Reviewer’s report

Title: “Free won’t” after a beer or two: Chronic and acute effects of alcohol on neural and behavioral indices of intentional inhibition

Version: 0 Date: 12 Aug 2019

Reviewer: Ann-Kathrin Stock

Reviewer's report:

The manuscript submitted by Liu et al. reports the effects of lifetime/long-term alcohol use and acute alcohol intoxication on stimulus-driven vs. intentional inhibition. In order to assess these two concepts of inhibition, the authors used a "Chasing Memo" task and a stop-signal task in two unrelated (?) healthy young student samples. The analyses are appropriate and the use of additional Bayesian analyses should be commended. The study question is both timely and interesting, as the effects of alcohol onto volitional inhibition have been much less researched than cued inhibition. However, I am still a bit skeptical, whether the initially proposed research questions can be adequately investigated with the available measures. Yet, it should be well possible to address this issue. In my opinion, the most feasible solution would be make some rather small, but relevant amendments to the wording of the research question and somewhat tone down the deducted conclusions. I have listed my comments in chronological order below:

General Background:

In the general background section, as well as in some parts of the following manuscript, the authors state that "In terms of drinking, the priming dose effect of alcohol, i.e., loss of control over further consumption after a priming dosage, reflects the insufficiency of intentional inhibition rather than stimulus-driven inhibition (Field, Wiers, Christiansen, Fillmore, & Verster, 2010)."

While this is most certainly a big issue in individuals with AUD, a few alternative explanations could also be conceivable in individuals with non-pathological drinking habits: In the investigated samples, the priming dose could also lead to a shift in plans / motivational values, or simply to changes in delay discounting. So while investigating alcohol effects in healthy samples is of course interesting and valid research question, I am skeptical whether this allows for valid conclusions on AUD mechanisms. -After all, loss of control over drinking is one of the key symptoms in AUD, which likely sets affected individuals apart from the general population.

Experiment 1:

The authors stated that they wanted to investigate the effects of "long-term" or "lifetime" alcohol use on inhibition These should not be used as interchangeable terms as lifetime use usually refers
to lifetime prevalence, while long-term use is more commonly defined as prolonged and continuous consumption.

Unfortunately, the assessed measures of alcohol consumption do not allow to answer this particular research question. More specifically, neither the AUDIT, nor the CORE provide proper measures of long-term alcohol use (supposing that all participants reported lifetime use, I assumed that the authors most likely wanted to focus on long-term use): The AUDIT was initially developed to distinguish heavy drinkers with AUD from rather strictly abstinent controls. Nowadays, this fact is mostly disregarded and it has become a widely tool which provides increasing scores with increasingly risky drinking behavior. While this application of the test seems warranted, I doubt that this score provides an accurate measure of long-term alcohol, especially as the AUDIT neither assesses the time of first consumption, nor any changes in consumption frequency and patterns over time. Compared to this, the long version of the CORE assesses age of first consumption, binge drinking within the past two weeks, and recent drinking prevalence and. Yet, the CORE questions are not neutral, but slightly biased by moralizing and judgmental undertones commonly found in US campus drug politics, and the test mainly assesses consumption within the past 12 months. Given that the available literature on long-term use often reports on the effects of much longer time intervals, and further given that the students who were included in the current study are unlikely to have started their substance consumption within the 12 months prior to testing, I would suggest to either clearly define long-term use as pertaining to this 12-month time interval, or use different term (like "consumption habits", or the like).

In summary, I would recommend that the authors would need to EITHER rectify their hypotheses to what is actually assessed by the AUDIT, OR explicitly define long-term use as a 12 month period and then focus on the CORE, OR recollect data with a more detailed and appropriate questionnaire.

Against this background, I also found some of the current conclusions to be only partly justified (e.g. "it's time to ask whether the stimulus-driven inhibition deficit is a real finding among drinkers"). These should be specified or toned down a bit.

Experiment 2:

The objective of experiment II was to test "whether and how acute alcohol use influence intentional inhibition". While inhibition is known to be most reliably impaired at high intoxication levels (i.e. typically more than 0.08 %), the authors only induced moderate intoxication of ~0.06 %. The intoxication level might hence have been too low to observe valid intoxication effects. While the authors already clearly mentioned this in their discussion, it should also be recognized more explicitly (e.g. in the abstract) that the experimental setup does therefore not allow for general conclusions on the full range of acute intoxication, as often seen in the field.

Furthermore, it should be more critically debated whether testing the effects of moderate alcohol intoxication on general domains of inhibition in a non-addicted, highly homogenous group of 16
healthy young psychology students without AUD truly allows for general conclusions on loss of control over drinking.

Lastly, I was surprised that the N2 and P3 were not quantified at all. -After all, they are the most commonly analyzed ERPs in the context of inhibition and previous studies have explicitly reported intoxication effects on these measures of inhibition. Instead, the focus was put on the somewhat less popular AUC and RP. It would be helpful if the authors could elaborate more on their reasons for doing so.

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

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

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

No

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable
Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors’ responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal