Author’s response to reviews

Title: Health-related behaviours and their relationship with self-rated health among Canadian adults

Authors:
Natalie Riediger (natalie.riediger@umanitoba.ca)
Andrea Bombak (andrea.bombak@unb.ca)
Adriana Mudryj (adriana.mudryj@umanitoba.ca)

Version: 1 Date: 03 Jun 2019

Author's response to reviews:

June 3, 2019

Filippos Filippidis, Editor-in-Chief
BMC Public Health

Dear Dr. Filippidis,

Thank you for your email on May 9, 2019 regarding our submission (PUBH-D-19-01283). We are submitting a revised version of an original, quantitative research article entitled “Health-related behaviours and their relationship with self-rated health among Canadian adults” to BMC Public Health.

We thank the editor and reviewers for their thoughtful comments. We have responded to their itemized comments below and have revised the manuscript accordingly.
All authors were involved in the design, conceptualization and analysis/interpretation of the data and/or drafting of the manuscript. All authors have read and agreed with the material in the manuscript. We, the authors, take full responsibility for the content of the manuscript. The material has not been published in whole or in part elsewhere, and is not being considered for publication elsewhere. Additionally, none of the authors have a conflict of interest.

Thank you for reconsidering our manuscript for publication. We look forward to hearing from you.

Sincerely,

Natalie Riediger PhD
Assistant Professor
Department of Food and Human Nutritional Sciences
University of Manitoba
209 Human Ecology
Tel: (204) 474-6411 | Fax: (204) 474-7593
E-mail: Natalie.riediger@umanitoba.ca
Response to reviewers

Editor comments

I agree with the reviewer who questions your choice to dichotomize all health-behaviour variables. I don't see the need for this, which, as the authors admit, poses important limitations to the analysis. More nuanced data are available and, considering these are used as independent variables in the regression, having more categories wouldn't require a major change in the analytical strategy. Hence, I suggest reviewing this decision. If the authors would like to stick to it, they need to explain why they think this is the best approach.

We have revised the dichotomization for the alcohol and smoking variables. Smoking status is now categorized as current smoker, former smoker, and never smoker. Alcohol use is now categorized as heavy episodic drinking, daily drinking (excluding those who also report heavy episodic drinking), and low-risk alcohol use. Given the different patterns and relationships of the variables with health outcomes and as suggested by another reviewer, we felt this revision was necessary. We have decided to preserve the sleep, fruit and vegetable, and physical activity variables as dichotomous. There have been numerous studies utilizing dichotomous variables of these behaviours and by creating additional categories we would lower the statistical power to detect significant differences in SRH. Alternatively, we could have utilized a continuous variable for fruit and vegetable intake for the analysis presented in Table 3. However, we felt it better to be consistent in our categorization between Tables and other health-related behaviours for comparison purposes. Furthermore, conceptually, we are primarily interested in Canadians referents of SRH and their alignment with current public health recommendations.

Additionally, I would question the dichotomization of the outcome variable (SRH). Almost 90% of the respondents rated their health as good, very good and excellent. This may imply that the others had health problems, which in turn may raise questions regarding reverse causation. The authors mention the case of alcohol, where people with pre-existing conditions may abstain as a result of their condition. My view is that exploring very good/excellent SRH may make more sense for the research question the authors are trying to answer.
We agree that reverse causation is an issue though this has mostly occurred in studies where the reference category is abstinence from alcohol. In the present study, our reference category includes individuals who drink casually but not daily and not more than three to four drinks two or more times per month. Therefore, the issue of reverse causation is not as concerning an issue for alcohol given this categorization. Furthermore, more than 60% of the sample are included in the reference category for alcohol use or low-risk alcohol use. However, we acknowledge that to further explore the relationships between drinking behaviours and SRH it would be prudent to separate never drinkers, former drinkers, and casual drinkers who are not daily or heavy episodic drinkers, as well as perhaps an additional category of both daily and heavy episodic drinking. This would require a separate, sex-stratified analysis, not including the other health-related behaviours and is not the focus of this paper. This analysis would be better served using the Canadian Community Health Survey, which has a much larger sample than the Canadian Health Measures Survey, and includes questions on alcohol use, but not sleep, for example, which we have utilized here.

