

Impact of a Pre-Test Measurement of Alcohol Craving: Lessons From a Self-Replication Study

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Abstract

A prior study during COVID-19 lockdown (Heck et al., 2024) examined whether a pre-test alcohol craving measurement influenced posttest assessment and tested its relationship with social desirability (SD) and demand effects (the consequences of participants trying to uncover the study's aim). Results suggested that the first craving measurement increased its post-experimental levels in heavy drinkers, with no associations found for SD or demand effects. Engagement with the alcohol-related video was linked to craving. This study aimed to replicate these findings three years later outside the lockdown context.

A hundred and forty-two psychology students were randomly allocated to either a “pre-post” or a “post-only” craving assessment group. They watched an alcohol-related video. SD, demand effects, engagement, and alcohol consumption levels were also assessed.

Several findings supported the robustness of effects observed in the initial study, while others diverged, offering new hypotheses. Heavier drinkers reported significantly higher craving levels following video exposure and craving correlated moderately with video engagement. No significant associations were found between craving and SD or demand characteristics. However, unlike the initial study, repeated measurements showed no significant effects or interactions with alcohol consumption.

Reanalysis of the original data highlighted a gender-based interaction, where the effect of the interaction between repeated craving measurements and alcohol consumption was significant in men but not in women. These results suggest partial replication of prior findings and underscore the need to further explore contextual and demographic influences on alcohol craving. Moreover, this study confirmed a significant role of video engagement in craving.

Keywords: Alcohol craving measurement, demand characteristics, engagement, social desirability.

1. Introduction

Craving is a key feature of drug addiction. It has been widely studied since its inclusion as a diagnostic criterion in the DSM-V [1–7]. However, despite decades of research, its usefulness and precise role in addiction is still debated [6,8]. Yet, the concept of craving is part of most theoretical models of addiction and has been consistently shown to be implicated in drug use and relapse [9]. The American Psychiatric Association defined craving as “an intense urge or desire for a drug” [10], although recent evidence shows that it also relates to non-substance-related behavioral addictions [11]. Based on extensive research and current theoretical knowledge, it is now widely accepted that craving is a complex multidimensional phenomenon, including automatic, cognitive, and physiological (interoceptive) components [12,13]. Regarding alcohol use disorder (AUD) more specifically, craving has for instance been shown to be associated with relapse [14–17, although see 18], disorder severity [19], and attentional biases [20,21]. Given its crucial role, it is essential to measure craving as accurately as possible. Various methods were developed to measure alcohol craving [22], but the most widely used are self-reported scales.

As with other measurements based on self-reports, there are many potential sources of bias that could impact craving accuracy measurement. Over 20 year ago, Sayette [23] already pointed out that craving research should take into account the multiple factors that could potentially affect the measurement of craving through self-reported questionnaires, citing for instance social desirability (SD), response styles, and memory biases. We have recently argued that using self-reported craving scales repeatedly in the same experiment (as is usually done when craving changes are expected after an experimental manipulation), could impair its proper evaluation at the end of the experiment [24]. Indeed, the initial completion of the craving scale by the participants could directly act as an alcohol cue, evoking alcohol consumption and therefore possibly promoting or altering the subjective experience of craving [25]. In other

words, the initial craving scale could have a priming effect on alcohol craving. Additionally, self-reported craving scales are generally very explicit and therefore possibly vulnerable to various experimental biases, such as social desirability and demand effects. Social desirability, or the tendency to respond in a manner that makes one “look good” [26] might significantly affect the measurement of craving, although this has been little investigated. Demand effects on the other hand, are related to the fact that participants are not passive responders to the experimental manipulations. They typically seek to offer a valuable contribution [27] and therefore to behave according to their understanding of the aim of the study. As a consequence, any explicit or implicit information about the purpose of the study is likely to affect their responses and behavior. All the explicit and implicit clues about the purpose of the study are called “demand characteristics”, because participants use these clues to identify what the experimenter is “demanding” of them. More recently, demand effects were conceptualized in three sub-dimensions [28]: cue interpretation (i.e., *"the analysis and interpretation of these cues by the participants to produce a set of conjectures about the purpose of the research"*), sensitivity to demand characteristics (i.e., *an expression of interest on behalf of the respondent, seeking to make sense of the questioning situation with which they are confronted"*), and response motivation (i.e., *"the willingness of the individuals being questioned to rely on their interpretation of the demand characteristics in order to engage in specific response behaviors"*). Based on these premises, the explicit nature of self-reported craving scales, especially when administered twice in the same experiment, is likely to induce specific demand effects in the participants.

