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Decreasing Risky Drinking Behaviors: Does Alcohol Response Feedback Improve Brief Intervention Outcomes?

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Abstract

For young adult heavy drinkers, higher sensitivity to alcohol's stimulating and rewarding effects, and lower sensitivity to the sedative effects, predicts continued heavy drinking and future alcohol-related problems. Current alcohol brief intervention (BI) does not address this risk factor. This study assessed the efficacy of BI incorporating personalized alcohol response feedback from smartphone-based assessments of alcohol use and subjective responses during a natural environment drinking episode. Current heavy drinkers (*N* = 45; 7.8±3.5 past month binge episodes[1]; aged 24.6±2.3 years) were randomized to either: smartphone-based assessments of alcohol use and subjective effects during a natural-environment drinking episode alone (CTL, *n* = 15), two standard BI sessions (BI-S, *n* = 10), or two BI sessions incorporating feedback from smartphone assessments of alcohol use and subjective effects during a natural-environment drinking episode (BI-ARF, *n* = 20). Intervention sessions (28.5±9.1 minutes) were administered via zoom. Drinking behaviors were assessed at baseline, 1- and 3-month follow-up. GEE analysis revealed that all groups showed significant reductions to past month drinking days, binge days, drinks per drinking day, maximum drinks per drinking day, and total drinks consumed (main effect of time, *ps* ≤ 0.001). However, there were no significant effects of group by time or group interactions (*ps* > 0.05), suggesting that all groups showed similar significant reductions to these behaviors. Additionally, in all groups, we saw larger reductions than typically seen following BI. To further understand the benefits of personalized alcohol response feedback, future research should be conducted with larger and more diverse samples, including a larger range of alcohol response phenotypes and desire to change drinking behaviors.

keywords: brief intervention; alcohol response feedback; heavy drinkers; binge drinking

[1] Binge episodes defined as 4+ or 5+ drinks in an occasion for women and men respectively (NIAAA, 2025)

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Binge drinking (defined as consuming 4+ or 5+ drinks in an occasion for women and men respectively; NIAAA, 2025) is most prevalent in adults aged 25-34 and is associated with increased drinking-related consequences including accidents, injuries, and health problems (Bohm et al., 2021; Wechsler et al., 1994). Alcohol brief interventions (BIs) were developed as a resource-minimal, cost-effective intervention approach for risky drinking in this population, with the goal of disrupting the progression from risky to disordered drinking through early intervention. BIs such as Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff et al., 1999) can be flexibly delivered in individual or group settings, and feature content on multiple topics in a short alcohol intervention format (i.e., alcohol use harm-reduction strategies, provision of drinking norms, risk factors and consequences of risky drinking behaviors). Current evidence supports the use of alcohol BI to reduce risky drinking in young adults. A meta-analysis of BI outcomes in primary care populations found that one year after receiving BI, individuals consumed an average of 20g less alcohol per week (about 1.5 standard drinks) than individuals who received minimal or no intervention (Kaner et al., 2007, 2018). A separate meta-analysis of alcohol consumption outcomes in young adults 12 months after completing BASICS showed that participants consumed an average of about 1.5 fewer standard drinks per week following the intervention (Fachini et al., 2012). However, work in this area has also found that alcohol BI had little impact on binge frequency per week, drinking days per week, or drinking intensity (Kaner et al., 2007, 2018). Given the modest decreases in risky drinking behaviors with current BI approaches, there is a need to improve upon standard BI to enhance the effects of these treatments on harmful drinking behaviors.

One promising approach to improving BI is to personalize and tailor content to the individual receiving the intervention. Standard BI such as BASICS already incorporate some personalized content according to gender, amount of alcohol consumed, and binge drinking behaviors. However, further personalization targeting factors linked to risky alcohol consumption may further enhance BI outcomes.

