Reviewer’s report

**Title:** The Association between Alcohol, Marijuana, Illegal Drug Use and Current Use of E-cigarette Among Youth and Young Adults in Canada: Results from Canadian Tobacco, Alcohol and Drugs Survey 2017

**Version:** 0 **Date:** 24 Jul 2019

**Reviewer:** Rosemarie Ann Martin

**Reviewer's report:**

This manuscript seeks to assess both the prevalence of and the factors associated with e-cigarette use among Canadian youth and young adults ages 15-24, and more specifically, to examine the association among e-cigarette use and illicit drugs, alcohol, and marijuana. Strengths of the manuscript include its focus on a timely public health concern among a vulnerable population of interest, as well as its novelty and utility. Additionally, the sample is nationally representative and generalizable. Further, the authors appropriately acknowledge study limitations. Overall, the manuscript has the potential to contribute compelling new insight on e-cigarette prevalence rates among Canadian youth and young adults and its concomitant use with substances such as alcohol, marijuana, and illicit drugs, however, the implication and application of these findings in a public health context need further discussion. There are a few areas where the authors could more clearly present their work, expand on their findings, and offer suggestion for future directions. In the sections below, concerns are outlined by order presented in the manuscript. I believe this manuscript will add to the current literature on e-cigarette use among youth and young adults, and highlight potential risks associated with alternative pathways for using other substances. It is my recommendation that this manuscript be revised and resubmitted.

**GENERAL:** Overall, this manuscript is well written and informative. There are some general proofing issues, such as spacing, particularly where material is cited, and on pg. 6 line 12. Throughout the manuscript, the authors use a number of transition words that are unnecessary and the manuscript will read more efficiently if some of these are removed. Additionally, I have concerns regarding the sample size and demographics, and methods employed for handling missing data. The discussion section, while informative, repeats much of the information presented in the results section, and could benefit from additional dialogue regarding how the findings further advance public health, potentially for policy implications given the findings, etc.
ABSTRACT:

1. The abstract definitively states, "Among all age groups, [Canadian] youth and young adults have the highest prevalence of e-cigarette use", whereas in the introduction, the authors state the objective of the study is to "assess the prevalence…” (last sentence of intro, pg. 4); perhaps in the introduction it is more appropriate to state they are confirming the prevalence or remove the reference to assessing prevalence, as written in the abstract.

2. The authors indicate the sample was restricted to youth and young adults aged 15-24, but the sample size is not provided; additionally, without reference to sample size analyzed, there is no point of reference for the percentages given in results and it is unclear how much of the population is represented in the percentage given.

3. The abstract indicates the statistical tests used, but makes no mention of missing data or the handling of missing data.

4. Given the focus of the paper and discussion, the abstract would benefit from an additional statement in the conclusion regarding the significance of the co-occurring use of other substances and associated risks.

INTRODUCTION:

1. The introduction concisely sets the tone for what is the contribution of this paper. The introduction does a nice job depicting the broader landscape of e-cigarette use, including associated risks and suggested harm reduction or health benefits, as well as the more targeted landscape pertaining to Canada. There is brief mention of marketing strategies, and the introduction may benefit for more details regarding the marketing of e-cigarettes to target youth and how that may affect the association of e-cigarette use and other substances.

2. The authors clearly outline the prevalence data available in Canada, indicating the increase in e-cigarette use from 2013-2017, however, later in the paper state they are not able to examine trends with the present data. Given their access to the CTADS data for a number of years, could they retrospectively examine trends similar to what was done to capture the change in prevalence? This could serve to strengthen findings and add further weight to their suggestions for future research directions.

3. Pg. 1, line 17 is misworded and should be written as, "Consequently, increased concerns have arisen within the substance use community." Additionally, here, it is unclear whom
the authors are referring to when they say substance use community—those in drug use forums (referenced in the following sentence discussing the Breitbarth work), substance use clinicians and physicians, both? If there are additional references that support this statement, please add.

METHODS:

Study Design and participants

1. The methods section adequately describes the survey procedures used by CTADS, but does not address the methods specifically used in the secondary analysis, including the final sample size used, methods for handling missing data, and there is no statement as to whether or not IRB review and/or approval as needed.

   a. Sample size is presented in Results, though what is presented does not align; see comment in results section.

Similarly, the Study Design and participants does not include any participant descriptives or demographics (i.e. gender split, average age of the sample, race/ethnicity). Some of these are provided in results and should be moved—the results should focus on the prevalence rates and associate substance use patterns, etc. Further, limitations section, pg. 12, line 15, the authors indicate ethnicity data was not collected in the CTADS, and this should be stated in the methods section in addition to being cited as a study limitation.