In a recent experiment, we investigated the impact of a pre-test measurement of alcohol craving on its final assessment, in relation to social desirability and demand effects [24]. Participants were randomly allocated to two experimental groups: a “pre-post” group in which craving was assessed twice, before and after watching an alcohol-related video; or a “post-only”

group in which craving was assessed only after the video. Social desirability, demand effects, engagement toward the video, and alcohol consumption levels were also assessed using validated questionnaires. The results showed that the levels of craving after watching an alcohol video were higher in heavier drinkers relative to low drinkers. Additionally, the pre-test assessment of craving had a significant impact on post-test craving, but only in heavier alcohol drinkers. More precisely, in high alcohol drinkers, alcohol craving was significantly higher after the video when craving was also assessed before the video. No such effect was observed in low alcohol drinkers. In contrast, no relationship between self-reported craving and SD or demand effects was found in that study. Finally, exploratory analyses indicated that engagement toward the alcohol-related video was a significant mediator of subsequent craving increases.

Since this initial study took place during the COVID-19 lockdown period and considering its modest sample size, we aimed to assess the robustness of these findings in a non-lockdown context, using a larger sample size. We took advantage of the participant pool at the University of Liège to replicate the study on a sample of first-year psychology students.

2. Methods

The present study used the exact same design as the initial study (see [24]). The only modification was the replacement of the DS36 social desirability scale [29] by the Social Desirability Scale-17 (SDS-17)[30], measuring social desirability with a one-factor structure instead of the two-factor structure (DS36). This modification was chosen to shorten the study duration and because our primary interest was in 'impression management'—the act of consciously presenting oneself in a favorable light to others—rather than 'self-deceptive enhancement,' which involves unconsciously seeing oneself in a highly positive manner.

Participants were a hundred-and-forty-two 1st-year psychology students (92% female, mean age= 19.33, sd= 1.81), recruited through a “participant pool” device of the Faculty of

Psychology at the University of Liège. This high percentage of female participants reflects the gender distribution within the faculty. Students received course credit for their participation and took part in an interactive educational session about the study. Exclusion criteria were strictly the same as in the initial study. Participants were randomly assigned to one of the two experimental groups: pre-post group (N= 72) vs. post-only group (N= 70). This study was approved by the Ethics Committee of the Faculty of Psychology, Speech and Language Therapy and Education of the University (on October the 3rd 2023, reference number: 10968) and was conducted in accordance with the ethical standards described in the Declaration of Helsinki (1964) and institutional guidelines. The privacy rights of participants have been observed and informed consent was obtained.

Following the initial study, we aimed for a sample size of at least 77 participants. However, given the participant pool setup, we anticipated obtaining a higher number of subjects.

Statistical analyses were run using R [31]. To examine the effect of repeated measures of craving, alcohol consumption, and their interaction on final craving levels, a multiple linear regression analysis was conducted. However, the normality of residuals was not achieved for this model. Consequently, craving data were square root transformed, which improved the distribution significantly, but residual normality was still not met due to a floor effect (Shapiro-Wilk p-value ranging from $<.0001$ to $.007$). Despite this, as homoscedasticity was satisfied (Breusch-Pagan test: $p=0.49$), the same linear regression model as in the previous study was applied. To determine if there was a relationship between craving and engagement with the alcohol-related video, similar to the previous study, a Pearson correlation coefficient was computed. Finally, Kendall's Tau correlation coefficients were used to investigate social desirability and demand characteristics.

3. Results

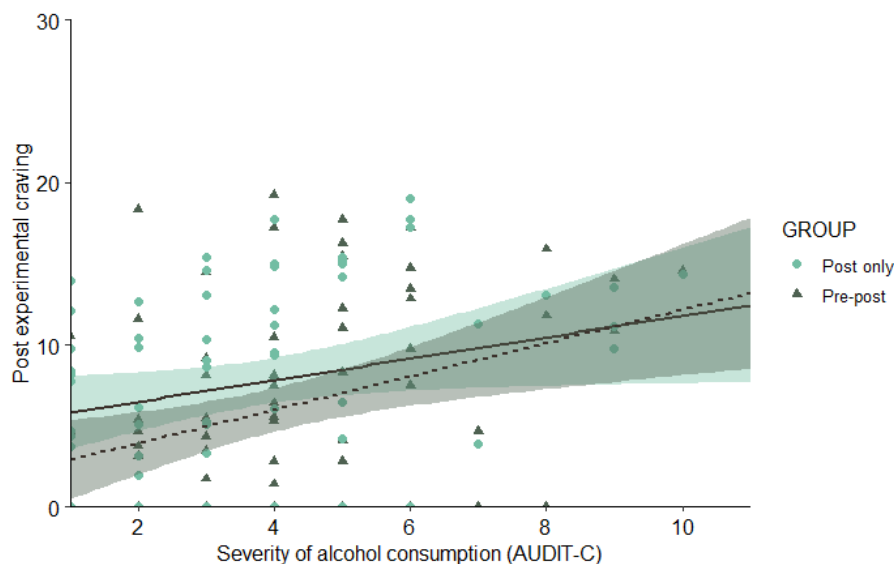
In relation to the initial study, several effects observed in the current study support their robustness. However, some effects differed from those in the original study or did not reach significance, generating new hypotheses.

