

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form ([see an example](#)) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below. Some articles will have been accepted based in part or entirely on reviews undertaken for other BMJ Group journals. These will be reproduced where possible.

ARTICLE DETAILS

TITLE (PROVISIONAL)	The persistence of adolescent binge drinking into adulthood: Findings from a 15-year prospective cohort study
AUTHORS	Degenhardt, Louisa; O'Loughlin, Christina; Swift, Wendy; Romaniuk, Helena; Carlin, John; Coffey, Carolyn; Hall, Wayne; Patton, George

VERSION 1 - REVIEW

REVIEWER	Sargent, James Dartmouth Medical School
REVIEW RETURNED	25-Apr-2013

THE STUDY	<p>I suggest amending stated aim 2 as discussed under Multivariate model. I suggest that alcohol consequences be treated as an outcome and heavy drinking dropped from the presentation.</p> <p>The claim to be the first to study whether adolescent drinking persists into adulthood is false. The investigators need to conduct a more thorough literature review.</p>
RESULTS & CONCLUSIONS	<p>The writing is generally clear and concise. There is too much emphasis on the details of drinking by wave and not enough emphasis on predicting adult drinking patterns. As an example, data in tables should not be replicated in figures but one or the other chosen for presentation. The literature review is woefully inadequate.</p>
GENERAL COMMENTS	<p>SUMMARY The authors report a cohort study in which adolescents were recruited during secondary school and followed into late young adulthood. The recruitment strategy was likely to yield an unbiased sample and the cohort was followed with acceptable levels of attrition. Attrition was handled with multiple imputation as is appropriate. They found that binge drinking, more often than not, persisted into young adulthood and became more prevalent there as former non-drinkers started binge drinking during young adulthood.</p> <p>GENERAL COMMENTS This study has great potential to enhance our understanding of adolescent binge drinking and its consequences. However, an incomplete literature review and a perplexing multivariate predictive model greatly reduced my enthusiasm. I think that these problems could be addressed in a major revision.</p> <p>MAJOR COMMENTS In the introduction, the authors state, ““We do not know a great deal about how persistent binge alcohol use in adolescence is because few longitudinal studies have examined its natural history from adolescence into adulthood(12).” The authors go on to claim to be the first to follow adolescents into young adulthood. The US studies generally show a normative decline in binge drinking that begins in the early 20’s. This study may show the decline begins later among Australians. As an example, the authors missed at least</p>

one well-documented youth cohort where investigators have published extensively on this topic. Catalano and Hawkins have a US cohort that were recruited in junior high school and have been followed to age 33. Below is a sample of citations that examine predictors of alcohol misuse in young adulthood as a function of alcohol use, school function, and family function during adolescence. The authors need to undertake a more complete literature review and then frame their findings in the context of what is currently known. They need to look harder and determine whether there are other cohort studies besides this one.

1: Guttmanova K, Hill KG, Bailey JA, Lee JO, Hartigan LA, Hawkins JD, Catalano RF. Examining explanatory mechanisms of the effects of early alcohol use on young adult alcohol dependence. *J Stud Alcohol Drugs*. 2012 May;73(3):379-90. PubMed PMID: 22456243; PubMed Central PMCID: PMC3316713.

2: Lee JO, Hill KG, Guttmanova K, Bailey JA, Hartigan LA, Hawkins JD, Catalano RF. The effects of general and alcohol-specific peer factors in adolescence on trajectories of alcohol abuse disorder symptoms from 21 to 33 years. *Drug Alcohol Depend*. 2012 Mar 1;121(3):213-9. doi: 10.1016/j.drugalcdep.2011.08.028. Epub 2011 Oct 2. PubMed PMID: 21963332; PubMed Central PMCID: PMC3272150.

3: Guttmanova K, Bailey JA, Hill KG, Lee JO, Hawkins JD, Woods ML, Catalano RF. Sensitive periods for adolescent alcohol use initiation: predicting the lifetime occurrence and chronicity of alcohol problems in adulthood. *J Stud Alcohol Drugs*. 2011 Mar;72(2):221-31. PubMed PMID: 21388595; PubMed Central PMCID: PMC3052892.

4: Mason WA, Hitch JE, Kosterman R, McCarty CA, Herrenkohl TI, Hawkins JD. Growth in adolescent delinquency and alcohol use in relation to young adult crime, alcohol use disorders, and risky sex: a comparison of youth from low- versus middle-income backgrounds. *J Child Psychol Psychiatry*. 2010 Dec;51(12):1377-85. doi: 10.1111/j.1469-7610.2010.02292.x. PubMed PMID: 20659188; PubMed Central PMCID: PMC2980793.

5: Beyers JM, Toumbourou JW, Catalano RF, Arthur MW, Hawkins JD. A cross-national comparison of risk and protective factors for adolescent substance use: the United States and Australia. *J Adolesc Health*. 2004 Jul;35(1):3-16. PubMed PMID: 15193569.

