Review of: "Using the Socio-ecological Model to Explain the Findings of Prevalence and Demographic Correlates of Alcoholic Beverage Consumption among Adolescents in Public Schools in Uganda"

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Potential competing interests: No potential competing interests to declare.

In my review I have focused on analytic details (statistics) and consistency, also highlighting issues related to measurement. The paper is generally well written, but there are many issues that should be improved before publication.

Introduction

The introduction is touching "harmful drinking", "heavy drinking experience", "weekly alcohol consumers", and I think that you could highlight why you decide to analyze a dichotomous drinking variable, and not the original 5-point variable measuring drinking frequency.

The aims of the study should be formulated clearly in the end of the introduction.

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Regarding: «Before the results of the present study, further research dealing with ecological correlates of alcohol consumption in schools was necessary to inform practice regarding alcohol use prevention among students."

It should be formulated such that it does not look like you are focusing on whether or not the students had consumed alcohol within schools!

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2.3 Measures

Regarding: "The instrument contained items to capture students' demographics, including region of origin and age as control variables, gender, religious affiliation and religiousness, love for places of entertainment, frequency of use of social media, number of friends, and class/form of study. "

The Age and Gender variables are obvious candidates to include in models predicting alcohol consumption. There are a number of variables that may be associated with alcohol consumption status. I would think that important for the choice of drinking alcohol may be associated with the degree of social control that the adolescent experiences form family or society may be important, an as such religiousness may be a proxy for social control when it comes to alcohol consumption. So, it may not necessarily be religious affiliation that is the important predictor, but rather the degree so social control that the adolescent experience within the families belonging to different religious groups. The degree of social control an adolescent experiences on the family or community level is important in explaining alcohol drinking initiation. Rules, norms, and expectations that are enforced by families and communities may regulate behavior. When social control is strong, adolescents are less likely to engage in risky behaviors such as alcohol drinking initiation. Research has shown that adolescents who experience high levels of social control from their families and communities are less likely to initiate alcohol use. This is because social control can act as a protective factor, providing a clear message that alcohol use is not acceptable and that there are consequences for engaging in such behavior. On the other hand, adolescents who experience low levels of social control are more likely to initiate alcohol use. This is because they may perceive that alcohol use is more acceptable and that there are fewer consequences for engaging in such behavior.

Other factors that could be important in explaining the status on alcohol consumption could be: parental attitudes, peer pressure, adolescents' personality (love for places of entertainment, frequency of use of social media, and number of friends, may be indirect measures of this), sensation seeking, accessibility, socioeconomic status, mental health, impulsivity, sensation seeking, knowledge of the dangers of excessive alcohol usage, etc.

It seems to me that the variables chosen as predictors in this study constitutes a limitation, since one can not assume these to have a direct effect on the decision to drink or not, and there are many potentially important variables left out of the model. Although the paper does not assess causal effects or mechanisms of alcohol consumption status, I think that the choice of predictors is a limitation with this paper that should be acknowledged by the authors.

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Regarding: "For instance, students were asked: for the previous 12 months, how frequently have you taken beers (e.g., Bell, Tusker, Nile, Guinness, etc.)? The initial items regarding alcohol consumption were based on a Likert scale carrying five responses, namely: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often. Responses to each of the items were transformed into a binary scale: response category 1 was dummied to denote "No" or "never used," and the other categories of 2, 3, 4, and 5 were dummied to denote "Yes" or "ever used."»

Using a recoded version of the alcohol consumption frequency variable may remove information about frequency (with those rarely drinking and those drinking very often having very different drinking habits), but as long as the focus is on the choice of drinking or not drinking alcohol, I believe that one can argue for such a transformation.

If the aims of the study focus on drinking vs. non-drinking of alcohol, and the introduction points to these aims, it should be ok. For example, religious affiliation may be more meaningful as a predictor for drinking status (yes or no) than for drinking frequency (since religions may have something to say when it comes to the alccohol drinking dichotomy, and not drinking frequency). On the other hand, the drinking frequency variable is a better variable to measure drinking behavior than drinking status (yes/no) because it contains more information about drinking pattern. Information about problematic drinking behavior (binge drinking; getting drunk etc.) is not informed about in the drinking measure presented in this study, so complete information about drinking behavior is not available. Just having information about whether an adolescent has tasted alcohol or not during the last 12 months is probably not very helpful to explain that "…in the context of a developing country like Uganda, alcohol consumption has resulted in hazardous and negative outcomes, including increased road traffic injuries, erosion of socio-cultural norms, involvement in risky sexual behaviour, premature death, poor health, interpersonal violence, and self-harm.", but it can serve the purpose of other types of aims.

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2.4. Sample Selection

Regarding: "The overall sample was obtained using Leslie's (2002) method of sample size determination."

This does not work as a description of the elements important to determining the sample size. You should provide more detail. Sample size affects precision in statistical tests, so often a formulation of desired precision is necessary in order to make decisions about sample size.