While we agree that we may be able to better explore relationships with SRH if we were to categorize very good with excellent, it is conceptually problematic to combine participants who rate their health as good with those who rate their health as poor. The literature consistently demonstrates the combining of good, very good, and excellent categories together, which we have now referenced in the manuscript. Alternatively, dividing SRH into 3 categories would result in lower statistical power to test for relationships. We acknowledge these limitations and are interested in conducting further research and analysis to examine the relationship between alcohol use and SRH among Canadian women, as well as qualitative research to explore further the attitudes and perceptions of women who consume alcohol.

Matthew Zack (Reviewer 1): To describe relationships between some health-related behaviors and self-rated health, a measure of health status and health-related quality of life and a predictor of mortality and chronic diseases, the authors analyzed data from almost 6,800 Canadian adults surveyed from 2012 through 2015. For men and women, good-to-excellent self-rated health was directly related to higher household income, more education, adequate sleep, adequate fruit and vegetable intake, and adequate physical activity but inversely related to age and current smoking. High-risk alcohol intake, especially among women, also appeared directly related to better self-rated health. The number of positive health behaviors was not associated with self-rated health, and adequate sleep was the only behavior persistently related to better self-rated health in both sexes after adjustment for other health behaviors and sociodemographic characteristics. The authors conclude that current Canadian public health priorities and promotion programs may not fully align with what Canadian adults relate their health to and that further study of sleep adequacy in both sexes and alcohol use in women is needed to improve this alignment.
Although the authors do not list the strengths of their study, the authors have used a data source representative of noninstitutionalized, civilian adults that allows generalization of their findings to this Canadian population (lines 63-74). The authors used an appropriate analytical strategy to account for the survey design (lines 101-115).

The authors describe several study limitations (lines 237-243): The small sample size, a 25% non-response rate, self-reported health behaviors and sociodemographic characteristics, and dichotomizing behaviors and self-rated health, perhaps biasing the relationships between these behaviors and self-rated health.

Besides these study limitations, the authors should consider and discuss the following other study limitations:

1. Even though the two survey cycles collected information on 11,485 respondents, the analytical sample included only 6,789 respondents (lines 64-72). Were the 4,696 excluded respondents (41% of the total) pregnant women and children? Or, were other adults excluded? The authors should account for all the persons eligible and ineligible for their study and why they were ineligible.

We have now included further information on the excluded sample. Of the 11,579 participants in the two surveys, 2,396 were excluded for being <18 years old and/or pregnant in cycle 3, 2,394 were excluded in cycle 4. This resulted in a sample of 6,789 respondents. Given the low number of pregnant women under the age of 18 in each cycle, we were not permitted to release this data separately.

2. The authors should explain further why they dichotomized their exposure variables and outcome variables knowing that this would affect the relationships between these variables and reduce the statistical power to assess these relationships. For example, their smoking status variable groups together former smokers with never smokers (lines 84-86).
We have revised the dichotomization for the alcohol and smoking variables. Smoking status is now categorized as current smoker, former smoker, and never smoker. Alcohol use is now categorized as heavy episodic drinking, daily drinking (excluding those who also report heavy episodic drinking), and low-risk alcohol use. Given the different patterns and relationships of the variables with health outcomes, we felt this revision was necessary. We have decided to preserve the sleep, fruit and vegetable, and physical activity variables as dichotomous. There have been numerous studies utilizing dichotomous variables of these behaviours and by creating additional categories we would lower the statistical power to detect significant differences in SRH. Alternatively, we could have utilized a continuous variable for fruit and vegetable intake for the analysis presented in Table 3. However, we felt it better to be consistent in our categorization between Tables and other health-related behaviours for comparison purposes. Furthermore, conceptually, we are primarily interested in Canadians referents of SRH and their alignment with current public health recommendations, which the dichotomization is based on.

Furthermore, SRH is often dichotomized in the literature, which we have now cited. Keeping SRH as an ordinal variable would result in very small cell sizes and unstable estimates when examining multiple health behaviours. Our purpose in this study was to determine the broad patterns and relationships; we are planning further analysis to better characterize the relationship between alcohol use among women and SRH.

