Author's response to reviews

Title: Do changes in social and economic factors lead to changes in drinking behavior in young adults? Findings from three waves of a population based panel study

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Version: 3 Date: 23 July 2014

Author's response to reviews: see over
Response letter to BMC public health

Dear Victorino Silvestre/To the editorial office,

We would like to thank both reviewers for taking time to review this manuscript and for their thoughtful comments. Below, we have responded to each of the individual reviewer’s concerns/comments. In our responses, we have outlined the according changes made in the manuscript (highlighted in yellow in the main manuscript). We have also made some minor additional revisions in the manuscript (also highlighted in yellow).

Kind regards,

Frederieke S. van der Deen (on behalf of my co-authors Kristie N. Carter, Sarah K. McKenzie, Tony Blakely)

Reviewer 1

1. There is a need to conduct sensitive analyses. Indeed, the analysis could be strengthened by using analyses better suited for assessing long term outcomes with multiple data points such as growth curve modeling, which would allow for assessment of change in alcohol consumption over time as well as social and economic factors.

Our response: In this paper, we aimed to estimate the impact of changes in social and economic factors (living arrangement, education/employment status, income, and deprivation) on two different measures of alcohol use (average weekly alcohol consumption and frequency of hazardous drinking sessions) in young New Zealand adults aged 18 to 24 years old (at baseline). To address this particular research question, fixed effects regression modelling is the most appropriate method. Fixed effects linear regression modelling estimates the impact of within-individual changes in a range of social and economic exposure variables on within-individual changes in drinking behaviour outcome measures whilst adjusting for potential unobserved time-invariant confounders. Thus, to answer the reviewer’s specific concern: Growth curve models do not assess both change in exposure and outcome measures (as does fixed effects regression modelling). Typically, growth curve models estimate between-person differences in within-person change. However, to remove bias from time-invariant unmeasured confounders, fixed effects methods ignore these between-person differences and focus only on within-person variation. In the present study, we were particularly interested in the assessment of within-individual changes in both drinking behaviour as well as social and economic factors whilst adjusting for time-invariant unmeasured confounding (by discarding between-person variability). Fixed effects methods “allow for assessment of change in alcohol consumption over time as well as social and economic factors”.

2. Please provide more detailed statistics comparing study participants to non-participants.

Our response: We have added additional information on the participants and attrition to the discussion: “The original SoFIE study population was a nationally representative sample of New Zealand households. The health module which included the questions on drinking behaviour, however, was only collected in wave 3, 5 and 7. We have previously shown that younger people of lower socioeconomic status or Māori or Pacific ethnicity were more likely to drop out of SoFIE [23]. Hence, this might have led to selection bias in our study, and led to reduced generalizability of our findings. However, unless these dropout rates were jointly distributed by the social and economic exposure measures and drinking behaviour outcome measures, the effect of attrition on the studied
associations is likely to be minimal. We have also previously shown that for the association of employment and education with self-rated health there appears to be no difference in the association among those respondents leaving the SoFIE study (non-participants) compared to those respondents who stayed in the study (participants) [37]."


3. The authors seem to discuss the results in only one process. It would be contributive to discuss both the fact that alcohol consumption affects individuals’ socioeconomic attainment and the fact that social and economic factors may lead to alcohol consumption, through deleterious exposures and experiences that are associated with disadvantaged social standing. In order for this to better contribute to the literature; it would be useful to at least briefly discuss how one might "disentangle" the contribution of multiple processes.

**Our response:** We agree with the reviewer that it is also important to consider the possibility of evidence for the reversed pathway from changes in drinking behaviours to changes in social and economic outcomes. For example, more frequent hazardous drinking can potentially be linked to adverse educational achievement, which in turn can lead to less good job opportunities in later life. We have now addressed this limitation in the discussion: “Furthermore, the mean-centred estimate that is produced by the fixed-effects linear regression method may be sensitive to health selection (eg, the reversed pathway from drinking behaviours to social and economic outcomes), which, consequently, might have biased the estimates that were found in the present study. However, changes in the social and economic exposure variables were measured over the 12 months prior to the interview date, whereas the drinking behavior variables were measured in the four weeks prior. We therefore argue that there is limited possibility of reverse causation in the model. Although, there is some evidence of an association between engagement in hazardous drinking during adolescence with adverse social and economic outcomes in later adult life [36], there is limited evidence on the reverse pathway within the years of young adulthood. Future research could use structural equation modelling to examine the joint relationship (both directions) between drinking and social and economic factors in young adulthood.”