Subjective alcohol responses vary across individuals, and are linked to vulnerability for alcohol related problems (King et al, 2011). One theory suggests that individuals who show low sensitivity to alcohol's effects are likely to consume more to compensate for those low response levels, over time increasing the likelihood of escalating from heavy to disordered drinking (Schuckit, 1994). However, our laboratory has previously shown that greater sensitivity to alcohol's stimulating and rewarding effects, along with lower response to its sedative effects, is an even more powerful predictor of continued heavy drinking behaviors and the development of future alcohol-related problems and dependence (King et al., 2011, 2014). Given the association between alcohol response phenotypes and alcohol use-related risk, incorporating personalized alcohol response feedback may be helpful in enhancing current alcohol BI. One study attempted this, and found that individuals with low alcohol response phenotypes who received a video-based intervention matched to their specific response type exhibited greater reductions in risky drinking behaviors when compared to participants who received a non-specific video intervention (Schuckit et al., 2015). In a pilot study in heavy drinking young adults who smoke (Fridberg et al., 2015), we assessed drinking outcomes after integrating personalized response feedback into traditional alcohol BI, with an emphasis on the utility of heightened sensitivity to alcohol's stimulating and rewarding effects in predicting future alcohol related problems (King et al., 2011, 2014). We found that participants who received a BI incorporating personalized alcohol response feedback reported larger reductions in drinking and smoking behaviors versus a different group that received a standard alcohol BI additional personalization, or an attention control group.

Although the results of Fridberg et al. (2015) showed that incorporating personalized alcohol response feedback may improve outcomes in alcohol BI, the study had several limitations. The pilot study collected alcohol response data using a standardized laboratory-based protocol (King et al., 2011), in which participants were instructed to consume a fixed amount of pre-mixed alcoholic beverage over 15 minutes at the beginning of the alcohol response session. Alcohol responses were assessed via questionnaires at pre-drink baseline and at periodic intervals until the completion of the episode (2 hours). Implementing this methodology into a brief intervention can be unrealistic due to the demands of the in-lab alcohol response session and in-person intervention delivery. To address this limitation and produce a more feasible intervention, the current study expands upon Fridberg's (2015) pilot study, using new remote methods for alcohol response data collection and intervention delivery.

Smartphone-based high resolution ecological momentary assessment (HR-EMA) is a reliable and valid method to assess alcohol use and subjective responses during heavy drinking episodes in participants' natural environments. Here, "high resolution" refers to repeated assessments targeting a behavior of interest (in this case, alcohol use and associated subjective responses; see "Assessment of natural environment drinking and subjective effects" below for more detail) over a fixed time (3 hours). This method of measuring alcohol responses in a natural environment was found to reliably measure alcohol use and subjective responses when compared to standard in-lab drinking sessions (Fridberg et al., 2021, 2023). Assessing heavy drinking episodes in a natural environment also provides the added benefit of observing drinking behaviors and responses in participants' typical context, which can be more representative of real-life drinking behaviors than alcohol response sessions conducted in a well-controlled lab environment (Fischer et al., 2023).

Building upon preliminary evidence showing that personalized alcohol response feedback can enhance outcomes in alcohol BI (Fridberg et al., 2015), the current study aimed to refine this approach and enhance feasibility by implementing HR-EMA alcohol response data collection in place of the standard in-lab alcohol response session, and using videoconferencing for efficient, convenient, and cost-effective intervention delivery. We recruited a nationwide sample of young adult heavy drinkers (HD) and randomized them to one of three groups: standard alcohol BI (BI-S), standard BI with additional personalized alcohol response feedback (BI-ARF), and a control group who completed alcohol response assessment only (CTL). We hypothesized that the addition of personalized alcohol response feedback would result in greater reductions in the quantity and frequency of alcohol consumption and binge drinking episodes at follow-up in the BI-ARF group versus the BI-S group. We also expected both the BI-S and BI-ARF groups to show greater reductions in drinking than the assessment-only CTL group who did not receive any intervention.