Consistent Effects.

Firstly, the effect of alcohol consumption levels on craving was significant, with heavier drinkers reporting higher craving levels following video exposure (Figure 1). This effect was medium-sized ($t = 2.107$, $p = .036$, $\eta^2p = .077$), aligning with previous results ($t = 3.47$, $p < .001$, $\eta^2p = .09$). Another effect that closely replicated the original study was the increase in craving after video exposure within the “pre-post group” ($V = 1315$, $p = .003$, $r = .29$).

Figure 1.

Relationship Between the Severity of Alcohol Consumption (AUDIT-C score) and Post-Test Alcohol Craving in the Two Groups.

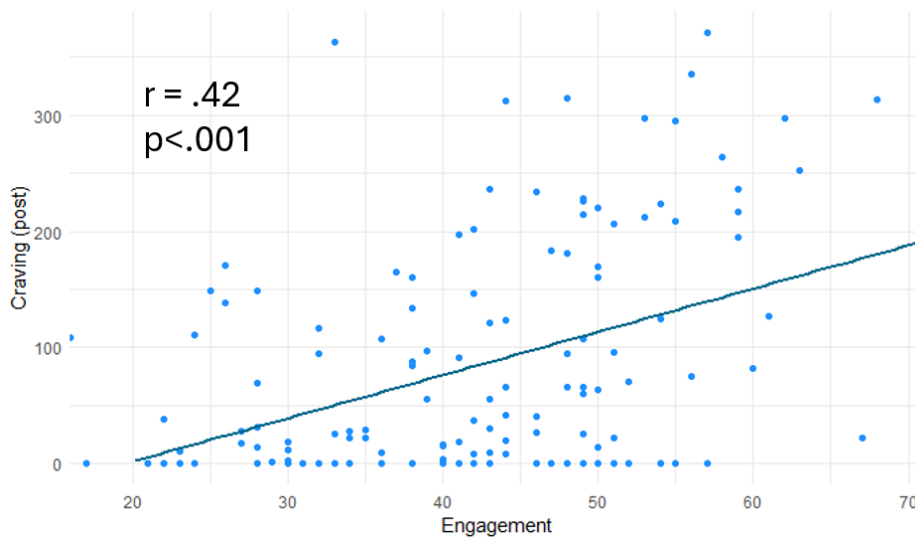


Note. Raw craving scores have been square root transformed. The light green and dark green (grey in printed version) areas around the regression lines represent the confidence intervals at 95 %. The green (or grey in printed version) triangles and dots represent individual data.

For the relationship between craving and engagement (the sum of all subdimensions), a significant, positive, medium-sized correlation was observed ($r = .42$, $p < .001$). This finding closely corresponds to the previous study's results ($r = .44$, $p < .001$). Figure 2 provides the scatter plot with a regression line illustrating this relationship between craving and engagement.

Figure 2.

Relationship Between Craving and Video Engagement.



Note. Blue dots are individual data.

The association between social desirability, demand characteristics, and post-experiment craving was analyzed using Kendall's tau correlations. Consistent with the initial study, no significant relationship was found between social desirability and craving ($\tau = -0.06$, $p = 0.86$). Similarly, for demand characteristics, none of the subdimensions showed significant correlations with craving (response bias: $\tau = -0.010$, $p = 0.94$, cue interpretation: $\tau = 0.05$, $p = 0.86$, sensitivity to demand characteristics (STDC): $\tau = 0.14$, $p = 0.27$). Table 1 displays Kendall's tau correlation coefficients for craving alongside social desirability and demand characteristics.

Table 1.

Kendall's tau correlation coefficients for post-video craving and social desirability, and demand characteristics variables.

Variable	Kendall's Tau	Adjusted P-Value	Raw P-Value	CI Lower (Adjusted)	CI Upper (Adjusted)
SDS	-0.06	0.860	0.512	-0.31	0.20
CI	0.05	0.860	0.516	-0.20	0.31
RB	-0.01	0.947	0.900	-0.27	0.25
STDC	0.14	0.274	0.098	-0.12	0.38

Note. SDS= Social desirability scale, CI= cue interpretation, RB= response bias, STDC= sensitivity to demand characteristics

New/Non-Replicated Effects.