3. The authors incorrectly attribute the attenuation of the relationship between current smoking and self-rated health after adjustment for education and income to "current smoking status [being] an important mediator between lower socioeconomic status and [self-rated health]" (lines 160-163). If current smoking status mediated between socioeconomic status and self-rated health, including current smoking status would attenuate the relationship between education and income and self-rated health, not attenuate the relationship between current smoking status and self-rated health.

Thank you for pointing out this error. We have revised this section accordingly.
4. The authors describe the relationship between smoking and self-rated health as stronger for men than for women and the relationship between fruit and vegetable intake and self-rated health as stronger for women than for men (lines 171-174). Actually, the 95% confidence intervals for the odds ratios in these two relationships overlap quite a bit for men and women (see table 3, models 7 and 8), so that the strengths of these relationships are comparable between men and women.

Thank you for pointing out this error. We have revised this section accordingly.

5. To explain the discrepant relationships of high-risk alcohol use and self-rated health between women and men, the author recommend further study "to understand the reasons behind increased binge-drinking among women" (lines 247-251). However, the only data the authors cite about binge-drinking (lines 141-144) do not identify such an increase among women.

We have included a reference to others’ research here (lines 250-252), which documents the increase in alcohol-related hospitalizations among Canadian women, as well as recent recommendations published in Lancet, such that no level of alcohol is safe.

Nikita Rajani (Reviewer 2): Thank you for the opportunity to review this paper which examines the relationship between self-rated health (SRH) and health-related behaviours among Canadian adults. The study uses pooled data from a Canadian health survey and highlights some interesting findings. I have highlighted a few points below that could strengthen the paper.

Strengths: (1) The study has interesting insights into referents used by individuals in rating their own health. With the use of a large sample size, results are generalisable. (2) The methodology and statistical analyses are clear and appropriate. The operationalisation of all variables is very clear for readers. (3) The authors touch upon some valuable points regarding the importance of adequate sleep on SRH, and its implications for mental health and mental disorders.

Thank you for noting the strengths
Weaknesses: (1) I would want to see more evidence about the use of a single-item measure of SRH, especially compared to multi-component measures. Similarly, a more detailed explanation for why high-risk alcohol use was operationalised in the way it was would be helpful. In the current operationalisation, individuals who drink everyday (regardless of quantity) are categorised as high-risk alcohol users which may be skewing the results. Another study amongst Canadian adults and also looking at SRH and alcohol use found similar findings but used a different operationalisation for alcohol use. The authors could consider strengthening the validity of their findings by comparing to other studies which use different operationalisations (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710937/#!po=39.4737) but found similar results.

We have added a statement as to differences between single-item versus multi-component measures of SRH in the background section, particularly highlighting the limitations of a single-use measure, but also the strengths in terms of our study. Depending on the study, a single-item measure may be more useful. Since SRH is subject to social norms and expectations, it may not be as useful in predicting objective health status. However, our intent is to take into account the subjective aspect of how individuals rate their health.

We have revised our operationalization of alcohol use, in response to another reviewers’ comment as well. In this way, it is no longer skewing our results. Thank you for suggesting that paper, which has also led us to other literature to further discuss our findings in the context of what is known.

(2) The authors may want to consider adding a bit of information/evidence from other research into why the relationship between SRH and high-risk alcohol use amongst men did not exist as this could add more value to the discussion section. Currently, explanations are plausible but it would be good to provide evidence for this, as well as compare whether the gender difference existed in prior studies.

Thank you for this suggestion. We have included additional discussion and references to further explain potential reasons for why this relationship was not observed for men. For instance, men exhibit greater problem drinking, which is also associated with mental health issues.
(3) In the introduction, while it is mentioned that researchers have found varied findings, this has not been expanded on. It would be useful to know what previous studies have found and what this study adds to the existing literature. At the moment, it is not clear what is new that is being added by the study. The authors may also consider reiterating this in a sentence or two in the conclusion.

We have added a couple additional references and rationale for why we have conducted this study. Mainly, behaviours and how individuals incorporate those behaviours as referents for SRH are likely not static. They are also subject to cultural/social norms and expectations. Therefore, we sought to provide a current assessment in the Canadian population. This is particularly timely given the intense public health focus on healthy eating, mental health, and alcohol use. We have reiterated this connection to the social influences on SRH, and how it relates to alcohol use in the conclusion.