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# Experimental Test of Drinking and Abstaining Social Media Content on Adolescent and Young Adult Social Norms and Alcohol Use

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## Abstract

**Objective:** Experimental research has demonstrated that when alcohol-related content is viewed on social media, adolescents and young adults tend to have favorable attitudes toward alcohol use. However, limited research focuses on social media norms for abstaining from alcohol use. The current study examined the role of descriptive and injunctive alcohol abstaining and drinking norms via experimentally-manipulated social media profiles. Experimental effects on descriptive and injunctive normative perceptions and subsequent behavior were tested. **Method:** Participants (N=306; ages 15-20) were recruited from the Seattle-metro area to complete a baseline survey and view researcher-fabricated social media profiles. Using stratified random assignment (birth sex and age), participants were randomized into one of three conditions: (1) *alcohol abstaining and drinking*, (2) *alcohol abstaining*, and (3) *attention control*. **Results:** The *alcohol abstaining and drinking* condition reported greater drinking descriptive norms compared to participants in either the *alcohol abstaining* and *attention control* conditions at post-experiment and 1-month follow-up. The *alcohol abstaining and drinking* condition reported lower abstaining descriptive norms (i.e., perceiving fewer peers abstain) compared to those in the *alcohol abstaining* condition at post-experiment and lower abstaining injunctive norms compared to those in the *attention control* condition at 1-month follow-up. **Conclusions:** Exposure to social media profiles containing both alcohol drinking and abstaining messages were respectively associated with individuals perceiving that peers were consuming alcohol more often and that fewer peers were abstaining. The present findings are consistent with prior experimental research that indicates alcohol displays on social media are associated with riskier drinking cognitions.

## Experimental Test of Drinking and Abstaining Social Media Content on Adolescent and Young Adult Social Norms and Alcohol Use

### Social Media and Alcohol Use

In the United States, adolescent and young adult alcohol use remains a major public health concern (NSDUH, 2021). Research on the initiation and progression of alcohol use indicates that most adolescents and young adults experiment with alcohol, which can lead to hazardous alcohol use in young adulthood (Bolland et al., 2016; Hingson et al., 2002, 2003). Accordingly, identifying factors associated with alcohol use in this age group may help inform the development and refinement of effective alcohol prevention programs.

Exposure to social media (e.g., Facebook, Twitter, Instagram, Snapchat, TikTok) has been associated with increased adolescent and young adult alcohol use (Litt et al., 2018; Litt & Stock, 2011; Moreno et al., 2016). Social media are platforms where adolescents and young adults may be exposed to peers' drinking behavior (Davis et al., 2019; LaBrie et al., 2021; Steers et al., 2019). The majority of teens (90%) actively use at least one social media platform (AACAP, 2018; LaBrie et al., 2021; Merrill et al., 2020) and most alcohol-related content on social media is favorable toward heavy alcohol use (Litt et al., 2018; Moreno et al., 2016; Russell et al., 2021). Studies demonstrate that viewing alcohol displays on social media is associated with risky drinking cognitions, heavy alcohol use, and harmful consequences (Geusens & Beullens, 2017; Hoffman et al., 2017; Litt et al., 2018; Nesi et al., 2017), suggesting the importance of considering alcohol-related social media exposure as a risk factor for alcohol use among adolescents and young adults. Notably, it is unclear whether exposure to alcohol abstaining social media content leads to reductions in drinking. We are aware of only one study that explicitly examined abstinence displays on social media (Moreno et al., 2012), indicating

that these displays were less common than alcohol displays among college students. Adolescents and young adults are exposed to social media that depicts both alcohol use and abstention, making it critical to understand whether the presence of abstaining content reduces the negative influence of alcohol content.