Contrary to the initial study, no significant effect of repeated measurements was found ($t = -1.605$, $p = .110$, $\eta^2p = .005$), nor was there a significant interaction with alcohol consumption level ($t = 0.805$, $p = .422$, $\eta^2p < .001$) (see Figure 1). The regression model accounted for 8.95% of the variance in self-reported craving ($F(3,138) = 5.621$; $p = .001$, adjusted $R^2 = .089$). The correlations between AUDIT-C and craving did not differ significantly between groups as they did in the initial study ($q=0.08$), although this correlation was only statistically significant in the “pre-post” group (pre-post group: $\tau = 0.25$, $p=0.005$; post-only group: $\tau = 0.17$, $p=0.05$).

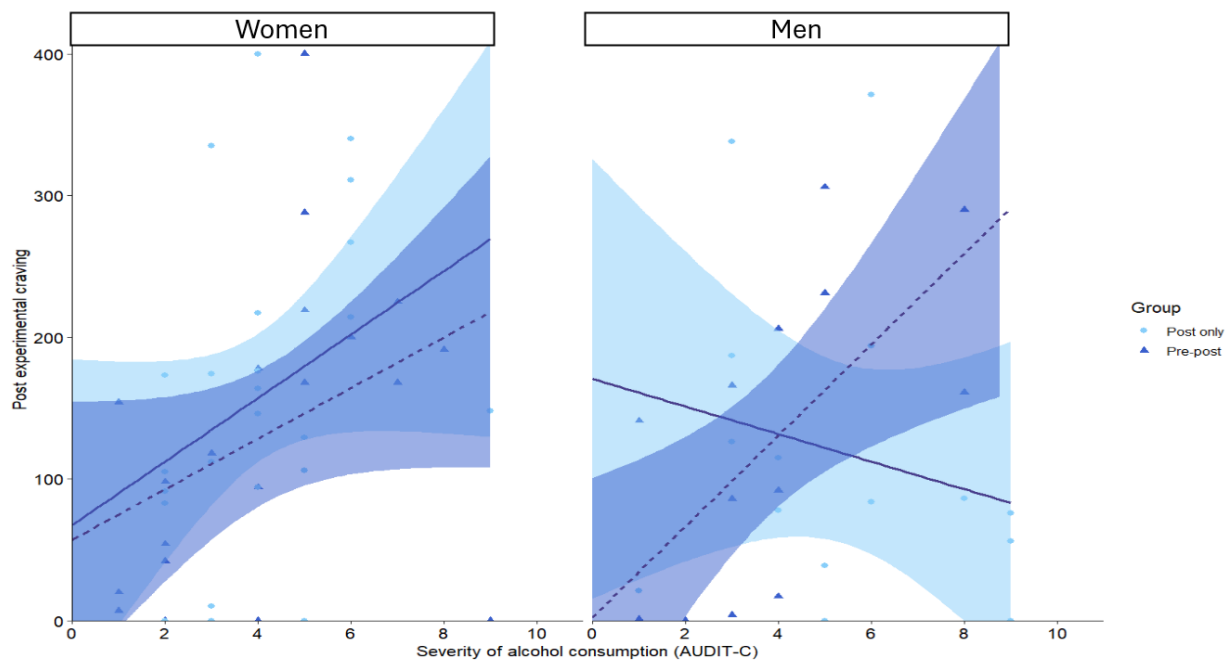
Re-examination of Initial Data.

Given the lack of replication of the original interaction effect between repeated alcohol craving measurements and alcohol consumption levels, we questioned whether this discrepancy might be due to the predominantly female sample in the present study. To investigate this possibility, we reanalyzed the original data, examining potential gender effects. Figure 3 shows the linear regression analysis from the initial study, stratified by gender. Results indicated a

large interaction effect between alcohol consumption and repeated measurements in men ($t = -2.812$, $p = .009$, $\eta^2p = .233$), whereas this effect was absent in women ($t = 0.283$, $p = .778$, $\eta^2p = .002$).

Figure 3.

Relationship between the severity of alcohol consumption (AUDIT-C score) and post-test alcohol craving in the pre-post vs post-only groups, for females and males.



Note. The light blue and dark blue areas (grey in the printed version) around the regression lines represent the confidence intervals at 95 %. The light and dark blue (or grey in printed version) triangles and dots represent individual data.