Methods

Participants

Young adult heavy drinkers (HD) were recruited using nationwide online advertisements placed on social media sites. Screening included online surveys assessing demographic characteristics, alcohol-related consequences (via the Alcohol Use Disorders Identification Test [AUDIT], Babor et al., 2001; and Brief Young Adult Alcohol Consequences Questionnaire [BYAACQ]; Kahler et al., 2005), general health history, and the Online Timeline Follow-back

(O-TLFB; Rueger et al., 2012) calendar survey to obtain daily estimates of past month alcohol use. Inclusion criteria were age 21- 29 years, not having any major medical or psychiatric disorders, cannabis use ≤4x/week, and recreational drug use (i.e., cocaine, amphetamines, barbiturates) <2x/month. Participants were current heavy social drinkers, defined as consuming 7+ or 10+ drinks/week for women and men respectively, with 1–5 binge episodes/week (4+ drinks per session for women, 5+ for men) over the past two years, consistent with prior investigations (King et al., 2011). Individuals were excluded if they reported a lifetime diagnosis of schizophrenia, bipolar disorder, or obsessive-compulsive disorder, or past year major depressive disorder, panic disorder, or eating disorder. All participants provided written informed consent to participate, and the study protocol was approved by the University of Chicago Institutional Review Board.

Procedure

Eligible participants (N = 48) were randomized into one of three conditions: standard brief alcohol BI (BI-S; n = 10), BI with alcohol response feedback (BI-ARF; n = 22), or a control group without intervention (CTL; n = 16). Participants then completed a study orientation session with a research assistant to familiarize participants with the mobile response assessment procedure (see below) to be completed during one typical alcohol drinking and one typical non-alcohol drinking episode in their usual environment. Following study orientation, three participants from the BI-ARF and CTL groups dropped out, resulting in a final sample size of 45 participants (10 BI-S, 20 BI-ARF, 15 CTL). After completing the alcohol drinking and non-alcohol drinking assessments, participants in the BI-S and BI-ARF groups attended two 30-minute alcohol brief intervention sessions with study staff and then completed electronic follow-up surveys assessing alcohol use and related consequences at 1-month and 3-months after their second BI session. For the present study, BI-S participants received their interventions from late August to early October, placing their 1-month and 3-month follow-ups from late September to December. The BI-ARF group received their interventions from January to July, placing their follow-ups from February to October. The CTL group, who did not receive any intervention, completed their 1-month and 3-month follow-ups between March and September.

Assessment of natural environment drinking and subjective effects

For the BI-ARF and CTL groups only, subjective experiences during one alcohol drinking and one non-alcohol drinking comparison event were assessed using high-resolution ecological momentary assessment (HR-EMA), a smartphone-based method of capturing individuals' experiences during a specific behavior of interest in their natural environment. Prior work from our group showed this method to be reliable and valid for measuring alcohol use and responses when compared to standard in-lab drinking sessions (Fischer et al., 2023, Fridberg et al., 2021, 2023).

During study orientation, a research assistant trained participants to install and use the HR-EMA app (Metricwire, Inc.) on their Android® or iOS® smartphone. Participants set a passcode to access the HR-EMA app and were instructed to complete all mobile assessments by themselves, without input from others. Research assistants reviewed participants' O-TLFB for patterns indicating days associated with heavier drinking, which were then used to suggest potential heavier drinking days to complete the HR-EMA episode. Participants were instructed to complete the alcohol episode assessments during a typical drinking event, and to refrain from completing the episode during a special event (e.g., wedding, birthday) or holiday (e.g., New Year's Eve and St. Patrick's Day). Participants were told that they were not required to consume a specific amount of alcohol during the episode, and were reminded to refrain from driving during or after drinking. Participants were compensated for any taxis or ride shares used to get home at the end of the drinking episode, if needed. Participants also completed HR-EMA of a comparison typical non-drinking episode. Participants were told that, for this episode, they should complete the same assessments while consuming non-alcoholic beverages only.

Before each episode, participants completed a baseline survey assessing their current location, presence of others, recent consumption of food or drugs, and subjective measures including the 6-item Brief Biphasic Alcohol Effects Scale (B-BAES; Rueger et al., 2009) assessing current stimulation (energy, excitement, feeling “up”) and sedation (sedation, slow thoughts, sluggishness). Each B-BAES item was rated 0-10 (“Not at all” to “Extremely”). If the participant reported consuming alcohol that day prior to the baseline survey, they were reminded not to drink before the HR-EMA episodes, the survey was terminated, and they were instructed to re-initiate the mobile assessment at least 24 hours later. Following the baseline survey, participants completed a post- first-drink survey after finishing their first drink (alcohol or non-alcohol) in the episode. This survey assessed the number, size, and type of drink(s) consumed since the baseline survey (i.e., non-alcoholic, or beer, wine, or liquor), as well as the participant’s location, presence or absence of others, and current subjective stimulation and sedation (via the B-BAES) and “feel,” “like,” and “want more” for the beverage(s) consumed via the Drug Effects Questionnaire (DEQ; Morean et al., 2013). Each DEQ item was rated 0-100 on a visual analog scale, with 0 = “Not at all” or “Dislike” and 100 = “A lot” or “Very much” (for “like,” a score of 50 indicated “neutral,” i.e., neither like nor dislike). After completing the first-drink survey, identical follow-up surveys were automatically delivered to the participant’s smartphone 15, 30, 60, 90, 120, 150, and 180 minutes later.