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Regarding: "Samples from their respective classes (senior two to senior six) were obtained using simple random sampling – each student present in the classroom was given a number, and then the numbers were selected at random.»

How many were selected from each classroom? If two or more individual are sampled from the classrooms, potential dependency in alcohol consumption status may occur. Logistic regression assumes independence in alcohol consumption status, and multiple individuals from each classroom would normally require that a generalized logistic regression is used. If not assessed properly, this can be a limitation. At least you should indicate the average number of participants at the classroom level.

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You use "Gender" mostly, but sometimes "Sex" as variable name. Use one of them.

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Feedback on 2.6. Data Analysis

Regarding: “Data were first entered into IBM Statistical Package for the Social Sciences (SPSS), version 20.0, and then exported to STATA version 15.0 for analysis.»

If all analyses were done in Stata, you do not need to inform about SPSS!

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Regarding: “Missing values were excluded using list-wise deletion.”

You should inform the reader about the degree of missingness in your data. Regression models are sensitive to missing information, so the proportion of cases lost in the multivariable logistic regression analyses should be easily accessible.

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Regarding: “Percentages were used to report the prevalence of consumption of Beers, Wines, and Spirits.”

The sentence is not really necessary, but if used, you should not use capital letters for beers, wines and spirits.

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Regarding: “The statistical significance of the proportions of alcohol consumers was examined using chi-square p-values”

Chi-square tests were used to assess the association between alcohol consumption and Age, Region, Class, Religion and Gender. However, you also do logistic regression to assess the same association. Table 2 and Table 3 therefore contain overlapping information for the bivariate tests. The question is whether you need to repeat the analysis with different analytic approach.

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Regarding: “Analyses were set at a 5% confidence interval.”

If you intend to explain your choice of significance level, you need to reformulate this sentence. Like: “We chose .05 as significance level for all statistical tests.”, although it does not seem to me that you have made a clear choice of significance level based on the result section. 95% Confidence intervals can also be used for statistical testing on the .05 significance level.

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Regarding: “Associations of the students’ socio-demographics with the consumption of Beers, Wines, and Spirits were explored using bivariable and multivariable logistic regressions.”

Beers → beers, etc.

Here you have used “bivariable” and “multivariable”, and other places “bivariate” and “multivariate” have been used. Use “multivariable” to refer to the case with multiple independent variables. I think the word “univariable” is a better word to use than bivariate/bivariable, since it refers to the case with one independent variable more clearly.

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Regarding: “The models were adjusted for students’ age and region of origin.”

It seems to me that you used a categorical version of age (< 16; 16-20; > 20). If age is a control variable, it is surely much better to use an age variable which is not categorized! Categorization of otherwise continuous variables waste information, so you should not do the analysis with a recoded version of age. If categorization is to be used (which I do not recommend), you should explain why you use these particular levels. Where I am from a 16-year-old and a 20-year-old are considered quite different when it comes to alcohol consumption. The 20-year-old would have higher odds of alcohol consumption than a 16-year-old. And the degree of social control from parents that a 16-year-old experiences is likely to differ from that from parents of a 20-year-old. So, by categorization of age, you limit the usefulness of the age variable. The role of age as a control variable could be reconsidered. Age seems to me as one of the most natural predictors of consumption status that exist, and if used as a continuous variable you gain the most of its usefulness. The lack of statistical effect of age in your analyses may be related to the loss of information due to categorization. If in fact this effect holds even if a continuous age variable is used, this would be an unusual result that could point at some specific Ugandan traits.

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Feedback on 3. Results

Regarding: “Bivariable and multivariable logistic regression models testing associations between socio-demographic variables and consumption of beers, wines, and spirits among students are reported in Tables 2, 3, and 4, respectively.”

Where is Table 4?

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Regarding: “The likelihood of beer consumption was 0.7 times lower among females compared to males (AOR = 0.7, 95%CI: 0.51-0.88, p <.01).“

In Table 3, the AOR (95% CI) related to the beer consumption variable is reported as: 0.6 (0.49-0.80)* . Why this discrepancy? There are also differences for religious group comparisons in Table 3 and in the text. And Table 3 do not include variables measuring love of being in places of entertainment, use of social media, and extent of religiousness. These variables are mentioned in the text, but absent from Table 3. Are the multivariable results in Table 3 based on a different model than the results presented in the text? This need to be sorted out.**

Relevant to all expressions where AOR is reported: p <.01 → p < .01 etc.; 95%CI → 95% CI etc.; AOR should be presented with two decimals (as you do for the lower and upper limit for the CI).

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General reporting of effects from a multivariable logistic regression: Reporting just post hoc pairwise contrasts between a reference group and the rest of the groups, and not the overall effect, limits the usefulness of the analysis. Some contrasts that are important when it comes to explaining the overall effect, may be hidden because you only make the comparisons involving the chosen reference group (to illustrate: for the religious affiliation variable you make 5 pairwise comparisons, of the possible 15 comparisons that could be made. Maybe in this case you have done the most important comparisons, but what about Anglican vs. Muslim, and Anglican v. Pentecostal?