6: Oesterle S, Hill KG, Hawkins JD, Guo J, Catalano RF, Abbott RD. Adolescent heavy episodic drinking trajectories and health in young adulthood. *J Stud Alcohol*. 2004 Mar;65(2):204-12. PubMed PMID: 15151351; PubMed Central PMCID: PMC1876676

7: Guo J, Hawkins JD, Hill KG, Abbott RD. Childhood and adolescent predictors of alcohol abuse and dependence in young adulthood. *J Stud Alcohol*. 2001 Nov;62(6):754-62. PubMed PMID: 11838912; PubMed Central PMCID: PMC1868672.

8: Guo J, Collins LM, Hill KG, Hawkins JD. Developmental pathways to alcohol abuse and dependence in young adulthood. *J Stud Alcohol*. 2000 Nov;61(6):799-808. PubMed PMID: 11188485;

PubMed Central PMCID: PMC1975961.

9: Hawkins JD, Graham JW, Maguin E, Abbott R, Hill KG, Catalano RF. Exploring the effects of age of alcohol use initiation and psychosocial risk factors on subsequent alcohol misuse. *J Stud Alcohol*. 1997 May;58(3):280-90. PubMed PMID: 9130220; PubMed Central PMCID: PMC1894758.

Choice of outcomes and presentation—Heavy drinking. The introduction of heavy binge drinking doubles the number of figures and tables. Heavy binge drinking is not a universally accepted outcome and some justification is required for its inclusion. Is this outcome more likely to lead to alcohol harms or consequences? Is it more likely to lead to hospitalization? If there is some justification I think it can be retained, otherwise, I'm not sure that it adds much.

Alcohol-related consequences—This is typically treated as an outcome, as indicated by the term “consequences.” Alcohol consequences are synonymous with alcohol abuse or alcohol problems. They reflect the consequences of heavy drinking. Onset of consequences is mediated through increases in the amount of alcohol consumed. (As an example, see Wills, et al. Wills TA, Sargent JD, Gibbons FX, Gerrard M, Stoolmiller M. Movie exposure to alcohol cues and adolescent alcohol problems: a longitudinal analysis in a national sample. *Psychol Addict Behav*. 2009 Mar;23(1):23-35. doi:10.1037/a0014137. PubMed PMID: 19290687; PubMed Central PMCID: PMC2805125.) I would treat alcohol consequences as a second outcome. I would not analyze them separately, but would either add up the number of consequences reported or treat report of any problems as a dummy variable.

On a similar theme, I do not find it helpful to show data in figures that is already presented in Tables. Personally, I think that figures 2 a is the best way to show binge drinking prevalence over the life course. I would show alcohol consequences over the life course in figure 2b.

The multivariate model is puzzling to me in the context of the stated aims. The authors state: “We investigated the persistence of binge drinking into adulthood using a 15-year prospective cohort study of young Australians that assessed alcohol use during adolescence and up to age 29 years.

We aimed to:

1. Examine the persistence of adolescent “binge” and “heavy binge” drinking from adolescence to young adulthood;
2. Examine which characteristics of adolescent binge drinkers predict the persistence of “binge” and “heavy binge” alcohol use into young adulthood.

The multivariate model is confined to adolescent binge drinkers. The problem with the model is that the outcome will be present in the vast majority of subjects, and logistic regression is not designed to work well under those circumstances. At the very least, this greatly affects the interpretation of the odds ratio, which cannot be considered to approximate relative risk.

Why not model binge drinking in young adulthood in the whole

	<p>cohort and include binge drinking and alcohol consequences during adolescence as a predictor (again, I don't see much value in breaking alcohol consequences into its individual components [just as you don't break antisocial behavior into its individual components]? Your second aim would then be: Examine adolescent predictors of binge drinking in young adulthood. You could also break the adolescent binge drinking variable into into early vs late onset adolescent binge drinking (an emphasis of the Hawkins group), or model the number of waves they reported binge drinking. This would capture the predictive value of various measures of drinking during adolescence on binge drinking in young adulthood. The other variables would capture what predicts the onset of binge drinking during adulthood. In this context, your choice of variables seems somewhat sparse compared to other work in this area. Just looking at the work of Hawkins and Catalano, there is family cohesion, community cohesion, school engagement. Others emphasize alcohol use by peers and parents (something you must have captured in your surveys but inexplicably ignore in this manuscript). What about alcohol access in the home? Finally, measures of personality like sensation seeking have been strong predictors of onset and persistence of multiple risk behaviors. (See stoolmiller et al for a set of likely predictors in terms of parent and peer use, personality factors, and media/marketing exposures: Stoolmiller M, Wills TA, McClure AC, Tanski SE, Worth KA, Gerrard M, Sargent JD. Comparing media and family predictors of alcohol use: a cohort study of</p>
--	---