**Alcohol Abstaining and Alcohol Use Norms**

Alcohol use during adolescence and young adulthood typically occurs in the context of peers (e.g., Barnes et al., 2006; Lipperman-Kreda, et al., 2018). Thus, peer influences are frequently included in theoretical models related to substance use (Lewis et al., 2010b). Specific to adolescents and young adults, the Prototype Willingness Model (Gerrard et al., 2008) aims to explain decisions to engage in health-risk behaviors and conceptualizes descriptive and injunctive norms as key antecedents to behavior. Research indicates that perceived descriptive (e.g., perceptions of how many peers engage in drinking) and injunctive drinking norms (e.g., perceptions of peer approval of drinking) are positively associated with alcohol use (Fairlie et al., 2021; Lewis et al., 2020; Litt et al., 2019). There is limited research examining norms for abstaining from drinking (Lewis et al., 2017; Litt & Lewis, 2015; Meisel et al., 2016). Given adolescents and young adults hold simultaneous motives to engage in and inhibit their alcohol use (Anderson et al., 2013), research examining normative perceptions should consider norms for using and abstaining from alcohol.

Cross-sectional (Boyle et al., 2018; Litt et al., 2018), longitudinal (Boers et al., 2020; Davis et al., 2019; Geusens et al., 2020) and experimental (Fournier et al., 2013; Litt & Stock, 2011) studies have found associations between exposure to alcohol-related social media posts and normative drinking perceptions. Social media may inherently convey both descriptive norms (e.g., perceptions of how many peers drink alcohol based on how many posts are viewed) and

injunctive norms (e.g., perceptions of how many peers approve of drinking based on likes and positive feedback on alcohol posts) (Boyle et al., 2016; Geusens et al., 2020). Social media exposure may increase normative beliefs about alcohol use, and in turn contribute to increased alcohol consumption (Boyle et al., 2016; Litt & Stock, 2011; Nesi et al., 2017).

Despite evidence that exposure to alcohol content on social media portrays both descriptive and injunctive norms, there remain unanswered questions about the effects of both abstaining and drinking descriptive and injunctive norms for alcohol use on social media. A study that experimentally manipulates or measures the effects of abstaining posts on normative perceptions would provide a more comprehensive understanding of social media's role in young people's drinking. Research shows that correcting overestimated normative perceptions for drinking can lead to decreased norms and drinking (Larimer et al., 2007; Lewis & Neighbors, 2006, 2007; Neighbors et al., 2010; Reid & Carey, 2015). Thus, it is possible that exposure to content that highlights norms for abstaining may serve to correct normative perceptions and in turn reduce drinking behavior. Testing this proposition will provide new perspectives to inform social media intervention strategies.

**Current Study**

The current study aims to (1) examine the role of descriptive and injunctive alcohol abstaining and drinking norms via experimentally-manipulated social media profiles and (2) test experimental effects on descriptive and injunctive normative perceptions and subsequent behavior. We hypothesized significant main effects of the experimental manipulation at immediate post-experiment and 1-month follow-up. First, we hypothesized participants who are exposed to social media profiles containing both *alcohol abstaining and drinking* content would report (H1a) higher descriptive norms for *drinking* and (H1b) higher injunctive norms for

*drinking* compared to participants who are only exposed to profiles containing *alcohol abstaining* posts and participants in the *attention control* condition at post-experiment and 1-month follow-up. Further, we hypothesized that participants who are exposed to social media profiles containing both *alcohol abstaining and drinking* content would report (H2a) lower descriptive norms for *abstaining* and (H2b) lower injunctive norms for *abstaining* compared to participants who are only exposed to profiles containing *alcohol abstaining* posts and participants in the *attention control* condition at post-experiment and 1-month follow-up. Finally, we hypothesized that participants who are exposed to social media profiles containing both *alcohol abstaining and drinking* content would report (H3) heavier drinking behavior compared to participants who are only exposed to profiles containing *alcohol abstaining* posts and participants in the *attention control* condition at 1-month follow-up.

## Method

### Participants and Procedures

Recruitment was conducted in the Seattle area through various methods including online and in-person recruitment, print advertisements, and friend referrals. Of those who completed the screening survey, 543 of 1,017 (53.4%) met eligibility criteria for the study which included: (1) be 15 to 20 years old, (2) live in the Seattle-metro area, (3) if age 18-20, drink at least once within the past 6 months, (4) use Facebook, Snapchat, or Instagram at least weekly, (5) be willing to attend two in-person sessions, and (6) obtain parental consent if under age 18. Parental consent was obtained from 93% of those 15-17 year olds who expressed interest in the study.

Out of the 543 participants who met screening criteria, 344 (63.3%) successfully completed a phone verification call, and of those, 306 (88.9%) completed the baseline survey and in-person session. At baseline, the mean age was 18.38 ($SD$ = 1.32) and 53% of the sample

identified their birth sex as female. Ethnic and racial representation of the sample was 50.3% non-Hispanic White, 27.5% non-Hispanic Asian, 10.1% More than one race, 6.9% Hispanic, 3.2% non-Hispanic Black, and 2.0% another race. Current education status consisted of 77.1% attending a 4-year university, 19.1% attending high school,1.6% attending a community college, 1.6% not enrolled in any form of school, 0.3% attending a vocational or tech school, and 0.3% pursuing a GED.

**Procedures**

***Consent and randomization.*** At the start of the in-person session, participants were presented with a full information statement and those who agreed to participate were routed to the baseline survey. Immediately after completing the baseline survey, participants were randomized (using stratified random assignment based on birth sex and age) into one of three conditions: (1) *alcohol abstaining and drinking*, (2) *alcohol abstaining*, and (3) *attention control*.

***Experimental Manipulation.*** Participants in each condition viewed a series of experimentally-manipulated social media profiles with equal numbers of photos, comments, group memberships, and items "liked" across profiles. Both descriptive and injunctive norms were targeted across both *alcohol abstaining and drinking* and *alcohol abstaining* profiles. Descriptive norms were displayed via photos and text that portrayed either abstaining (e.g., a comment on a photo about not needing to drink to have fun or a photo of a clearly identified mocktail) or drinking (e.g., young adults playing drinking games at a party). Injunctive norms were conveyed via the number of reactions (e.g., likes) across posts.

All participants viewed four social media profiles, including one Snapchat profile, one Facebook profile, and one Instagram profile with the fourth profile's social media platform being randomly selected. Participants assigned to the *alcohol abstaining and drinking* condition viewed

three profiles that contained both references to abstaining from and using alcohol within the same profile and one control profile (75% of the profiles contained both alcohol abstaining and alcohol drinking content); abstaining and drinking profiles included images of alcohol use (e.g., beer cans, liquor bottles, ) and non-use (e.g., pictures of clearly identified mocktails) and the content (e.g., posts, "likes") addressed both alcohol use and non-use. Participants assigned to the *alcohol abstaining* condition viewed three profiles showing alcohol non-use and one control profile (75% of the profiles contained alcohol abstaining references); photos were explicitly of abstaining from alcohol (e.g., holding signs that reflect desire to abstain, "liking" posts about abstaining from alcohol). For those assigned to *attention control* condition, all photos, comments, and group memberships were devoid of any alcohol-related content (drinking or abstention). For both experimental conditions, the order of profiles (experimental vs. control) and the platform type (Snapchat, Instagram, Facebook) were counterbalanced across all profiles. Similar strategies have been used in experimental research examining the impact of social media profiles on substance use among adolescents and young adults to conceal the true purpose of the study and reflect realistic variation in social media content among this age group (Litt & Stock, 2011; Vogel et al., 2021). To control for attractiveness and similarity, the person portrayed in the social media photos was the same across conditions, and participants viewed same-sex profiles in line with their own birth sex (male or female).

After viewing all four profiles, participants rated the profiles on several dimensions (as part of the cover story that we were studying social media, personality, and health), completed a manipulation check, and answered post-experiment questions regarding their alcohol-related cognitions and behaviors. Total time for baseline assessment and experimental manipulation with profile viewing was 45 minutes and participants were paid $30 by Visa gift card.

***One-Month Follow-Up.*** A total of 293 participants (95.8%) completed the 1-month follow-up survey. Participants were invited to complete the 1-month follow-up in the lab, and if they did not schedule a session or missed their session and did not reschedule, they were sent a link to complete the 1-month follow-up survey online. Of participants who completed the 1-month follow-up assessment, 263 (89.8%) completed it in-lab and 30 (10.2%) completed it online. After the assessment, all participants read a debriefing statement that explained the purpose of the study, the necessity of using deception, and contact information if participants wanted to speak with someone about the study. All participants were directed to a brief personalized normative feedback (PNF) alcohol intervention. Parents of participants ages 15-17 who provided consent were emailed a debriefing statement and a parent manual (Turrisi et al., 2013). Participants who did not complete the 1-month follow-up survey (n = 24) were emailed the debriefing information and a link to complete the PNF intervention.

The 1-month assessment, debriefing, and PNF took approximately 45 minutes, and participants were paid $45 with a Visa gift card. A Federal Certificate of Confidentiality was obtained to help ensure privacy of research participants. All study procedures were approved by the University's Institutional Review Board, and no adverse events were reported.

## Measures

Measures were administered at baseline, post-experiment, and 1-month unless otherwise noted.

***Drinking Descriptive Norm.*** Participants responded to an item that read "How many days per month do you think the typical [male/female] your age drinks alcohol?" using an open-ended response capped at 31 days (adapted from NSDUH, 2019).

***Drinking Injunctive Norm.*** In a question parallel to the drinking descriptive norm, participants were asked "How many days per month do you think the typical [male/female] your age thinks are acceptable to drink alcohol?" using an open-ended response capped at 31 days (adapted from NSDUH, 2019).

***Abstaining Descriptive Norm.*** Participants were asked "What percentage of typical [males/females] your age do you think have never drank alcohol?" on a scale from 0-100% (Litt & Lewis, 2015; Litt & Stock, 2011).

***Abstaining Injunctive Norm.*** Participants responded to a single item on a Likert scale (1 = *Strongly Disapprove* to 7 = *Strongly Approve*) (Lewis et al., 2010a) that asked "Please indicate to what extent you think the typical [male/female] your age would approve or disapprove of never drinking?"

***Drinking Outcomes.*** At baseline and 1-month, participants were asked, "During the last month, on how many days did you drink alcohol?" using an open-ended response capped at 31 days (adapted from NSDUH, 2019). Participants also responded to a single item from the Daily Drinking Questionnaire (Collins et al., 1985) that assessed drinking frequency: "On average, during the past month, how often have you consumed alcohol?" using an 11-point scale (0 = *never* to 10 = *seven times per week*).

***Manipulation Check.*** Several questions were asked at post-experiment to test the experimental manipulation. First, participants were asked "How many profiles did you view?" with options ranging from 1-4. Next, participants were asked "Were the profiles you viewed male (0) or female (1)?" Finally, they were asked "What % of the profiles you viewed contained references to alcohol?" selecting (0) 0%, (1) 25%, (2) 50%, (3) 75%, or (4) 100%. For each item, correct answers (based on birth sex and condition) were coded as "1" and incorrect answers were

coded as "0." A sum score was created and then dichotomized whereby participants who had a sum score of 0-1 correct were coded as 0 = *did not pass manipulation check* and those who had a sum of 2-3 correct were coded as 1 = *passed manipulation check.*

***Demographics.*** Age and birth sex (0 = *Female*, 1 = *Male*) were included as covariates based on associations with substance use (Schulenberg et al., 2018).

**Analytic Plan**

Descriptive statistics were examined separately for each experimental condition at baseline, post-experiment assessment, and 1-month follow-up. Kruskal-Wallis tested for baseline differences in outcomes across the three experimental conditions. To investigate immediate and short-term experimental effects, separate analyses were conducted to evaluate the effects using the post-experiment assessment and 1-month follow-up. The post-experiment analyses had the following four norms-related outcomes: descriptive norms for drinking days per month (H1a), injunctive norms for drinking days per month (H1b), descriptive norms for percentage of same-age peers who never drink alcohol (H2a), and injunctive norms for never drinking (H2b). The analyses for H3 had two drinking behavior outcomes from the 1-month follow-up: number of drinking days per month and drinking frequency. For this three-arm experiment, the *alcohol abstaining and drinking* condition was set as the reference group because the comparison of interest was between the *alcohol abstaining and drinking* condition and each of the remaining two conditions (i.e., *alcohol abstaining* and *attention control*). Multiple linear regression models (for continuous outcomes of perceived norms, H1a-b and H2a-b) and negative binomial regression models (for count outcomes of alcohol use, H3) were estimated to evaluate the experimental effects at the immediate post-experiment assessment and 1-month follow-up. Baseline drinking frequency, baseline level of the corresponding outcome,