Alcohol brief interventions

Participants in the BI-S group attended two alcohol brief intervention sessions ($M \pm SD$ = 27.0 ± 3.5 minutes) conducted one-on-one with a Ph.D.-level psychologist via videoconference. These sessions, separated by approximately one week ($M \pm SD$ = 7.0 ± 2.6 days), provided information on age-matched drinking norms, education on alcohol-related health risks and low-risk drinking habits, and motivational enhancement to change harmful drinking behaviors with goal setting and planning (Dimeff et al., 1999). Of note, the BI-S group did not undergo natural environment assessment of drinking and non-drinking episodes as this is not included in standard brief intervention for alcohol use.

The BI-ARF group completed two alcohol brief interventions like the BI-S group, with an additional novel personalized feedback component integrating alcohol consumption and subjective responses collected during the 3-hour HR-EMA episodes as described above. Data from the response session were aggregated to create each participant's personalized alcohol response profile, and presented to him or her in the form of graphs depicting stimulation, sedation, liking, wanting, along with corresponding estimated blood alcohol content over time. Data from the participant's non-alcohol drinking episode were also presented on the graphs as a comparison. In this component of the intervention, the psychologist explained prior research suggesting that individuals who show increased sensitivity to alcohol's stimulating and rewarding effects may be more likely to endorse heavy drinking and alcohol-related problems in the future, and discussed the implications of the participant's individual results in light of this association (King et al., 2011, 2014). The addition of this personalized segment resulted in significantly longer interventions than the BI-S group, with a mean intervention length of 29.6±3.2 minutes (p = 0.04), with an mean of 7.5±2.2 days between intervention sessions.

Participants in the CTL group completed the HR-EMA episodes only, and did not receive any intervention or feedback on their drinking behavior or subjective experiences.

Follow-up

At 1- and 3-months after completion of the second intervention session, participants completed an online follow-up consisting of the O-TLFB to assess past-month alcohol use, and surveys regarding desire to reduce or quit drinking alcohol. Participants also completed questionnaires assessing alcohol-related consequences, sleep quality, life stress, and current symptoms of anxiety and depression (data not presented here).

Results

The final study sample consisted of 45 young adult risky drinkers, aged 24.6±2.3 (*M*±*SD*) years. Participants identified as 48.9% female, 73.3% White, 6.67% Black, and 15.6% Hispanic. At baseline, participants reported drinking on 13.8±5.2 days in the past month and binge drinking on 7.8±3.5 of those days. Demographic and baseline drinking characteristics for each group are shown in Table 1. Importantly, the BI-ARF, BI-S, and CTL groups did not differ significantly on any demographic or baseline drinking characteristics (all ps > 0.30). Follow-up rates were very high; 100% of participants completed the 1-month follow-up and all but one participant (98%) from the CTL group completed the 3-month follow-up.

Drinking behaviors

Change in drinking behaviors from baseline to 1-month and 3-month follow-up were examined using generalized estimating equations (GEE) to examine potential associations between group, time and their interaction on changes in drinking behavior (assessed via the O-TLFB) from baseline to the two follow-up assessments (geepack package v1.3.12 in R v4.4.2). Means and standard deviations for each outcome and the three study time points (baseline, 1-

month follow-up, 3-month follow-up) are shown in Table 2. Results showed that, across all O-TLFB alcohol use outcomes (any drinking days, binge drinking days, drinks/drinking day, maximum drinks per day, and total past-month drinks consumed), all three groups reported significant reductions in alcohol use from baseline to follow-up (main effect of Time, all ps ≤ 0.001; see Table 2 and Figure 1). However, there were no significant group by time interactions (ps ≥ 0.18) or main effects of group (ps ≥ 0.06), suggesting that alcohol use outcomes did not differ significantly across the three study groups.