REVIEWER	Erika M. Edwards, Ph.D., M.P.H. Research Assistant Professor Mathematics and Statistics University of Vermont Burlington, Vermont, USA
REVIEW RETURNED	30-Apr-2013

THE STUDY	<p>I have concerns about the logistic analyses (table 2). The analysis does not account for clustering of risk factors that occur within a single individual. At the very least, the authors need to adjust for the clustering with hierarchical logistic regression. Did the authors consider structural equation modeling or latent cluster or transition analysis?</p> <p>Please provide more detail on how you collected the information on the types of alcohol and sizes. How did you standardize the alcohol types to alcohol grams per drink? How did you estimate the sizes? (In the United States, "a pint" is a vague term. It may be more standard in Australia. But readers don't know that.)</p> <p>I know "standard drink" shortens to "SD" but "SD" also stands for "standard deviation." That got a little confusing. Is there another way to shorten "standard drink"?</p>
RESULTS & CONCLUSIONS	<p>For each section in the Results I recommend describing the larger sample first and then describing the stratified binge drinking behaviors. That translates simply to switching paragraph order - for example, on page 10, switch the second and third full paragraphs.</p> <p>The Discussion reviews the results of the univariate logistic regression but should also include the multivariable regressions.</p>

	<p>What effect did imputing have on your results? Did you analyze the sample without imputed data? Are those results available? In the appendix, you list X of key variables had Y percent of missing values. Where do the outcomes fall in this list? The amount of imputation is a limitation that needs to be addressed in the discussion.</p> <p>The individual figures need to be labeled and need titles. Additionally, while I understand why it was done, the scales on the figures are different which is misleading. Either the scales need to be the same or the different scales need to be identified.</p>
--	---

VERSION 1 – AUTHOR RESPONSE

Reviewer 1

I suggest amending stated aim 2 as discussed under Multivariate model. I suggest that alcohol consequences be treated as an outcome and heavy drinking dropped from the presentation. The claim to be the first to study whether adolescent drinking persists into adulthood is false. The investigators need to conduct a more thorough literature review.

We address these comments below.

The writing is generally clear and concise. There is too much emphasis on the details of drinking by wave and not enough emphasis on predicting adult drinking patterns. As an example, data in tables should not be replicated in figures but one or the other chosen for presentation. The literature review is woefully inadequate.

This paper is centred around outcomes for adolescent binge drinkers. We wish to retain the graphs, tables and text of our results on the levels across adolescence as that is the strength and one of the unique ways in which this study informs the field – such detailed analyses have never before been presented, and are important for both prevention and early intervention responses. The strength of the figures is that the reader needs is able to see the trends as well. While the graphs visually show the patterns of drinking, the tables enable the reader to have accurate estimates of the prevalences.

We address the reviewer's comments about the adequacy of the literature review later on where this comment is repeated.

SUMMARY The authors report a cohort study in which adolescents were recruited during secondary school and followed into late young adulthood. The recruitment strategy was likely to yield an unbiased sample and the cohort was followed with acceptable levels of attrition. Attrition was handled with multiple imputation as is appropriate. The found that binge drinking, more often than not, persisted into young adulthood and became more prevalent there as former non-drinkers started binge drinking during young adulthood.

Thanks to the reviewer for their positive comments on the paper.

GENERAL COMMENTS This study has great potential to enhance our understanding of adolescent binge drinking and its consequences. However, an incomplete literature review and a perplexing

multivariate predictive model greatly reduced my enthusiasm. I think that these problems could be addressed in a major revision.

We have responded to these comments where they are again repeated below.

MAJOR COMMENTS In the introduction, the authors state, ““We do not know a great deal about how persistent binge alcohol use in adolescence is because few longitudinal studies have examined its natural history from adolescence into adulthood(12).” The authors go on to claim to be the first to follow adolescents into young adulthood. The US studies generally show a normative decline in binge drinking that begins in the early 20’s. This study may show the decline begins later among Australians. As an example, the authors missed at least one well-documented youth cohort where investigators have published extensively on this topic. Catalano and Hawkins have a US cohort that were recruited in junior high school and have been followed to age 33. Below is a sample of citations that examine predictors of alcohol misuse in young adulthood as a function of alcohol use, school function, and family function during adolescence. The authors need to undertake a more complete literature review and then frame their findings in the context of what is currently known. They need to look harder and determine whether there are other cohort studies besides this one.

We feel that the author has missed the intent of our paper. The author refers to a number of papers that do indeed examine alcohol use in adolescence as a predictor of young adult use. We are happy to (and now have) cited many of these.

However, none of these papers charted the natural history of binge alcohol use specifically. More importantly, none of those papers have explicitly examined the prognostic significance in adulthood of adolescent onset binge drinking. For the clinician this is a central question in deciding how to respond to a young patient she/he identifies as a binge drinker.

Choice of outcomes and presentation—Heavy drinking. The introduction of heavy binge drinking doubles the number of figures and tables. Heavy binge drinking is not a universally accepted outcome and some justification is required for its inclusion. Is this outcome more likely to lead to alcohol harms or consequences? Is it more likely to lead to hospitalization? If there is some justification I think it can be retained, otherwise, I’m not sure that it adds much.