4. There is also a need to discuss that analyses did not control for some factors known to influence young adulthood alcohol use.

**Our response:** We agree with the reviewer that residual time-varying confounding is possible. We have addressed this in the discussion, page 12, line 22-25 using the following sentence: “However, residual time-varying confounding is possible, such as other major life-changing events (e.g. losing a beloved one), or changes in parental or peer drinking behaviors.”
Reviewer 2

Major compulsory Revisions

1. When focusing on change it is important not to ignore the baseline data, as has been done by the authors. Anyone reading the current manuscript is left wondering what the association is when the data are examined cross-sectionally. If these were examined and reported elsewhere, please also refer to this in detail in the paper. If not published elsewhere, these should be added to the results here.

Our response: The research question of the current research paper (Do changes in social and economic factors lead to changes in drinking behavior in young adults?) follows from a descriptive analysis of alcohol use in young New Zealanders from the SoFIE study, conducted for the Health Promotion Agency that is currently in the publication process. In this work (conducted in 2012), the cross-sectional association of socioeconomic measures with drinking behaviour was assessed in 15-24 year olds. Higher levels of weekly alcohol consumption were found in 15-24 year olds who had no school qualification, reported to live in more deprived areas, and lived in non-family households (eg, with flatmates or in a one person household), whereas 15-24 year olds who were inactive in the labour force reported lower levels of alcohol consumption. For both young males and females, engaging in hazardous drinking appeared to be high in respondents not living in a family nucleus (eg, living in a flatting situation or in a one person household), and those that had no educational qualification.

We have included information from this work in the results section as suggested by the reviewer: “In a previous descriptive report, we have shown higher levels of drinking in 15-24 year old males and females who did not have a school qualification, or lived in a flatting situation or in a one person household, whereas young respondents who were inactive in the labour force reported lower levels of alcohol consumption [28].”


2. In addition, the effect of change in circumstances may be related to the initial circumstances. A decile increase in individual deprivation may be different when an individual comes from a high or low deprivation. According to your rather brief description of the model, only changes where included in the model. Similarly, sex and age (18 vs 24) may also be important in this respect. For women, a decrease in alcohol consumption may be stronger after starting a family than for men. Has this been examined? Please address this.

Our response: We agree with the reviewer that it is possible that the impact of a change in individual deprivation (on drinking behaviour) may be different for someone that reports no or very low levels of deprivation at baseline than for someone that already reports multiple factors of deprivation at baseline. The fixed effects method assesses the impact of a change in the exposure variable on the outcome variables, but we can however not differentiate from what baseline point the change has been made. A different type of method would be required to explore this. For example, one could apply a Markov model designing multiple states (low deprivation/high alcohol use, medium deprivation/high alcohol use, high deprivation/high alcohol use, low deprivation/low alcohol use, medium
deprivation/low alcohol use, high deprivation/low alcohol use etc.) and analyse how respondents move between states. That was however out of scope for the present paper.

We have tested for sex interactions with the key exposure variables on the drinking behavior outcomes. We found no statistically significant differences between males and females. As gender differences were not the main focus of this paper, these findings were not reported in the manuscript.

3. Along the same line. The last paragraph in the discussion preceding the conclusion seems odd, why not include this analyses as you have the data and this seems the appropriate paper for it?

Our response: In this paper, we were particularly interested in the association between changes in social and economic life events during young adulthood and changes in drinking behaviour (e.g., average weekly alcohol consumption and frequency of hazardous drinking). Fixed effects regression modelling only includes respondents that experience change on the exposure variable. Although it would be important to research the association between living in continuous adverse social and economic circumstances and its association with drinking behaviour, this is a different type of research question than we are addressing in the present paper, and therefore out of scope for the present study.

4. In the methods you indicate that you used a different definition for hazardous drinking. Why and what are the consequences? Would you have different results if you used the standard definition? This should be addressed in the discussion.