age, and birth sex were included as covariates to adjust for baseline difference and potential confounding. All analyses were limited to those with complete observations depending on the analysis (see sample size for each model in Tables 2 – 4).

## Results

### Manipulation Check and Test for Baseline Differences

Results indicated that 96.4% of participants at immediate post-experiment follow-up passed the manipulation check. The Kruskal-Wallis test did not yield any statistically significant baseline differences across the experimental conditions for descriptive norms for drinking days per month, percentage of peers who have never consumed alcohol, injunctive norms for drinking days per month, injunctive norms for never drinking, drinking days per month, or drinking frequency in the past month (Table 1).

### Descriptive Information

Table 1 provides the sample size and descriptive statistics for each experimental condition as measured in baseline, the post-experiment survey, and 1-month follow-up.

### Tests of H1a and H1b: Experimental Effects on Descriptive and Injunctive Norms

Table 2 shows the results for H1a and H1b testing the experimental effects on descriptive and injunctive norms for drinking comparing the *alcohol abstaining and drinking* condition (reference) to both the *alcohol abstaining* and *attention control* conditions at post-experiment and 1-month follow-up. In support of H1a, results indicated that participants in the *alcohol abstaining and drinking* condition reported greater drinking descriptive norms compared to participants in either the *alcohol abstaining* and *attention control* conditions at post-experiment and 1-month follow-up. However, no support was found for H1b whereby there were no

significant differences among conditions for drinking injunctive norms at post-experiment or 1-month follow-up.

**Tests of H2a and H2b: Experimental Effects on Descriptive and Injunctive Norms for Abstaining**

Table 3 shows the results for H2a and H2b testing the experimental effects on descriptive and injunctive norms for abstaining comparing the *alcohol abstaining and drinking* condition (reference) to both the *alcohol abstaining* and *attention control* conditions at post-experiment and 1-month follow-up. In partial support of H2a, results indicated that participants in the *alcohol abstaining and drinking* condition reported lower abstaining descriptive norms compared to those in the *alcohol abstaining* condition at post-experiment. In partial support of H2b, results indicated that participants in the *alcohol abstaining and drinking* condition reported lower abstaining injunctive norms compared to those in the *attention control* condition at 1-month follow-up. No other comparisons of abstaining descriptive or injunctive norms between conditions were significant.

**Tests of H3: Experimental Effects on Drinking Behaviors**

Table 4 shows the results for H3 testing the experimental effects on drinking behaviors comparing the *alcohol abstaining and drinking* condition (reference) to both the *alcohol abstaining* and *attention control* conditions at 1-month follow-up. Contrary to hypotheses, no significant differences were found on drinking behaviors between conditions.

In all analyses for H1-H3, outcomes were positively associated with their corresponding baseline levels. Being older was significantly associated with higher injunctive norms for drinking days per month at the 1-month follow-up. Being male was significantly associated with higher descriptive norms for drinking days per month and drinking frequency at the 1-month

follow-up, but being male was associated with lower injunctive norms for never drinking at the 1-month follow-up. No other covariates were significantly associated with outcomes.

## Discussion

Prior longitudinal and experimental research has demonstrated that exposure to alcohol posts on social media affects young adults' descriptive and injunctive normative perceptions (Geusens et al., 2020; Nesi et al., 2017; Vranken et al., 2020). Our study revealed that exposure to social media profiles containing both alcohol drinking and abstaining messages was associated with individuals perceiving that peers consumed alcohol more often. Additionally, exposure to drinking and abstaining messages was associated with perceptions that fewer peers abstained, especially compared to seeing abstaining messages only.

