints may per se affect sleep (such as back pain). This also means that adjustment for sleep in the models may bring ‘over control’. This need to be discussed in the ms.

The term ‘incidence’ is used throughout the manuscript. However, considering that all data is collected at one point in time, the correct term is ‘prevalence’.

Discretionary revisions

The references do not appear in numerical order

The introduction, paragraph 1: It can be noticed that the argumentation for the study area deals more with pain in adults than in adolescents

Results, paragraph 4: Referring to Table 3, problems with insomnia etc is stated to be 54.5% but that is not the estimate presented in the table

Results, paragraph 6: Referring to the results in Table 5, it is said that the prevalence of 38.6% and 27.5% were significant but it is the next group (‘after 1:00’) that shows significant results

Results, paragraph 3: ‘enormous pressure’ should read ‘much pressure’ since that is what is asked for

Table 2: <10h should be >10h

Tables: The table (no 1, 4 and 5) give a messy impression. Fewer decimals (one decimal for percentages and two for OR) would help together with not using an own column to display the general p-value.

Discussion, para 1: It is stated that “multivariate analysis indicated no significant correlation between grade and chronic pain, which is most likely due to the heavy learning burden generally experienced by the students in all grade levels”. Is it not possible that the reason is that an unequal burden of school pressure between grades is controlled for in the model?

Discussion, para 2: It is stated that “the incidence of chronic headache was closely related to the average daily study time...”. I find this association weak and unclear.

Discussion, para 4 and 6; Conclusion, para 1: The findings are mentioned in terms of bidirectional effects and mutual effects. Perhaps a more careful wording van be used considering that this is a cross-sectional study.
Discussion: The gender differences are discussed. It can be noted that this study could easily include an analysis of gender differences and to what degree they can be explained by school pressure.

**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