We wish to retain the “heavy” binge drinking analyses in our paper. This variable was defined based upon previous Australian work¹ that had documented high levels of this form of extreme drinking in the previous year among young people. The exposure variable they had derived was based upon Australian National Health and Medical Research Council (NHMRC) guidelines for risky drinking levels.

Further, there are shifting definitions of risky drinking among young people. Binge alcohol use is variously defined in the literature to date. We also think that there is considerable value in having a higher threshold definition for the clinician who is likely to see adolescents in this category.

Our analyses show that a pattern of very high level drinking is prevalent even with a short one-week window period.

The level of drinking is also clinically important because of the health risks of the high levels of alcohol consumption that this definition captures.

Alcohol-related consequences—This is typically treated as an outcome, as indicated by the term

“consequences.” Alcohol consequences are synonymous with alcohol abuse or alcohol problems. They reflect the consequences of heavy drinking. Onset of consequences is mediated through increases in the amount of alcohol consumed. (As an example, see Wills, et al. Wills TA, Sargent JD, Gibbons FX, Gerrard M, Stoolmiller M. Movie exposure to alcohol cues and adolescent alcohol problems: a longitudinal analysis in a national sample. *Psychol Addict Behav.* 2009 Mar;23(1):23-35. doi:10.1037/a0014137. PubMed PMID: 19290687; PubMed Central PMCID: PMC2805125.) I would treat alcohol consequences as a second outcome. I would not analyze them separately, but would either add up the number of consequences reported or treat report of any problems as a dummy variable.

Again we think that the reviewer has misunderstood our reasons for including the “alcohol consequences” variables in adolescence in the regression predicting binge drinking in adulthood. This was to provide prognostic information for clinicians who may be able to elicit this information from patients. It is important for clinicians to know that these experiences in adolescent drinkers are predictive of the persistence of binge drinking into adulthood (i.e. that in a patient who is binge drinking in adolescence, the presence of these consequences provides information about the risks of this behaviour persisting into adulthood).

We included these variables separately in the model (in the same way that we did for other risk behaviours) because we wished to examine the predictive value of each of the consequences independently of others. This decision was given some support since in both the univariate and multivariate analyses, not all adolescent alcohol consequences were associated with persistence of binge drinking into young adulthood.

On a similar theme, I do not find it helpful to show data in figures that is already presented in Tables. Personally, I think that figures 2 a is the best way to show binge drinking prevalence over the life course. I would show alcohol consequences over the life course in figure 2b.

As noted above in response to the same comment, we wish to retain the figures because they present, in a concise and striking way, the variation over time and by sex in the levels of these patterns of drinking. Further, our focus in this paper is on the exposure (binge and heavy binge alcohol use), rather than on the consequences of alcohol use. For that reason, we do not wish to add an additional graph on alcohol-related consequences.

The multivariate model is puzzling to me in the context of the stated aims. The authors state: “We investigated the persistence of binge drinking into adulthood using a 15- year prospective cohort study of young Australians that assessed alcohol use during adolescence and up to age 29 years.

We aimed to:

1. Examine the persistence of adolescent “binge” and “heavy binge” drinking from adolescence to young adulthood;
2. Examine which characteristics of adolescent binge drinkers predict the persistence of “binge” and “heavy binge” alcohol use into young adulthood.

The multivariate model is confined to adolescent binge drinkers. The problem with the model is that the outcome will be present in the vast majority of subjects, and logistic regression is not designed to work well under those circumstances. At the very least, this greatly affects the interpretation of the odds ratio, which cannot be considered to approximate relative risk.

We are unsure where the confusion has arisen here. We have stated in the aims that we wished to examine the prognostic value adolescent binge drinking for binge drinking in young adulthood. This was stated as our second aim. Our analysis is focused on the adult outcomes for these drinkers, not upon the adolescent risk factors for young adult binge drinking. As our outcomes are common, we have not assumed that the odds ratios estimated by our models approximate relative risk; we have never referred to "risks" when discussing odds ratios in the paper and feel that our consistent use of the OR terms is clear in the paper.

Why not model binge drinking in young adulthood in the whole cohort and include binge drinking and alcohol consequences during adolescence as a predictor (again, I don't see much value in breaking alcohol consequences into its individual components [just as you don't break antisocial behavior into its individual components]? Your second aim would then be: Examine adolescent predictors of binge drinking in young adulthood. You could also break the adolescent binge drinking variable into into early vs late onset adolescent binge drinking (an emphasis of the Hawkins group), or model the number of waves they reported binge drinking. This would capture the predictive value of various measures of drinking during adolescence on binge drinking in young adulthood. The other variables would capture what predicts the onset of binge drinking during adulthood. In this context, your choice of variables seems somewhat sparse compared to other work in this area. Just looking at the work of Hawkins and Catalano, there is family cohesion, community cohesion, school engagement. Others emphasize alcohol use by peers and parents (something you must have captured in your surveys but inexplicably ignore in this manuscript). What about alcohol access in the home? Finally, measures of personality like sensation seeking have been strong predictors of onset and persistence of multiple risk behaviors. (See stoolmiller et all for a set of likely predictors in terms of parent and peer use, personality factors, and media/marketing exposures: Stoolmiller M, Wills TA, McClure AC, Tanski SE, Worth KA, Gerrard M, Sargent JD. Comparing media and family predictors of alcohol use: a cohort study of

The reason we have not analysed these data in this way is because it would not answer the question we pose, namely, whether these are risk factors for continued binge alcohol use in young adulthood among adolescent binge drinkers. The reviewer is suggesting an analysis which would completely change the focus of the paper.

The idea is a good one, but the proposed analyses would answer a very different question to the one we posed. It would be the subject of a separate piece of work.

Reviewer 2

I have concerns about the logistic analyses (table 2). The analysis does not account for clustering of risk factors that occur within a single individual. At the very least, the authors need to adjust for the clustering with hierarchical logistic regression. Did the authors consider structural equation modeling or latent cluster or transition analysis?

Our regression was entirely aimed at examining potential variables that predicted the adult prognosis for adolescent binge drinkers. We have included multiple risk factors, many of which may be related, as independent predictors in the model. We wished to examine these independently rather than considering them in some aggregate manner, as the reviewer seems to be suggesting.

Although it may be true that more sophisticated modelling techniques would be useful for addressing more complex research questions about patterns of change over time, we believe that the approach that we have adopted best addresses our questions. We preferred to work with an empirical classification that was readily accessible to the reader rather than a latent structure, which might have theoretical advantages but at the cost of making the results more difficult to understand.

In addition, fitting a latent growth curve or growth mixture model requires assumptions about the shape of these latent trajectories. It is difficult to incorporate time dependence beyond simple linear trends, which are insufficient to represent complex patterns of uptake and moderation. In previous exploration of growth curve modelling in this cohort study (analyses of cigarette smoking and depression), difficulties were encountered in dealing with floor and ceiling effects. The main problem in fitting such models is that we did not follow all individuals from a time before initiation of the behaviour of interest (in this case, binge alcohol use) to the development of a stable pattern of drinking. It is accordingly difficult to model the period of "growth".

Please provide more detail on how you collected the information on the types of alcohol and sizes. How did you standardize the alcohol types to alcohol grams per drink? How did you estimate the sizes? (In the United States, "a pint" is a vague term. It may be more standard in Australia. But readers don't know that.)

We described in the methods section (p.5) how participants were asked to record their consumption. We then calculated standard drinks (10g alcohol each) from this reporting. We agree that the term "pint" refers to varying amounts across countries, but given we report everything in terms of standard drinks we feel explanation of this term is not required in the paper.

I know "standard drink" shortens to "SD" but "SD" also stands for "standard deviation." That got a little confusing. Is there another way to shorten "standard drink"?

The reviewer makes a reasonable observation. We have used the full wording of "standard drinks".

For each section in the Results I recommend describing the larger sample first and then describing the stratified binge drinking behaviours. That translates simply to switching paragraph order - for example, on page 10, switch the second and third full paragraphs.

We have made this suggested change.

The Discussion reviews the results of the univariate logistic regression but should also include the multivariable regressions.

We have added this in as suggested on page 12.

What effect did imputing have on your results? Did you analyze the sample without imputed data? Are those results available? In the appendix, you list X of key variables had Y percent of missing values. Where do the outcomes fall in this list? The amount of imputation is a limitation that needs to be addressed in the discussion.

Imputation had little impact on our findings. We have included tables with results prior to imputation in the appendix to show this (using available case data). We refer to these tables in the first paragraph of the results.

The individual figures need to be labeled and need titles. Additionally, while I understand why it was

done, the scales on the figures are different which is misleading. Either the scales need to be the same or the different scales need to be identified.

Each figure is labelled. For figures 2a and 2b we used a different scale for graph of “heavy” binge alcohol use in order to show changes over time. The axes are clearly labelled and the data pertaining to these figures are also available in the Tables so we feel this is all clear.

References

1. Livingston M, Laslett AM, Dietze P. Individual and community correlates of young people's high-risk drinking in Victoria, Australia. Drug and Alcohol Dependence. 2008; 98(3): 241-8.