Our findings further indicated that much of the change due to the experimental manipulation was on descriptive rather than injunctive norms. Research indicates that descriptive norms are more strongly associated with drinking than injunctive norms (Lac & Donaldson, 2018; Neighbors et al., 2008). It may be easier for adolescents and young adults to notice and recall what others are perceived to be doing rather than what others approve of. For example, if a photo is displayed on social media that shows ones' peers at a party with alcohol, it may be easier to determine that others are drinking than determine how approving others are of drinking from the photo.

Findings from the present study indicated that participants in the *alcohol abstaining and drinking* condition reported lower abstaining descriptive norms (i.e., perceiving that fewer peers abstain) compared to those in the *alcohol abstaining* condition at the post-experiment assessment and 1-month follow-up. Future research is needed to determine if viewing abstaining social media displays can help balance the negative impact of drinking social media displays on

adolescent and young adult cognitions. Our study is the first experimental test for this line of research.

Examining abstaining social media displays is important as they may be a potential sign of not using alcohol and motivation to change or reduce current alcohol use. These abstaining displays may identify adolescents or young adults who could benefit from indicated behavioral change interventions. Recent research by Moreno et al. (2023) utilized social media alcohol displays as a means to deliver a targeted brief online alcohol intervention. Future research should examine potential abstaining alcohol posts as signals of motivation to change alcohol use behaviors.

We did not detect differences in drinking behavior outcomes at the 1-month follow-up. PNF interventions that include a normative component often compare one's own drinking behavior to the perceived behavior of others and others' actual drinking (Lewis & Neighbors, 2006). The experimental manipulation tested only focused on manipulating normative behavior and not comparisons with one's own drinking, which may be why we did not detect changes in drinking outcomes.

**Limitations and Future Directions**

The current research is not without limitations. First, the social media profiles were created by the researchers, thus exposure to known peers may have yielded stronger effects, as research indicates that similarity to normative referents is an important factor in predicting drinking (Lewis & Neighbors, 2007). This relates to potential limitations pertaining to gender, sexual orientation, race, and ethnicity as our profiles were only matched based on birth sex and therefore participants may not have felt similar to the normative referents used in our study. Further, we did not measure executive functioning and cannot determine whether some

participants may have had difficulties understanding the perspective of others or the questions asked in our study. Next, at the time of data collection (2017), TikTok did not exist. Recent research indicates that alcohol and abstaining information is frequent on TikTok (Russell et al., 2021) and thus should be examined. Third, participants were exposed to four social media profiles, which is significantly less than typically encountered in the real world. It is possible that some of our null effects may be due to the limited exposure (i.e., dose) in our manipulation. We did not measure alcohol exposure on social media in our baseline survey, and as such could not account for this construct in our analyses. Intensive research designs that capture real-world exposure to both drinking and abstaining content on social media (e.g., ecological momentary assessment) would provide more nuanced data into how drinking and abstaining content may relate to behavior. Next, none of the experimental profiles contained alcohol or liquor brands and given the high rates of alcohol advertising (Barry et al., 2018) and impact on drinking behavior (Alhabash et al., 2016), future research could consider including advertisements as well. Finally, about half of the sample identified as White college students (50.3%) and as such, results may not generalize to more diverse samples in terms of race, ethnicity, and student status.

**Conclusion**

Exposure to social media profiles containing both alcohol consumption and abstaining messages were associated with individuals perceiving that peers were consuming alcohol more often and that fewer peers were abstaining. The present findings confirm prior experimental research indicating that alcohol displays on social media are associated with riskier drinking cognitions. Much of the change due to experimental manipulation was on descriptive norms rather than injunctive norms. Perceptions of what others are doing may be easier for individuals to notice and recall compared to perceptions of others' approval. Lastly, findings indicated that

participants in the *alcohol abstaining and drinking* condition reported lower abstaining descriptive norms compared to those in the *alcohol abstaining* condition. Future research could elucidate whether viewing abstaining social media displays reduces the negative impact that social media alcohol displays have on individuals. Such findings could allow for screening individuals into targeted preventative interventions.

