Author’s response to reviews

Title: Marijuana legalization and historical trends in marijuana use among US residents aged 12-25: Results from the 1979-2016 National Survey on Drug Use and Health

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Response to reviewers’ comments

Comments from Reviewer 1:

Q1: We know that there is "mixed situation" in the US (this is from a European reviewer), and for us quite peculiar. Where medical use is blended in with a somewhat of a precursor for the recreational use. In Europe this is quite different and more divided. And the authors should take this more into consideration. In the first paragraph they say in the same sentence "it may relieve pain, but there are also adverse consequences of recreational use", illustrating this mix - a mix that is also apparent in the first paragraph page 4.

Reply: Yes, we agree with you that the situation in US was different with that in Europe. There exists mixed effects of marijuana and medical and recreational marijuana laws. We considered the mixed situation when revising the paper (Line 47, Page 3 and Line 70-74, Page 4).

Q2: I am surprised they don't cite and discuss Hughes and coworkers form addiction 2018 - an important piece of work in this context. I would think this could be done on the top of page 4 (Hughes B, Matias J, Griffiths P. Inconsistencies in the assumptions linking punitive sanctions and use of cannabis and new psychoactive substances in Europe. Addiction 2018; 113(12): 2155-7).

Reply: Thank you for your suggestion, and we included this paper in our references (Line 91, Page 5).

Q3: There are too many figures, and they are not all necessary. I would think that figure 2 could be eliminated, as this is the figure that contributes the least with new data, only confirming what we already know.

Reply: Since APC modeling method can separate the rate of marijuana use into independent age, period and cohort effects, to better understand and present the separated effects, we would like to keep the three effects to make it easier for readers to follow one after another.
Q4: It is not easy to understand the cohort phenomenon in detail. Please go through the manuscript and try to make it clearer, especially in the discussion (page 13) what the findings signify.
Reply: We provided more detailed explanation about age, period and cohort effects (Line 117-126, Page 6, Lines 316, 326-328, 335-337, 348-350, Page 16-17).

Minor concerns

Q5: Please state that this is an ecological study in the abstract. The abstract should also contain a mention of the 31 waves included.
Reply: Added (see in Abstract).

Q6: The abstract has repetition of the method used (last part of method and first part of results). This is unnecessary.
Reply: We removed the repeated information in the results section.

Q7: I would prefer if the abstract contained more explicitly what they have found.
Reply: More detailed results were added in the abstract.

Q8: Page 4 line 6 (16-17): don't use "non-responsible" - it is judgmental and imprecise.
Reply: Removed.

Q9: First paragraph of page 5 should have a better discussion of the weaknesses of previous studies.
Reply: We provided more detailed discussion about the limitations of previous studies (Line 95-108, Page 5).

Q10: Last but one line on page 5: is it likely that these data can say something about the use of cannabis back to 1954 (when the first respondents were first born….)?
Reply: Yes, a person who is 25 in 1979 contains information on the risk of marijuana use 25 years ago in 1954 when the person was born. And the age-period-cohort modeling method can separate the information into three independent age, period and cohort effects. That's the advantage of the age-period-cohort modeling method (Line 117-127, Page 6).

Q11: I am not sure that the last sentence of the second paragraph of page 6 holds true (the sentence that ends with reference 27).
Reply: In the age-period-cohort model, if the age group is 5 years interval, then the birth cohort interval is 10 years when the survey is every 5 years as indicated in that paper (Kerr, 2018). The average trend of cohort effect with 10-year interval is insensitive to detect the differences and the influences of specific historical events. This is one limitation of previous studies. Therefore, we used annual survey with two-year age group in this study (Line 139-142, Page 7).
Q12: Page 6 last sentence: please explain all abbreviations before they are used (here NSDUH).
Reply: Revised.

Q13: Second paragraph page 11: it would be better if they wrote: "(1) the Historical Declining Cohort (HDC): those born in 1954-1972" etc.: to make it clearer that this is different form the prevalence data.
Reply: Thank you for your suggestion, and we revised accordingly.