4. Discussion

The primary objective of this study was to determine whether our initial findings could be self-replicated outside the context of the covid-19 lockdown. The initial study examined whether repeated measurements of craving influenced its assessment after watching an alcohol-related video, considering social desirability and demand effects. The findings of the initial study revealed significant effects of the repeated measurement of craving, alcohol consumption level, and their interaction, suggesting that pre-experimental craving measurements elevated post-experimental levels, but only in heavy drinkers. No evidence was found linking these

changes to social desirability or demand effects. Further analyses also indicated that the increase in craving in heavy drinkers was mediated by a stronger engagement with the alcohol-related video.

The present study replicated most results of the initial study, strengthening the robustness of the initial findings. In both studies, level of alcohol consumption significantly influenced cue-induced craving, and, when repeated assessments were conducted, craving levels increased following cue exposure compared to pre-exposure levels, indicating successful craving induction. Similar effects were documented in the literature over recent decades [25,32–35]. These results demonstrate that the video cue exposure used in both studies successfully induced subjective craving and effectively differentiated between light and heavy drinkers.

Notably, the impact of engagement was also replicated, with a correlation of similar magnitude in the two studies (initial study: $r = .44$; present study: $r = .42$). This finding provides further support for our hypothesis that the level of engagement with alcohol-related stimuli (whether in a video format or other media) is a critical factor in craving induction.

In both studies, there was no indication of a statistically significant effect of social desirability, or demand characteristics on cue-induced craving. This indicates that self-reported alcohol craving was not significantly affected by participants' tendencies to present themselves in a socially desirable manner or to conform to perceived experimental expectations. The absence of such biases enhances the validity of the experimental findings on craving, suggesting that the responses were mainly driven by experimental manipulations, such as alcohol cue exposure. However, future research could further validate this conclusion by using implicit measures of craving or incorporating additional checks to detect potential subtle influences of social desirability and demand characteristics.

Since the effects of repeated measurements of craving were not replicated in the present study, we questioned what differences between the two studies might explain these discrepancies. A major difference was the gender ratio. Participants in the second study were recruited from a "participant pool" in the Faculty of Psychology, resulting in a very high proportion of female participants, reflecting the faculty's gender distribution. Consequently, we reanalyzed the data from the initial study to explore potential gender effects. This analysis revealed a significant gender effect (Figure 3) with a large interaction effect between alcohol consumption and repeated measurements in men, whereas this effect was absent in women. Therefore, the two studies yielded similar effects when gender is included in the analyses. We also checked whether differences in AUDIT-C scores or levels of engagement could act as confounding variables explaining the observed gender difference; however, this was not the case in our data (AUDIT-C: $W = 745$, $p = 0.35$, $r = 0.11$ CI95% $-0.12 - 0.21$; Engagement: $W = 680.5$, $p = 0.83$, $r = 0.026$, CI 95%, $-0.22 - 0.05$). However, these analyses were not part of the initial study design, and the sample sizes were relatively small (20 women and 15 men in the pre-post group, and 24 women and 15 men in the post-only group). Therefore, further research is needed to confirm these conclusions.

This observed gender difference might be related to gender stereotypes. For women, the reported levels of post-video craving were consistent with their usual alcohol consumption: light drinkers reported low craving, while heavier drinkers reported higher levels of craving, regardless of the repeated measurements. In contrast, a different pattern emerged for men. When craving was assessed only after the video, the reported levels were unrelated to their drinking habits. Their responses seemed to be directly influenced by the cue exposure itself, potentially activating social stereotypes that portray heavy drinking as socially positive for men. However, the pre-video measurement of craving appeared to anchor their reported levels to their drinking

habits, subsequently influencing their post-video responses. This speculative explanation clearly requires further confirmation in future studies.

In conclusion, the present results suggest that an initial pre-exposure craving measurement could significantly impact the final craving assessment in men, but not in women. Moreover, the way individuals engage with alcohol-related videos is significantly related to increased craving for alcohol afterwards. These findings also confirm the absence of social desirability and demand effects observed in our previous study. Further investigations are needed to determine whether these effects of an initial craving measure are beneficial or represent a significant bias in craving studies, and why they may not apply to women.

Author contributions

EQ: Methodology, Conceptualization, Writing - Review & Editing, Supervision; MH: Methodology, Conceptualization, Project administration, Formal analysis, Methodology, Investigation, Data curation, Writing – Original Draft, Visualization.

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Declarations of competing interest

Authors declare no real or potential conflict of interest in any form.

Data Availability Statement

All data underlying the findings of this study are openly available on the Open Science Framework (OSF) at: <https://osf.io/erjx5/files/osfstorage> .

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT and Microsoft Copilot in order to improve readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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