VERSION 2 – REVIEW

REVIEWER	James D Sargent MD Geisel School of Medicine at Dartmouth No competing interests
REVIEW RETURNED	19-Jun-2013

THE STUDY	<p>Disagree with the decision to model adult binge drinking only for adolescent binge drinkers</p> <p>Patients may be representative of Australia but the authors generalize beyond that country. Drinking in Australia is heavier, of higher prevalence and persistence than in other countries.</p> <p>Summary and abstract fails to acknowledge other studies of binge drinking persistence and over generalizes the results. In addition the first sentence of the abstract conclusion is misleading.</p> <p>Disagree with the decision to model adult binge drinking only among adolescent binge drinkers.</p> <p>The authors need to reference longitudinal studies that examined this already and interpret their results accordingly.</p>
RESULTS & CONCLUSIONS	<p>Tables contain too much detail on prevalence by wave, data which are repeated in figures. Last four rows of tables 1a and 1b are the key information.</p> <p>The abstract conclusion “Binge alcohol use is common and has a greater degree of persistence than other health risk behaviours that commonly arise in adolescence.” is misleading. This was not a study that compared the persistence of other risk behaviors. I think the authors would find that smoking is also a persistent behavior.</p> <p>See first paragraph of MAJOR COMMENTS for my concerns about interpretation in light of previous evidence.</p> <p>Message about binge drinking predicting future binge drinking is lost in the regression because it starts with adolescent binge drinkers.</p>
GENERAL COMMENTS	<p>SUMMARY This is a revision of a previously reviewed manuscript. The revision is little changed from the original and contains many of the same problems that the original contained.</p> <p>GENERAL COMMENTS I don't think I have ever as a reviewer rejected a resubmission after</p>

opting for a revise and resubmit for the first round. That is because, in most cases, my concerns were effectively responded to by clarifications or changes in the manuscript. I have opted for rejection so in this case because I found the revision unresponsive to my concerns. I list those concerns below, but emphasize that my decision to reject is primarily based on the first concern addressed in the major comments below—that the authors fail to adequately interpret their findings in the context of the already large literature that shows that drinking during adolescence predicts drinking during adulthood.

MAJOR COMMENTS

The original was criticized because it failed to acknowledge the results of many longitudinal cohort studies that examined drinking during adolescence as a predictor of adult drinking behaviors. In response to the critique, the investigators now cite a number of the longitudinal studies but fail to interpret their findings in the context of the published literature and continue to insist that binge drinking during adolescence as a predictor of adult binge drinking has not been studied. They continue to claim in the Article Focus statement, “We know little about the persistence of binge drinking in adolescence into young adulthood.” They now cite a recently published systematic review (MCCAMBRIDGE, J., MCALANEY, J. & ROWE, R. (2011) Adult consequences of late adolescent alcohol consumption: a systematic review of cohort studies, PLoS Medicine, 8, e1000413) that reported the results of many of these studies but fail to correctly interpret the conclusion of that review. Their statement associated with the citation is, “However, there has been little study of the strength of persistence of binge alcohol use from adolescence into young adulthood.” In contrast to this perception by the authors, the systemic review found multiple cohort studies that studied drinking during adolescence as a predictor of young adult drinking. A count of the studies in Tables 1 and 2 of that article shows 3 studies that examined binge drinking as a predictor of binge drinking, 3 that examined heavy drinking as a predictor of heavy drinking, and one that examined binge drinking as a predictor of weekly alcohol use above recommended limits. There were many others that assessed only frequency and quantity as a predictor of that outcome in adults and are unable to comment on binge drinking per se but also show that high frequency and quantity of drinking during adolescence predicts high frequency and quantity during adulthood. The abstract of the systematic review concludes, “There is consistent evidence that higher alcohol consumption in late adolescence continues into adulthood and is also associated with alcohol problems including dependence.” I do not find it acceptable from a scientific standpoint for the authors to continue to insist that theirs is the first to look at this.

The authors’ insistence in this respect is not only misleading from a scientific standpoint but it fails to contextualize the Australian findings with those from other countries. The data are clear that Australia has a big problem with drinking during adolescence and young adulthood, and it is probably justified to conclude that “Efforts to prevent the onset of binge drinking during adolescence may substantially reduce harmful patterns of alcohol use in young adulthood.” In that country. However, this may not be the case in other countries, and the data do not warrant us to conclude this for other countries in an international journal. For example, a cohort study conducted in Norway found that