Our response: In the present study, we used data from the Survey of Family, Income and Employment (SoFIE). In the SoFIE questionnaire (developed in 2003), hazardous drinking was measured by asking if the respondent had ever consumed six or more standard drinks during a single drinking session (for females) or eight or more standard drinks (for males). Thereafter, respondents were asked how often this had occurred in the past month. We recognise that the definition of hazardous drinking has changed since the SoFIE study took place (i.e., not more than four standard drinks in one drinking session for women and no more than five standard drinks for men). This means that, according to most current practice, we may have underestimated the number of hazardous drinkers in this sample of young adults. This is discussed in the methods section: “the number of hazardous drinkers, in this sample may therefore be underestimated”.

5. In your full model, you do not include increase in household income. You state in a comment with the Table that this is because personal income is deemed more appropriate. If this is so, why did you include it in the first place? Also, more discussion is needed on this in the text.

Our response: We deemed personal income to be more appropriate as we analysed respondents who were 18-24 year olds who may go through major transitions in their lives (starting new jobs, moving out of their family home, etc.). Using personal income as a proxy measure for their disposable income was therefore deemed more appropriate than using household income (for example, at wave 7 only 30% of the sample resided in a family household in the child role – see table 2). For full transparency we also ran analyses with household income, however, in agreement with the reviewer we removed all text around household income, and we also deleted results for household income from all the tables.
6. Discussion. Page 11, line 15-17. In what way would the studies be biased?

**Our response:** This sentence has been changed to: “However, none of these studies have controlled for unobserved time-invariant confounding, and may therefore have under- or overestimated associations between social and economic measures and drinking behaviour.”

7. Discussion. Page 12, line 9-11. You state your findings are in contrast with the findings in an adolescent sample. Becoming a parent as an adolescent will be problematic for any young person, independent of educational level. For young adults, there may be groups within the population, e.g. lower education and income groups for whom becoming a parent is a more natural, planned event. When making these statements and comparisons, please provide some discussion.

**Our response:** We agree with the reviewer. We have now added the following sentence in the discussion at the end of this paragraph: “This is perhaps not surprising given that others factors associated with drinking behaviours such as finishing education, having a secure and income or somewhere to live may also be pertinent issues for those become teenage parents.”

8. Throughout the discussion, ensure that you talk about change in circumstances, e.g. page 12, line 12-13. It was change in individual deprivation that was related to change in drinking behaviour. You related change in individual deprivation here to being able to afford food, but as stated above this may also be related to the initial level of individual deprivation. When this was already low and decrease further, then ability to afford food may be affected.

**Our response:** The measure of individual deprivation is a measure of both social and economic well-being as it is comprised out of eight measures such as for example being able to afford fruit and vegetables, using a food bank, or the need to borrow money for day-to-day needs. The questions require binary yes/no responses so there is no way to highlight the extent of food insecurity, just whether someone reports restricted access to food or not. The measure of individual deprivation is a proxy measure for living standards and access to resources. We found that a one unit increase in individual deprivation (with 0 being the lowest and 8 being the highest) was associated with almost 0.5 unit increase in the average weekly consumption and a modest increase in the frequency of hazardous drinking sessions. As discussed above the fixed effects regression method does not allow us to differentiate between the effect of a one unit increase at the lower end of the individual deprivation spectrum versus the higher end. This is a different research question, and would therefore require a different methods approach (see reply to question 2).

9. In the discussion, page 12/13, you suddenly report the effect on change in self-rated health. This is a topic by itself – in 18-24 year olds it is unlikely to see major changes in subjective health. I take it there are no data for the other factors mentioned.

**Our response:** Change in health status was not part of the exposure measures that we studied in this paper, as we were interested in the impact of changes in social and economic exposure measure on changes in drinking behaviour during young adulthood. Unfortunately, we have no data on other major stressful life events such as losing a beloved one. We agree with the reviewer that this sentence might be a bit ‘out of the blue’, and that it might be unlikely for 18-24 year olds to experience major changes in subjective health. We have now deleted this sentence.

10. Some discussion in the text of the generalizability of the results would be good. Are there any indicators whether the 23% non-responders and the drop-outs scored higher on alcohol use and
lower on detrimental social factors? Is your population representative in drinking behaviour, with 13% not drinking? There are also quite a few persons not in education and not employed – is this also corresponding with general population figures?