2. The authors mention residents of three territories are not included in the survey—though this is something the authors could not control; it may be of interest to indicate the reason for excluding them, if possible. Please note how this may have affected the representation of indigenous people and the variable "indigenous status".

Covariates

1. For consistency, the authors should provide the question used to assess each covariate (this is explicitly done for the main outcome and for marijuana) or add a blanket statement to the effect of "each substance use questions was assessed using a question asking participants whether they had used a specific substance in the past 12 months, yes or no"

2. Indent line 12 if this a new paragraph as presented.
Statistical Analysis

1. Please indicate how missing data was treated in the analyses.

RESULTS:

1. The results should not be the first mention of the sample size or any other participant characteristic. This should be in the methods. The stated N (10,322) does not align with the Ns provided in the tables, which are more in line with the second N presented, 4,443,600; it is unclear if the 10,322 is an error? It is also unclear who is included in the 4,443,600 number. Please expressly state how many 15-24 year old youth and young adults are included in the study.

   a. The table titles indicate the data presented should represent only those 15-24, and the Ns provided do not align with the 10,322 stated in the results section.

   b. Additionally, both tables 1 and 2 include a wide range of Ns; this is confusing. Who is included in each N and if the Ns differ because of missing data, and whether that data was missing at random or excluded purposefully.

   c. Additionally, in both tables, many of the percentages provided do not add up to 100%.

2. In paragraph one, the authors clarify the outcomes reported by explicitly stating 'youth and young adults' in lines 9 and 14, and 'this cohort' in line 17. Given that the authors state in Methods that the study sample is only inclusive of youth and young adults 15-24, the authors do not need to continually state it when presenting findings, it muddles the results.

3. In the Statistical Analysis section of Methods, the author's state p was set at .05; beyond that, the authors do not provide any significance values beyond the confidence intervals. Please add the exact p value.

4. The ¶ on page 8, the authors reference differences among the age groups. Was there exploration of differences between age beyond this? Similarly, the authors mention sex differences in e-cigarette use. These are interesting findings, yet casually mentioned (here as well as in the Discussion section).
DISCUSSION:

1. Overall, much of focus in the discussion repeats the results with little expansion on what implications they may have for public health and potential policy impact; the paper overall would benefit from an expanded discussion addressing these points.

   a. For example, with the express attention to the differences between provinces presented in the results, the authors could expand the discussion section to address any potential factors that may support these findings. Additionally, the authors could discuss any differences regarding e-cigarettes (i.e., marketing, access, etc.) that may account for provincial differences.

2. In the first ¶, when referencing similar prevalence rates to 2015 and 2013, it would be useful to the readers to have those percentages noted.

3. In ¶ 2, lines 15 & 16, is it possible to retroactively examine the CTADS and see if the current findings replicate? Similar to how they looked at prevalence rates from all 3 years.

4. Please provide the dates for the Blundell and Breitbarth citations listed in pg. 9, ¶2 line 19; pg. 10 ¶3 line 14 Hershberger, pg. 11 ¶5 lines 17 and 23, Reid and Coleman

5. ¶2 Line 23, this sentence regarding replication of findings seem to speak to the findings of Blundell and Breitbarth, and this is the type of inference that needs expanding in relation to the author's own findings.

6. The authors did a nice job succinctly stating the study strengths and acknowledging limitations.

CONCLUSIONS

1. Overall, the conclusion is well written and concise.

3. The first ¶ needs to be indented, and in line 13, please change abuse to use to be consistent with efforts to use less stigmatizing language.

4. The mention of more research needed regarding alternative pathways to drug use via e-cigarette (line 13) is not in-line with the study objectives and not needed to be in the conclusion. This is important, and the authors should reference this in the discussion as it
relates to their findings of co-occurring use, and how this could be a direction for future research based on their current findings.

TABLES AND FIGURES

1. Please see comments in Results regarding the Ns provided in both tables and the cumulative totals of percentages provided.

2. In Table 1's notes, there is a line presented for Other# (line 51), but there is no data presented in that row, and the percentages given total 100.1%. Please confirm this is not a mistake, and if there is no date for 'other' for either ever use or past 30-day use, consider removing from the table.

ACKNOWLEDGEMENTS

1. I believe Research should be capitalized in line 5, Social Science and Humanities research Council.

REFERENCES

1. Reference 1 has punctuation in the initials that is not consistent with the rest of the references.

2. Reference 26 has a typo in Statistics Canada

3. Reference 28 does not have the author initials consistent with the rest of the references, Swahn MA and Hammig BJ

4. Reference 31 has an added space between the initials VV

5. Reference 34 has something odd happening with the quotations, likely the reference generator

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No
Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
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