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Table 1

*Descriptive statistics on demographics and all outcomes by experimental condition at baseline, post-experiment assessment, and 1-month follow-up*

| Variable | Baseline | Post-experiment assessment | 1-month follow-up |
|---|---|---|---|
| **Sample size** | | - | - |
| Attention control condition | 99 | 99 | 94 |
| Alcohol abstaining condition | 103 | 103 | 98 |
| Alcohol abstaining and drinking condition | 104 | 104 | 101 |
| **Demographic information** | | | |
| Age at baseline | | - | - |
| Attention control condition | 18.43 (1.30) | - | - |
| Alcohol abstaining condition | 18.32 (1.34) | - | - |
| Alcohol abstaining and drinking condition | 18.40 (1.33) | - | - |
| Birth Sex (% female) | | | |
| Attention control condition | 52.5% | 52.5% | 53.2% |
| Alcohol abstaining condition | 53.4% | 53.4% | 53.1% |
| Alcohol abstaining and drinking condition | 52.9% | 52.9% | 51.5% |
| **Perceived Norms** | | | |
| Descriptive norms for drinking days per month | | | |
| Attention control condition | 8.10 (4.00) | 7.85 (4.24) | 6.97 (3.61) |
| Alcohol abstaining condition | 7.30 (4.51) | 6.80 (4.05) | 5.92 (4.60) |
| Alcohol abstaining and drinking condition | 7.47 (4.46) | 8.12 (4.79) | 7.74 (4.51) |
| Descriptive norms for % never drink alcohol | | | |
| Attention control condition | 19.19 (13.81) | 18.29 (12.79) | 19.26 (14.98) |
| Alcohol abstaining condition | 18.64 (17.03) | 19.49 (16.78) | 20.78 (17.41) |
| Alcohol abstaining and drinking condition | 18.06 (14.49) | 16.32 (13.14) | 17.40 (16.19) |
| Injunctive norms for drinking days per month | | | |
| Attention control condition | 10.05 (6.29) | 8.90 (5.70) | 9.45 (8.26) |
| Alcohol abstaining condition | 8.61 (5.25) | 7.63 (4.62) | 7.32 (5.08) |
| Alcohol abstaining and drinking condition | 9.30 (5.57) | 8.77 (5.01) | 8.68 (5.24) |

| | | | |
|---|---|---|---|
| Injunctive norms for never drinking | | | |
| Attention control condition | 3.77 (1.65) | 4.10 (1.76) | 4.15 (1.82) |
| Alcohol abstaining condition | 4.19 (1.69) | 4.32 (1.78) | 4.31 (1.60) |
| Alcohol abstaining and drinking condition | 3.86 (1.52) | 4.00 (1.55) | 3.76 (1.57) |
| **Alcohol Use Behavior** | | | |
| Drinking days per month | | | |
| Attention control condition | 5.70 (5.13) | - | 5.04 (5.02) |
| Alcohol abstaining condition | 5.25 (5.56) | - | 4.89 (5.55) |
| Alcohol abstaining and drinking condition | 5.13 (4.89) | - | 4.66 (4.96) |
| Drinking frequency in last month | | | |
| Attention control condition | 3.40 (2.16) | - | 3.12 (2.22) |
| Alcohol abstaining condition | 3.22 (2.09) | - | 2.93 (2.24) |
| Alcohol abstaining and drinking condition | 3.30 (2.19) | - | 2.98 (2.19) |

*Note: Alcohol Use Behavior was not assessed immediately post-experiment*

Table 2

*Drinking norms outcomes: Results of multiple linear regression for evaluating experimental effects at post-experiment assessment and 1-month follow-up (H1a and H1b)*