Importantly, though there were no significant group by time interactions or main effects of group for any of the drinking-related outcomes, the BI-S and BI-ARF groups reported larger reductions in drinks per drinking day (28%-39%) than did the CTL group (11%) at the 1-month follow-up. Likewise, at 1-month follow-up, both intervention groups showed greater reductions (42%-46%) in total drinks consumed versus the CTL group (28%). Similarly, at 1-month follow-up, BI-S and BI-ARF groups reported greater reductions in binge drinking frequency (50+%) than the CTL group (29%), as well as at 3-month follow-up, where BI-ARF and BI-S reduced by 46% and 67% respectively, versus 38% for CTL.

GEE analysis of participants' desire to change or reduce alcohol use behaviors revealed no significant effects of group by time, group, or time ($ps > 0.05$), as shown in Table 3.

Discussion

Results showed that the BI-ARF group reported significant reductions in past month drinking days, binge days, and total drinks per month from baseline to 1-month and 3-month follow-up. The BI-ARF group also showed significant reductions in drinks per drinking day and maximum number of drinks per occasion, but this was not sustained at 3-months post intervention. No models showed a significant group by time interaction, suggesting that reductions in each of the above drinking-related outcomes decreased similarly for the BI-ARF, BI-S, and CTL groups. This is contrary to the hypothesis that the BI-ARF group would see significantly greater reductions to risky drinking behaviors when compared to BI-S and CTL groups.

Interestingly, all three groups showed markedly stronger reductions in alcohol use over time than has been reported previously in literature on alcohol brief intervention. The BI-ARF group showed reductions in past month drinking days from baseline to 3-month follow-up (mean of 14.0 to 7.6 days), for an average reduction of about 6.4 drinking days. This is a much larger reduction than the average of 0.8 fewer drinking days per month following standard BI reported in a previous meta-analysis of BI effectiveness in young adults aged 19 to 30 (Tanner-Smith & Lipsey, 2015). Similarly, the BI-S and CTL groups also showed large reductions on that outcome, from 12.0 to 7.9 days and 14.9 to 9.6 days, respectively.

Volunteer bias could be one explanation for the large reductions in drinking behavior observed in this study, given that individuals who enrolled in the study did so due to interest in alcohol research participation after seeing social media ads targeting young adult drinkers. When compared to real-world BI recipients, this self-selected participant population may be more willing and likely to reduce their drinking behaviors. Another potential explanation for these reductions could be that all participants were required to report at least some desire to change alcohol use behaviors (≥ 1 on a 0-10 scale with labels “Not at all” to “Very much so”) in order to be enrolled. As discussed, many real-world BI participants may not have any desire to change, therefore resulting in further selection bias. Similar reductions seen in the BI-S and BI-ARF groups may be attributed to completing two alcohol-focused one-on-one intervention sessions with a trained clinician. Both groups had notable direct contact with the clinician, shared personalized components that appear in standard BI, and an overlap in many intervention materials used across both conditions. Alcohol response data collection may have contributed to reductions in the BI-ARF and CTL groups via increased self-reflection, perceived personal relevance, and intrinsic motivation in response to personalized data collection with or without feedback.

There were some discrepancies between the current study and Fridberg's pilot study (2015) which may have contributed to differences in drinking outcomes. The current study enrolled heavy drinkers, but the pilot study population included heavy drinking smokers. Because these individuals were interested in changing both drinking and smoking behaviors, feedback may have been more personally relevant to the pilot participants. Additionally, although alcohol response data collection via HR-EMA in the current study provides the benefit of observing drinking behaviors in participants' natural environment, individuals may be more likely to minimize feedback based on data collected in their favorite drinking contexts.

