Reviewer's report

Title: Changes in Health Risk Behaviors of Elementary School Students in Northern Taiwan over Three Years: Results from the Child and Adolescent Behaviors in Long-Term Evolution Study

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Reviewer: Andrew Springer

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General

Wu and colleagues present an interesting and potentially informative study that aims to assess changes in health risk behaviors in fourth- to sixth-grade students in Taiwan over a three year period. The focus on aggregate risk behaviors utilizing a factor analytic method is a relatively innovative approach compared to more traditional risk behavior studies that examine changes in single risk behaviors over time. Furthermore, the study appears to contribute to a limited body of literature on risk behavior in elementary school students in Taiwan. The methods, for the most part, are well presented, and the statistical analyses are rigorous and described in detail.

These strengths notwithstanding, specific aspects of the paper merit further attention.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. Rationale of selected youth risk behaviors. While the authors state that health risk behaviors were related to health outcomes and selected based on previous studies, more description/justification based on the empirical evidence of specific risk behaviors in relation to health outcomes would provide a stronger rationale for inclusion in the study. For example, while a growing body of literature points to the importance of adequate sleep for children, this risk behavior has received less attention in national studies of risk behavior. As such, more description on this risk behavior and the health consequences of inadequate sleep would benefit the reader. Secondly, it is not clear how eating snacks late at night is a risk behavior if these snacks are healthy. Perhaps more specification on what types of snacks or the health consequences of eating late at night would provide further justification of this behavior as a health risk behavior. Swearing is highlighted in the study, yet it is not clear how swearing is related to health outcomes. Here again more description of the measures would help the reader better understand swearing as a dimension of aggressive behavior. Suppressing urination is another risk behavior that could benefit from more explanation in terms of its health consequences and classification as a ‘risk behavior’. Lastly,
important domains of child health were not included in the study, such as sexual health risk behaviors, mental health such as depression/suicidal ideation, and physical activity. The rationale for not including these dimensions of child health merits some explanation.

2. Interpretation of Results and Conclusions. The authors conclude that frequency of unhealthy habits and aggressive behaviors increased significantly over time. However, when we examine Table 1, this trend is not so straightforward. In examining the ‘unhealthy habits’ construct, percentage of students watching TV dropped in grade five, then increased by one percentage point in grade 6, with similar results for video game playing (changes in these behaviors were not statistically significant). Eating fast food decreased, as did suppressing urination. Eating snacks decreased in grade 5, then increased by ~3 percentage points in grade 6 (this change was not statistically significant). Much of the increase in ‘unhealthy behaviors’ appears to be due to staying up late. Similarly, when examining the construct of ‘aggressive behaviors’, the percentage of students reporting ‘hitting others’ decreased, ‘throwing things’ decreased in grade 5 and was slightly less in grade 6 compared to grade 4, and changes in vandalism were not statistically significant; as such, much of the change in aggressive behavior appears to be due to swearing. The variability in changes of these behaviors over time brings into question whether they should be grouped under one construct, especially when the change in the construct appears to be due to one variable. This is a major concern for the reviewer in relation to the authors’ study conclusions that unhealthy habits and aggressive behaviors increase over time. As 9 of the 13 behaviors examined either decreased or had no significant changes between 4th and 6th grade, more clarification and qualification of these findings is warranted.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

3. Further description of youth risk behaviors. Following up from point one, more specificity of how the risk behaviors were operationalized would enhance the interpretability of the prevalence estimates and results as well as strengthen comparability with other studies. It appears that most operational definitions of behaviors in this study with the exception of eating snacks late at night and suppressing urination are presented in Yen et al’s “Aggregation of health behaviors among fourth graders in northern Taiwan” study (J Adolesc Health 2006; 39: 435-442). I would recommend including a statement to direct readers to this study for further information on operationalization of study variables. Ideally, readers would have enough information on description of these behaviors in order to not have to access the previous study.

4. Other issues:
   a. “Although our study did not find high rates of substance use behaviors, the results still indicate that children do have these problems at a young age.” (p. 11). I would recommend exploring other word choice as it is difficult for this
reader to interpret the ~1% of children who tried smoking once or twice or 5-8% of children who had a mouthful of alcohol as a ‘problem’. Perhaps stating something like “these results suggest that a small percentage of students experiment with these substances at a young age.”

b. Paragraph in Discussion: “The means of aggressive behaviors, unhealthy habits, and substance use behaviors indicate that the students expressed mild behavior problems…” (pp11-12). This paragraph lacks coherency with the statement that “Millstein et al indicated that an extremely important and currently neglected area in professional education is knowledge about adolescent development.” It is not clear how the mild engagement in risk behavior translates to the need for knowledge about adolescent development.

c. While the authors state that students “…expressed mild behavior problems” (pp11-12), the discussion (see first and conclusion paragraph) and abstract do not appear to reflect this finding.

Discretionary Revisions (which the author can choose to ignore)

5. Magnitude of youth risk behavior prevalence. It is difficult to assess the relative magnitude of engagement in risk behaviors for several reasons. First, the authors group all engagement in risk behavior together (thus, percentages of students reporting consecutive video game playing 1 or 2 times [in past week or month] is grouped with those who report playing every day). Providing the breakdown of the distribution of engagement in risk behavior by the response categories (never, 1 or 2 times, many times, every day) would provide some insights into the magnitude of engagement in these risk behaviors. Secondly, the response options lack some specificity. For example, the option of “many times” may be interpreted as many times in one day, or many times throughout the week or month. Is three times of smoking considered ‘many times’? This response option appears to allow some subjectivity in interpretation by students. A response option that reports by day (e.g., “In the past seven days, how many days did you smoke?”) or a response option that disaggregates “many times” (e.g., 1 or 2 times, 3 to 5 times, 6 to 9 times, 10 or more times, etc.) would have provided for better specificity and interpretation among students. This lack of specificity affects interpretation of the frequency of engagement in risk behaviors. Lastly, the reader is left wondering whether we should be concerned with the prevalence estimates reported. How do these compare with students in other parts of Taiwan? With students in other countries? Placing the findings in the larger epidemiologic health profile of Taiwan may provide further rationale for why parents, health professionals, educators should be concerned (e.g., high percentage who reported video game playing and TV watching in relation to overweight in Taiwan? High percentage who report hitting someone in relation to other statistics on adolescent aggressive behavior/intentional injury in Taiwan?)

6. Lack of stratification by gender. While the aims of the study were to assess changes in elementary school students' behavior over time, the study could be enhanced by stratifying the analysis on gender. As boys and girls tend to differ
substantially on health behaviors, presenting results by gender group instead of
controlling for gender may present a different and more informative picture of
change in health risk behaviors among 4-6 graders in Taiwan.

**What next?:** Unable to decide on acceptance or rejection until the authors have
responded to the major compulsory revisions

**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 not competing interests.