Q14: Last paragraph page 11: it is excellent that they control for the cohort data in the prevalence data, but please explain better how this was done.
Reply: As shown in Equation 1 (Line 213, Page 10), the three components, age, period and cohort, as well as other covariates were included in the same age-period-cohort model (i.e. log-linear regression). Thus, the age and cohort effects were controlled when presenting the period effect (Line 209-215, Page 10).

Q15: Discussion, first paragraph: I would refer if the first paragraph of the discussion stated the main findings and did not contain yet another reference to method and some general remarks about the value of the research.
Reply: Revised.

Q16: General remark to discussion: in all other parts pf the manuscript (aims, methods and results) the period/prevalence data are mentioned first, but in the discussion the cohort data are discussed first. Please keep one order and stick to that to help the reader.
Reply: Revised.

Q17: Page 15 second paragraph last sentence "…and avoided using "War in Drugs". Avoided what: the term, the idea or the action?
Reply: Revised (Line 310, Page 15).

Q18: The limitations section should contain a reflection on state-wise data, as this is a short-coming that I am unsure why they did not consider. It would have been a very significant addition to the manuscript if they were to have such data (comparing different states) instead of just adding up the percentage of the US population having experience with different laws.
Reply: We included it as a limitation.

Q19: Table 1: the last 5 lines of this table can be deleted. Such "sum values" are contribute very little. If any additional numbers should be added it should be percentages of the male/female columns or even the ethnicity columns. This would help the reader to see if some of the trends could be explained by these factors. But even this would be a bit too much.
Reply: We removed the last five rows in the Table 1.
Comments from Reviewer 2:

Q20: Introduction: The sentence "a participant aged 25 in 1979 contains information on the risk of marijuana use 25 years ago in 1954" is a little bizarre. Please (a) re-word, and (b) provide a fuller description of the HAPC procedure that will be informative to readers who are not yet familiar with it.
Reply: More explanations of HAPC model were added (Line 117-127, Page 6)

Q21: Methods: Please make clear that participant recruitment was by the survey, not by the authors of this paper.
Reply: Revised.

Q22: Please clarify: "We excluded participants aged 26 and older because the public data did not provide information on single or two-year age that was needed for HAPC modeling." Or perhaps add "see below".
Reply: We added “details see statistical analysis section” after the sentence.

Q23: Analysis: I'm not clear whether the legal events were coded for each participant in relation to their domicile.
Reply: We did not code the legal events for each participants since we were unable to have the state or zip code for each participant. We associated the legal events with our estimated period and cohort effect.

Q24: Results: The past tense should be used when describing what was done, but the present tense is appropriate when describing what's in the paper. (… results are - not were - shown in figure x).
Reply: Revised.

Q25: I'm surprised that marijuana use is shown as 0 for age 12-13.
Reply: Figure 2 shows the results of age effect after controlling for period and cohort effects. Age effect equals 0 does not mean the rate of marijuana use in age 12-13 is 0. The effect estimated is the regression coefficients of the log-linear model as indicated in Equation 1, and the effect reflects the change of the risk with the increase of age (Lines 224-226, Page 11).

Q26: Please state the period covered by the analysis of the correlation with RML. If 2012-2016, there are only three data points, which decreases the value of this comparison and restricts the inferences that can be drawn from it.
Reply: From 2012-2016, there were five data points in the RML with one data point for each year. We agree that the value of comparison may be reduced due to limited data points, and we explained this in the discussion part (Line 311-314, Page 15).

Q27: Is there any confound between the two sets of laws. That is, did RML states already have MML laws and would this impact on the correlations?
Reply: There are states with both MML and RML. In this study, only simple correlation was conducted to investigate the correlation between period effect and MML, and RML separately.

Discussion

Q28: I note the RML data are not mentioned - see previous comments.
Reply: See reply to Q26.

Q29: The limitations section should draw attention to the fact that the discussion of the legal context at different times is discursive and lacks methodological rigor.
Reply: We put it as a limitation (Line 344-345, Page 16).