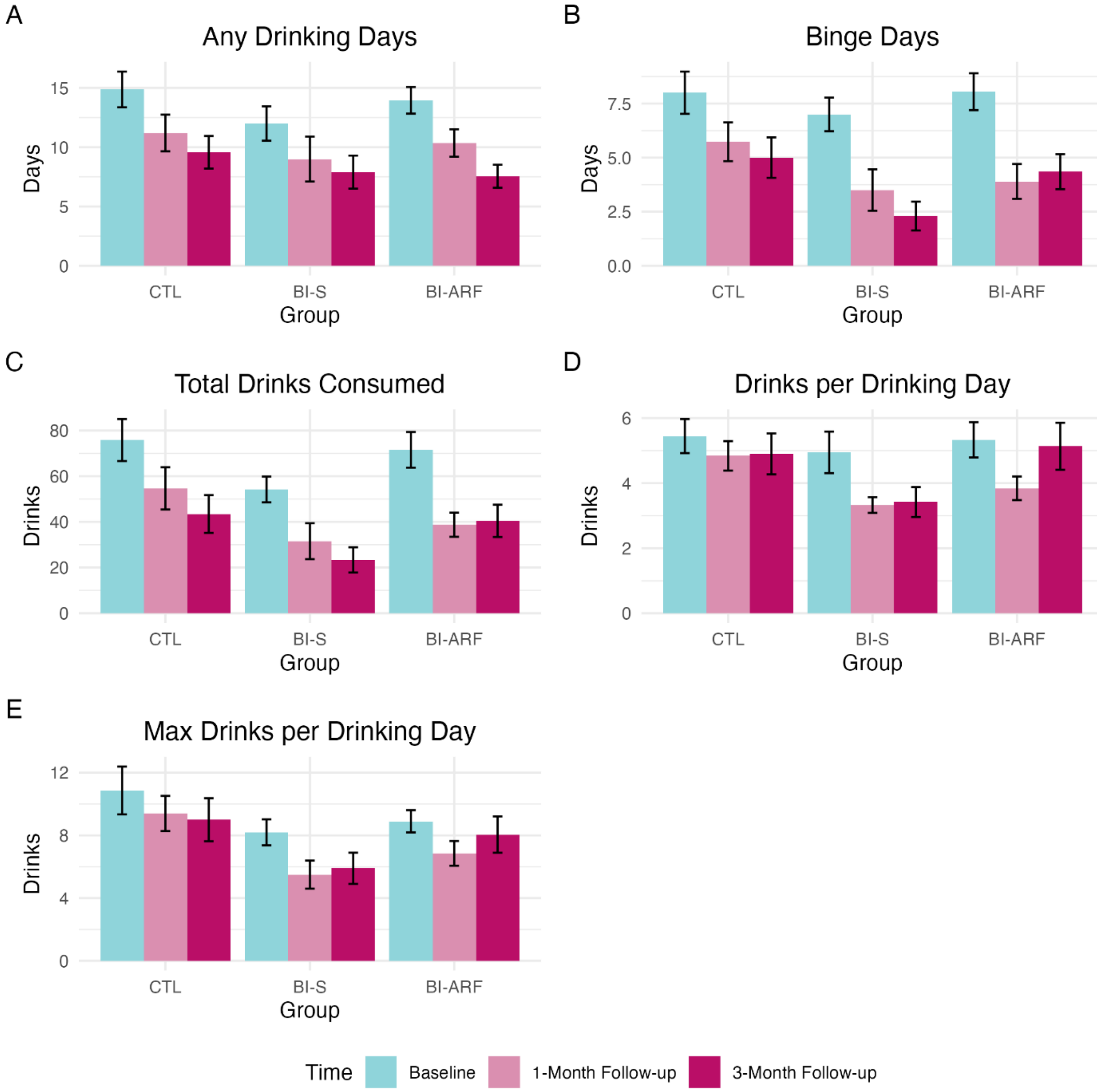
One limitation of this study is the timing of data collection and intervention delivery. Participant groups differed in terms of the seasonality of their recruitment and subsequent follow-ups. Therefore, their drinking behavior may have been increased or decreased as a function of seasonal drinking trends. Prior work has shown that warmer months are associated with heavier drinking, potentially due to increased social and outdoor activities as well as seasonal shifts in routine such as vacation, and drinking behaviors tend to decrease in colder temperatures (Hagström et al., 2019). Recent trends such as "Sober October" and "Dry January," where individuals—especially younger populations—challenge themselves to refrain from drinking alcohol for a month for health or social reasons, may also have affected the results (Siconolfi et al., 2024). BI-S group baseline alcohol data was collected in the summer, when people tend to drink more, and follow-ups occurred in the winter, when drinking behaviors tend to be lower. The BI-ARF group, on the other hand, underwent baseline data collection in the winter or early spring, with follow-ups in the summer when drinking behaviors are at their peak. The timing suggests that common drinking trends would work in favor of the BI-S group reducing drinking behaviors, and the BI-ARF group would tend to increase drinking behaviors between the baseline and 3-month follow-up time points. As seasonal effects may have affected our outcomes, future research in this area should randomize the time of year that individuals in different comparison groups complete the intervention and follow-ups.