	<p>eliminating all drinking during adolescence would impact only 11% of hazardous drinking during young adulthood because in that country much of the hazardous drinking among young adults was adult-onset drinking.</p> <p>MINOR COMMENTS</p> <p>I continue to find the tables and figures repetitive and distracting from the main goal of the manuscript, which is to highlight the persistence of binge and heavy drinking. The key numbers are found in the last four rows of tables 1a and 1b, and the rest of the information is repeated in the figures.</p> <p>I continue to disagree with the insistence to use logistic regression to assess persistence of drinking but only among those that were drinking during adolescence. It's a little like a regression that predicts lung cancer, but only among smokers. By not using the entire cohort to model adult drinking the authors miss the chance to show the odds ratio for adult drinking associated with adolescent binge drinking as a very substantial risk factor (which is their stated aim to begin with). If done on the whole cohort, firstly, the size of the odds ratio associated with adolescent binge drinking will be adjusted for other risk factors (for example males were more likely to binge drink during adolescents and also persist in drinking to adulthood, so male gender is a confounder of the association between binge drinking in adolescence and binge drinking during young adulthood). Secondly, it will be clear to the clinician that the main risk factor they should focus on is adolescent binge/heavy drinking. With the current approach, the clinician might be led to believe they should emphasize sexual risk taking as a predictor of heavy drinking.</p> <p>A concern was raised that the odds ratio is not a good indicator of the relative risk when the incidence of the outcome is high. The response did not address the concern. The investigators should take a look a BMJ description of when the odds ratio may be used as an approximation of the relative risk (http://www.bmj.com/content/316/7136/989). All clinicians (and researchers too) view the odds ratio as a relative risk approximation.</p> <p>The abstract conclusion "Binge alcohol use is common and has a greater degree of persistence than other health risk behaviours that commonly arise in adolescence." is misleading. This was not a study that compared the persistence of other risk behaviors. I think the authors would find that smoking is also a persistent behavior.</p> <p>1 Norström T, Pape H. Associations between adolescent heavy drinking and problem drinking in early adulthood: implications for prevention. <i>J Stud Alcohol Drugs</i>.2012 Jul;73(4):542-8.</p>
--	---

REVIEWER	Erika M Edwards, PhD, MPH Research Assistant Professor Mathematics and Statistics University of Vermont Burlington, Vermont, USA
REVIEW RETURNED	28-May-2013

GENERAL COMMENTS	The file that was uploaded did not include the figures. The figures in the first draft did not have titles or figure numbers. I assume you will work with the Editorial Office to fix that.
-------------------------	---

VERSION 2 – AUTHOR RESPONSE

Reviewer 1

The file that was uploaded did not include the figures. The figures in the first draft did not have titles or figure numbers. I assume you will work with the Editorial Office to fix that.

Thanks to the reviewer, yes we will ensure all details are accurately published in the paper.

Reviewer 2

This is a revision of a previously reviewed manuscript. The revision is little changed from the original and contains many of the same problems that the original contained.

I don't think I have ever as a reviewer rejected a resubmission after opting for a revise and resubmit for the first round. That is because, in most cases, my concerns were effectively responded to by clarifications or changes in the manuscript. I have opted for rejection so in this case because I found the revision unresponsive to my concerns. I list those concerns below, but emphasize that my decision to reject is primarily based on the first concern addressed in the major comments below—that the authors fail to adequately interpret their findings in the context of the already large literature that shows that drinking during adolescence predicts drinking during adulthood.

The original was criticized because it failed to acknowledge the results of many longitudinal cohort studies that examined drinking during adolescence as a predictor of adult drinking behaviors. In response to the critique, the investigators now cite a number of the longitudinal studies but fail to interpret their findings in the context of the published literature and continue to insist that binge drinking during adolescence as a predictor of adult binge drinking has not been studied. They continue to claim in the Article Focus statement, "We know little about the persistence of binge drinking in adolescence into young adulthood." They now cite a recently published systematic review (MCCAMBRIDGE, J., MCALANEY, J. & ROWE, R. (2011) Adult consequences of late adolescent alcohol consumption: a systematic review of cohort studies, PLoS Medicine, 8, e1000413) that reported the results of many of these studies but fail to correctly interpret the conclusion of that review. Their statement associated with the citation is, "However, there has been little study of the strength of persistence of binge alcohol use from adolescence into young adulthood." In contrast to this perception by the authors, the systemic review found multiple cohort studies that studied drinking during adolescence as a predictor of young adult drinking. A count of the studies in Tables 1 and 2 of that article shows 3 studies that examined binge drinking as a predictor of binge drinking, 3 that examined heavy drinking as a predictor of heavy drinking, and one that examined binge drinking as a predictor of weekly alcohol use above recommended limits. There were many others that assessed only frequency and quantity as a predictor of that outcome in adults and are unable to comment on binge drinking per se but also show that high frequency and quantity of drinking during adolescence predicts high frequency and quantity during adulthood. The abstract of the systematic review concludes, "There is consistent evidence that higher alcohol consumption in late adolescence continues into adulthood and is also associated with alcohol problems including dependence." I do not find it acceptable from a scientific standpoint for the authors to continue to insist that theirs is the first to look at this.

The authors' insistence in this respect is not only misleading from a scientific standpoint but it fails to contextualize the Australian findings with those from other countries. The data are clear that Australia has a big problem with drinking during adolescence and young adulthood, and it is probably justified to conclude that "Efforts to prevent the onset of binge drinking during adolescence may substantially reduce harmful patterns of alcohol use in young adulthood." In that country. However, this may not be the case in other countries, and the data do not warrant us to conclude this for other countries in an international journal. For example, a cohort study conducted in Norway¹ found that eliminating all

drinking during adolescence would impact only 11% of hazardous drinking during young adulthood because in that country much of the hazardous drinking among young adults was adult-onset drinking.