Our response: Please see our response to comment 2 of reviewer 1 regarding generalizability of the study sample. We have added the following sentences to the discussion: “The original SoFIE study population was a nationally representative sample of New Zealand households. The health module (which included the questions on drinking behaviour), however, was only collected in wave 3, 5 and 7. We have previously shown that younger people of lower socioeconomic status or Maori or Pacific ethnicity were more likely to drop out of SoFIE [23]. Hence, this might have led to selection bias in our study, and led to reduced generalizability of our findings. However, unless these dropout rates were jointly distributed by the social and economic exposure measures and drinking behaviour outcome measures, the effect of attrition on the studied associations is likely to be minimal. We have also previously shown that for the association of employment or education with self-rated health there appears to be no difference in the association among those respondents leaving the SoFIE study (non-participants) compared to those respondents who stayed in the study (participants) [37].”

Regarding the reviewer’s concerns about representativeness of our data compared to general population figures, we compared our data with other data from the Ministry of Health and Ministry of Business, Innovation, and Employment. We looked at New Zealand Health Survey results from 2006/2007 which was around the same time that SoFIE data was collected (from http://www.health.govt.nz/system/files/documents/publications/chapter2.pdf). Approximately 90% of 18-24 year olds reported to have consumed alcohol in the past 12 months, so that is very similar to our results (ie, 87-88%).

In our study at baseline (Wave 3), 11.5% of 18-24 year olds is not enrolled in education nor employment. We compared this to 2013 data from the Ministry of Business, Innovation and Employment, wherein 9.1% of 15-19 year old was assigned to this category and 17% of 20-24 year olds (from http://www.dol.govt.nz/publications/lmr/pdfs/lmr-fs/lmr-fs-youth-mar13.pdf). This percentage for 18-24 year olds should therefore lie somewhere in between these percentages. Our SoFIE data for 18-24 year olds therefore seems representative.

11. Table 1. The inclusion of drinking status in Table 1 is confusing. The variable has not been defined in the text – when is someone classified as drinking? Either treat this as a true variable and describe it fully in the method section, or remove it from the variable and just state in the text that more than 87% of the sample drinks alcohol.

Our response: We included the information on drinking status in Table 1 to show that the vast majority of 18-24 sample is already classified as a drinker at baseline (“Have you consumed alcohol in the past 12 months”). We could not include this as an exposure measure in the fixed effects regression analyses, as not enough “change” is experienced in this exposure measure.

We have now removed this information from table 1, and have just stated in the results section that 87.5% of the sample drinks alcohol at wave 3 – the underlined words were added: “The prevalence of drinking (having consumed alcohol in the past 12 months) at wave 3 was 87.5%, and this remained stable over time. Very few (between 4 - 5%) young adults stopped or started drinking between waves.”
Minor Essential Reviews

12. Page 2, line 18. Provide also the details for the result on the modest increase in frequency.

Our response: This finding is now included in the abstract.


Our response: Thank you for spotting this, we have now corrected the spelling.


Our response: Now changed.

15. In the results section, there is a lot of repeating the analyses. E.g. page 9 and page 10, line 16-19.

Our response: We agree with reviewer 2 that there is some repetition of analyses in the results. We therefore deleted line 17-19 on page 11.

16. Table 1. I have difficulty understanding the N for the current drinkers only reports. E.g. for wave 3 there are 1050 drinking but you have frequency for 1055, while stating that frequency was measured in current drinkers only?

Our response: We have used information on average weekly alcohol consumption and frequency of hazardous drinking only for those who reported to be a drinker in both waves (wave 3 to wave 5 and wave 5 to wave 7). Thus, only information on average weekly alcohol consumption and frequency of hazardous drinking was taken into account if respondents answered yes to “have you consumed alcohol in the past 12 months”. The difference between 1,050 and 1,055 lies in that all counts are random rounded to a near multiple of 5 as per Statistics New Zealand requirements. The difference between number of current drinkers in the analyses for average weekly alcohol consumption and frequency of hazardous drinkers is that not all current drinkers answered both questions (more missing for frequency of hazardous drinking sessions). As per comment 11 of the reviewer, all information on drinking status is now removed from table 1, as this was not modelled as one of the outcome variables.