| | Post-experiment assessment | | 1-month follow-up | |
|---|---|---|---|---|
| | Descriptive norms: Drinking days per month (N = 303) b (SE) | Injunctive norms: Drinking days per month (N = 298) b (SE) | Descriptive norms: Drinking days per month (N = 278) b (SE) | Injunctive norms: Drinking days per month (N = 277) b (SE) |
| Intercept | -0.24 (2.12) | -2.57 (2.66) | -2.64 (2.88) | -9.09 (4.78) |
| Baseline Drinking Frequency | 0.14 (0.07) | 0.01 (0.09) | 0.14 (0.10) | 0.10 (0.16) |
| Age | 0.10 (0.12) | 0.26 (0.15) | 0.27 (0.16) | 0.67 (0.27)* |
| Birth Sex | 0.37 (0.30) | 0.24 (0.38) | 0.96 (0.40)* | 0.59 (0.67) |
| Attention control condition vs. Alcohol abstaining and drinking condition | -0.77 (0.36)* | -0.43 (0.46) | -0.99 (0.48)* | 0.55 (0.80) |
| Alcohol abstaining condition vs. Alcohol abstaining and drinking condition | -1.15 (0.36)** | -0.64 (0.45) | -1.63 (0.47)*** | -0.96 (0.79) |
| Baseline Level of Outcome | 0.79 (0.04)*** | 0.69 (0.03)*** | 0.60 (0.05)*** | 0.52 (0.06)*** |

*Note.* N = Number of observations in the analysis. Baseline Level of Outcome = the level of the outcome variable at baseline.

* $p < .05$, ** $p < .01$, *** $p < 0.001$.

Table 3

*Abstaining norms outcomes: Results of multiple linear regression for evaluating experimental effects at post-experiment assessment and 1-month follow-up (H2a and H2b)*

| | Post-experiment assessment | | 1-month follow-up | |
|---|---|---|---|---|
| | Descriptive norms: Percentage never drink alcohol ever (N = 303) b (SE) | Injunctive norms: Never drinking (N = 302) b (SE) | Descriptive norms: Percentage never drink alcohol ever (N = 277) b (SE) | Injunctive norms: Never drinking (N = 277) b (SE) |
| Intercept | 7.31 (8.73) | 1.17 (1.09) | 16.16 (12.61) | 2.84 (1.19)* |
| Baseline Drinking Frequency | -0.20 (0.29) | 0.04 (0.04) | -0.14 (0.40) | 0.07 (0.04) |
| Age | -0.12 (0.47) | 0.00 (0.06) | -0.43 (0.68) | -0.09 (0.06) |
| Birth Sex | -0.51 (1.18) | -0.01 (0.15) | -2.08 (1.65) | -0.33 (0.16)* |
| Attention control condition vs. Alcohol abstaining and drinking condition | 1.36 (1.42) | 0.19 (0.18) | 0.92 (1.99) | 0.40 (0.19)* |
| Alcohol abstain condition vs. Alcohol abstaining and drinking condition | 2.93 (1.41)* | 0.12 (0.18) | 2.92 (1.98) | 0.33 (0.19) |
| Baseline Level of Outcome | 0.67 (0.04)*** | 0.70 (0.05)*** | 0.58 (0.06)*** | 0.63 (0.05)*** |

*Note.* * $p < .05$, ** $p < .01$, *** $p < 0.001$. N = Number of observations in the analysis. Baseline Level of Outcome = the level of the outcome variable at baseline.

Table 4

*Drinking behavior outcomes: Results of negative binomial regression for evaluating experimental effects at 1-month follow-up (H3)*

| | Drinking days per month (N = 280) b (SE) | Drinking frequency (N = 280) b (SE) |
|---|---|---|
| Intercept | -1.16 (0.75) | -1.12 (0.58) |
| Baseline Drinking Frequency | 0.26 (0.05)*** | 0.22 (0.02)*** |
| Age | 0.07 (0.04) | 0.07 (0.03)* |
| Birth Sex | 0.12 (0.10) | 0.13 (0.07) |
| Attention control condition vs. Alcohol abstaining and drinking condition | -0.02 (0.12) | 0.03 (0.08) |
| Alcohol abstain condition vs. Alcohol abstaining and drinking condition | 0.01 (0.12) | -0.00 (0.08) |
| Baseline Outcome Level | 0.03 (0.02) | - |

*Note.* * $p < .05$, ** $p < .01$, *** $p < 0.001$. N = Number of observations in the analysis. Baseline Level of Outcome = the level of the outcome variable at baseline.