Feedback on Table 2

Table heading: Write the Yes (%) and No (%) in a consistent way. Sometimes you include a space and sometimes you do not (Yes (%) vs. Yes(%) etc.). You do not need capital letters in Beers, Wines and Spirits when writing the variable names starting with Consumption.

The readability is lowered by the varying row heights.

You should be consistent with regards to the use of parentheses for the percentages (included for Consumption of beers, but not for wine and spirits). Since you have the percentages in separate columns, you do not need the parentheses.

For the 16-20 age group, you have two decimals for the Consumption of beers instead of one decimal.

You present p-values and *, ** or *** next to the p-value to indicate significance. Instead, you should present the chi-square test statistic values, with *, **, *** to indicate significance.

Do not present a p-value as 0.000. Instead use < .001 if p-values are to be presented in the table (p = 0.000 is the same as saying that p = 0, but the p isn't zero. A 0.000 in the output just tells you that the p is lower than .0005.) In the table and in other parts of the manuscript you vary between including and excluding the leading zero in the p-value. You should be consistent.

There seems to be some errors in the decimals for the percentages. For example: For the Central region, Consumption of wines: 57.8 should be changed to 57.2 if the frequencies are correct.

For the S3 class of study, Consumption of wines: 63.8 should be changed to 63.4 if the frequencies are correct. Please check your numbers once more.

The p-value for the test of association between Region and Consumption of spirits is reported as < .001 (0.000 in the table), but should be .007. Check your numbers.

A value of 21 or higher should be written as > 20 or ≥ 21, not 21 <.

A value of 15 or below should be written as < 16 or ≤ 15, not 15 >

Foot note: Use space both before and after < (and also for > or =). Be consistent.

* chi-square statistic significant at p <.05 → * p < .05 or "* significant at the .05 significance level" etc.

Feedback on Table 3

Table heading: multivariate → multivariable. "Multivariate" refers to the situation with multiple dependent variables, while "multivariable" refers to the situation with multiple independent variables.

The headings are misleading (Consumers of Beers; Consumers of Wines; Consumers of Spirits). The dependent variables measure the individuals' status on consumption of beer, wine and spirits, so the analyses include non-consumers also, and therefore "Consumption of beers", etc. are better names.

For the age variable: The number of people in the different age groups having consumed beer differ from the numbers in Table 2. It seems to me that you have switched rows, but also that the numbers are wrong to some extent. Again, it is necessary that you check the numbers.

The authors do not present the "overall" effect of each of the variables in Table 3. They only present the effect comparing the reference group with the remaining groups. This relevance of these tests depends on the overall effect of the variable, and on the choice of reference group! If the overall effect of a variable is non-significant, why focus on post hoc comparisons between the reference group and the remaining groups. The choice of reference group is also important. If you for the age variable choose the ≥ 21 group as reference group, the post hoc comparisons will have low power to detect effects since just 30 individuals are ≥ 21 years old (with just 10 "events" (Yes) if the table 2 numbers are correct). The statistical effects will be statistically strongest where the majority of the cases are (large groups dominate the statistical effect). Using small reference groups, may hide the statistically most important differences between the groups.

In Table 2 you did bivariate tests using the Pearson chi-square test, and in Table 3 the Wald test is used. Why not base the statistical tests in Table 2 also on the Wald test? It seems to me that it is unnecessary to do the same bivariate tests (via different statistics) both in Table 2 and in Table 3.

Odds ratios should be presented with two decimals. Also: There are inconsistencies when it comes to the use o**bold** in some of the significant ORs.

The columns with heading "Yes" do not explain that the cell content is n (%). There should also be a space between n and (%) and between OR and the CI for the OR

For Sex, you have placed the R at the wrong category. For Religious Affiliation, you have forgotten the R for the reference

category.

Comparison between S5 and S2 (beer consumption): 1.4(**1.00-1.93**)*. You indicate that the test is significant at the 0.05 significance level (p < .05), but the p = .053, i.e. p > .05 (based on the frequencies in Table 2).

Typo: 0.3(0.19-042)* → 0.3 (0.19-0.42)*** (forgotten . in 0.42).**

Typo: 0.8(0.32-2.00 → 0.8 (0.32-2.00) (forgotten right parenthesis).

There are inconsistencies when it comes to the use of**bold** in some of the significant ORs.

Foot note: You have left out the “R” in the explanation of the reference category. Be consistent with the use of capital S in “Significance”.

UOD → UOR

* significance at p < 0.05 → * p < .05 or “*significant at the .05 significance level” etc.

Discussion

Some of the limitations I have mentioned should be mentioned in the limitation part. A discussion where you include a mention about variables not measured or used in this study is necessary.

The discussion mentions heavy drinking and risk of alcohol abuse, but the present study do not focus on drinking frequency.

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Adjusted logistic regression models → Multivariable logistic regression models