We apologise to the reviewer if they felt we did not incorporate their earlier comments. However, we would note that although our paper deals with the continuities and discontinuities of binge drinking across adolescence and young adulthood, our prime focus has been on outcome of adolescent binge drinking rather than prediction of young adulthood drinking. We do feel this focus differs from earlier papers on continuities in drinking between adolescence and young adulthood. Perhaps we were not clear enough in our responses, which were not an attempt to dismiss the reviewer's viewpoint but rather to clarify our views about the aims of the paper. We have edited the introduction which now reads as follows:

"There have been many studies examining alcohol use among adolescents(12, 13), risk factors for young adult consumption and alcohol use disorders(14-19), and the impact of adolescent use upon health in young adulthood(13). However to our knowledge there has not been a study of the course of adolescent binge drinking in a cohort study of young Australians. We investigated the persistence of binge drinking into adulthood among Australian young people using a 15-year prospective cohort study of young Australians that assessed alcohol use during adolescence and up to age 29 years. We also examined the predictors of persistence of binge alcohol use into young adulthood for adolescent binge drinkers."

We have also included detail about the Norwegian study in the discussion where we contrast their findings with ours:

"The overwhelming majority of those who reported binge drinking in adolescence continued to do so in young adulthood. Even if past-week binge drinking was not reported in the teens, it was reported in at least one wave in young adulthood by 70% of males and 48% of females who did not report binge drinking at any time in adolescence. Interestingly, our findings about the continuity of past-week binge drinking from adolescence to young adulthood contrasted somewhat with the findings of a Norwegian cohort study, where considerable discontinuity was observed, and where they estimated that eliminating all adolescent hazardous drinking would only reduce adult hazardous drinking by 10%(29)."

MINOR COMMENTS

I continue to find the tables and figures repetitive and distracting from the main goal of the manuscript, which is to highlight the persistence of binge and heavy drinking. The key numbers are found in the last four rows of tables 1a and 1b, and the rest of the information is repeated in the figures.

We are happy to take the editors' views on this; we do feel that it is useful to retain the figures as they present in a concise and rather striking way the variation over time and by sex in the levels of these behaviours. If the editors would prefer to have some detail in an appendix we could also move the information there.

We have included further detail in the abstract as requested by the editors, as noted above.

I continue to disagree with the insistence to use logistic regression to assess persistence of drinking but only among those that were drinking during adolescence. It's a little like a regression that predicts lung cancer, but only among smokers. By not using the entire cohort to model adult drinking the authors miss the chance to show the odds ratio for adult drinking associated with adolescent binge drinking as a very substantial risk factor (which is their stated aim to begin with). If done on the whole cohort, firstly, the size of the odds ratio associated with adolescent binge drinking will be adjusted for other risk factors (for example males were more likely to binge drink during adolescents and also persist in drinking to adulthood, so male gender is a confounder of the association between binge drinking in adolescence and binge drinking during young adulthood). Secondly, it will be clear to the

clinician that the main risk factor they should focus on is adolescent binge/heavy drinking. With the current approach, the clinician might be led to believe they should emphasize sexual risk taking as a predictor of heavy drinking.

The reason we have not analysed these data in such a way is because it would not answer the question we pose, namely, whether these are risk/prognostic factors for continued binge alcohol use in young adulthood among adolescent binge drinkers. We do not think that the analogy of smoking and lung cancer is the right one. Rather the analogy would be with which smokers continue to smoke and the factors that predict continuation or remission. Although we do agree that it is a valid question to examine the predictors of adult drinking, we were focused here upon the prognostic question.

A concern was raised that the odds ratio is not a good indicator of the relative risk when the incidence of the outcome is high. The response did not address the concern. The investigators should take a look at a BMJ description of when the odds ratio may be used as an approximation of the relative risk (<http://www.bmj.com/content/316/7136/989>). All clinicians (and researchers too) view the odds ratio as a relative risk approximation.

We disagree that everyone thinks that odds ratios are relative risk approximations. Our use and reporting of odds ratios in our paper is not, we would argue, different to other research using these statistics. We have not used odds ratios to talk about relative risk; we have found one instance in our results where we used the word "risk" and so have reworded as follows:

"Associations with behavioural characteristics were substantially attenuated when adjusted for sex and other characteristics, with the strongest independent effect being an increased the odds of young adult binge drinking if sexual risk taking had occurred in adolescence."

The abstract conclusion "Binge alcohol use is common and has a greater degree of persistence than other health risk behaviours that commonly arise in adolescence." is misleading. This was not a study that compared the persistence of other risk behaviors. I think the authors would find that smoking is also a persistent behavior.

We have edited the text of the abstract as suggested, which now reads as follows:

"Binge alcohol use is common and persistent among young Australians. Efforts to prevent the onset of binge drinking during adolescence may substantially reduce harmful patterns of alcohol use in young adulthood."