A notable strength of this study is its entirely remote format. As noted previously, Fridberg's (2015) pilot study was implemented using a standardized in-laboratory alcohol response episode. Although laboratory-controlled alcohol challenge paradigms are the gold standard for assessing alcohol subjective responses, these methods are time and resource intensive for both study staff and participants. The HR-EMA and videoconference assessments and interventions in the present study allowed for a convenient and cost-effective intervention, and similar approaches could be feasibly implemented among diverse populations. One potential limitation to a fully remote intervention is technology requirements and the potential for issues related to deploying the mobile assessment tools, but we did not find this to be an issue in the present work, especially among a young adult population with relatively high technology literacy. Additionally, the study orientation allowed an opportunity for research assistants and participants to go over any potential questions or difficulties with the HR-EMA application prior to the natural environment assessment episodes.

In conclusion, the present study examined the effects of integrating additional alcohol response feedback into standard BI on alcohol use behaviors. We saw significant reductions in many hazardous drinking behaviors from baseline to 1-month and 3-month follow-up in all groups, but there were no significant differences between groups. These reductions are much larger than the typical drinking reductions seen following traditional BI. Further research is needed to understand why we saw such strong reductions in all groups, including use of larger, more diverse samples, including a larger range of alcohol response phenotypes and desire to change drinking behaviors, and controlling for the time of year that the interventions are delivered.

Figure 1

Past month drinking outcomes at baseline, 1-month, and 3-month follow-up.



Note. Data shown are Mean ± SEM. Refer to Table 2 for significance testing via GEE model. BI-ARF = brief intervention with alcohol response feedback, BI-S = standard brief intervention, CTL = alcohol response data collection control.

Table 1

Baseline demographic and drinking characteristics across groups.

	CTL	BI-S	BI-ARF	Significance testing
Age	24.1 (2.3)	24.7 (2.1)	24.9 (2.5)	$p = 0.66$
Race				$p = 0.93$
% White	12 (80%)	7 (70%)	14 (70%)	
% Black	1 (6.67%)	1 (10%)	1 (5%)	
% Asian	1 (6.67%)	1 (10%)	2 (10%)	
% Other [a]	1 (6.67%)	1 (10%)	3 (15%)	
Ethnicity				$p = 0.32$
% Hispanic	3 (20%)	0 (0%)	4 (20%)	
% Female	7 (46.7%)	5 (50%)	10 (50%)	$p = 0.98$
AUDIT [b] (range 0–40)	13.2 (4.6)	11.3 (4.8)	13.3 (4.1)	$p = 0.52$
BYAACQ [c] (range 0-24)	5.4 (4.5)	3.9 (2.5)	5.9 (4.0)	$p = 0.42$
Desire to reduce drinking (range 0-10)	4.7 (2.1)	5.0 (2.2)	5.6 (2.3)	$p = 0.50$
Desire to quit drinking (range 0-10)	2.5 (2.2)	2.4 (1.4)	2.9 (2.1)	$p = 0.82$
Past month alcohol use				
Any drinking days	14.9 (5.8)	12.0 (4.6)	14.0 (5.0)	$p = 0.41$
Binge days	8.0 (3.8)	7.0 (2.5)	8.05 (3.8)	$p = 0.72$
Drinks per drinking day	5.4 (2.0)	5.0 (2.0)	5.3 (2.4)	$p = 0.85$
Max drinks per drinking day	10.9 (5.9)	8.2 (2.6)	8.9 (3.2)	$p = 0.24$
Total drinks consumed	75.8 (35.5)	54.2 (17.8)	71.5 (34.9)	$p = 0.25$

Note: Values are *M* (*SD*) or *n* (%). Groups were compared by one-way ANOVA. Significance testing indicates the main effect of group.

[a] Other Race includes Native American, Native Hawaiian/Pacific Islander, or more than one race.

[b] AUDIT = Alcohol Use Disorders Identification Test.

[c] BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.

Table 2

Past month alcohol use behaviors for each group at baseline, 1-month and 3-month follow-up.

		CTL	BI-S	BI-ARF	Significance testing
Any Drinking Days					
	Baseline	14.9(5.8)	12.0 (4.6)	14.0 (5.0)	Group x Time $p = 0.83$
	1 month	11.2 (6.0)	9.0 (6.0)	10.4 (5.2)	Group $p = 0.30$
	3 month	9.6 (5.3)	7.9 (4.4)	7.6 (4.3)	Time $p < .001$
Binge Days					
	Baseline	8.0 (3.8)	7.0 (2.5)	8.1 (3.8)	Group x Time $p = 0.35$
	1 month	5.7 (3.5)	3.5 (3.0)	3.9 (3.6)	Group $p = 0.17$
	3 month	5.0 (3.6)	2.3 (2.1)	4.4 (3.6)	Time $p < .001$
Drinks per Drinking Day					
	Baseline	5.4 (2.0)	5.0 (2.0)	5.3 (2.4)	Group x Time $p = 0.18$
	1 month	4.8 (1.8)	3.3 (0.7)	3.8 (1.6)	Group $p = 0.40$
	3 month	4.9 (2.4)	3.4 (1.4)	5.13 (3.1)	Time $p < .001$
Maximum Drinks per Drinking Day					
	Baseline	10.9 (5.9)	8.2 (2.6)	8.9 (3.2)	Group x Time $p = 0.76$
	1 month	9.4 (4.3)	5.5 (2.8)	6.9 (3.5)	Group $p = 0.06$
	3 month	9.0 (5.3)	5.9 (3.1)	8.1 (5.2)	Time $p = .001$
Total Drinks Consumed					
	Baseline	75.8 (35.5)	54.2 (17.8)	71.5 (34.9)	Group x Time $p = 0.63$
	1 month	54.7 (35.7)	31.6 (24.9)	38.8 (23.7)	Group $p = 0.06$
	3 month	43.5 (32.0)	23.4 (17.5)	40.5 (31.7)	Time $p < .001$

Note: This table shows past month drinking characteristics at baseline, 1-month and 3-month follow-up. Values are *M* (*SD*). For 3-month outcomes, data was excluded from one participant in the CTL group who did not complete the 3-month follow-up, resulting in a group size of 14. Analysis was executed with a GEE model using CTL as reference group.

Table 3

Baseline and follow-up survey reports across groups.

		CTL	BI-S	BI-ARF	Significance testing
Desire to reduce drinking					
	Baseline	4.7 (2.1)	5.0 (2.2)	5.6 (2.3)	Group x Time *p* = 0.99 Group *p* = 0.44 Time *p* = 0.94
	1 month	4.6 (1.6)	5.2 (1.8)	5.4 (2.7)	
	3 month	4.8 (1.8)	5.1 (2.3)	5.6 (2.5)	
Desire to quit drinking					
	Baseline	2.5 (2.2)	2.4 (1.4)	2.9 (2.1)	Group x Time *p* = 0.13 Group *p* = 0.34 Time *p* = 0.66
	1 month	1.9 (1.6)	2.8 (2.0)	2.7 (2.3)	
	3 month	2.1 (1.5)	2.3 (2.0)	3.7 (2.9)	

Note: Table shows desire to reduce or quit drinking at baseline, 1-month and 3-month follow-up. Values reported are *M (SD)*. For 3-month outcomes, data was excluded from one participant in the CTL group who did not complete the 3-month follow-up, resulting in a group size of 14. Analysis was executed with a GEE model using CTL as reference group.

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