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Mediators and Moderators of a Personalized Feedback Alcohol Intervention for Nonstudent Emerging Adult Drinkers

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Abstract

Objective—The main objective of this study was to test proposed mediators and moderators of a personalized feedback alcohol intervention (PFI) on alcohol use. Data for the current investigation came from an earlier randomized controlled trial of a PFI targeted for nonstudent heavy drinkers between 18–25 years.

Method—Participants were 164 (65.9% men) drinkers recruited from the community. They were randomly assigned to either a single-session PFI or an assessment-only (AO) control group. Follow-up assessments at 1 and 3 months were included for analysis.

Results—Perceived drinking norms mediated the intervention effect on quantity, frequency, and peak drinking; two dimensions of protective behavioral strategies (PBS) mediated the intervention effect on peak drinking; and drinking to cope motives did not mediate any drinking outcomes. Of the moderating factors examined (i.e., norms, PBS, drink to cope motives, age, gender), only PBS related to serious harm reduction moderated intervention impact. Specifically, for those high in serious harm reduction PBS at baseline, post-intervention reductions in drinking were stronger for the PFI group compared to AO.

Conclusions—Overall, findings highlight the importance of correcting misperceived drinking norms and addressing the use of specific PBS in brief interventions. The knowledge gained from this study represents an important step towards minimizing drinking-related harms that are disproportionately experienced by those with lower educational attainment.

Keywords

nonstudents; emerging adults; alcohol; brief alcohol intervention; mediators; moderators

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Introduction

Young adulthood (i.e., between ages 18 to 25 years) is a period of heightened vulnerability for problematic alcohol use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2016). Noncollege-attending young adults, comprising 60% of 18 to 24 year-olds in the U.S. (U.S. Department of Education, 2016), may be particularly at risk. Young adults with lower educational attainment are less likely to mature out of heavy drinking (Lanza & Collins, 2006; Muthén & Muthén, 2000; White, Labouvie, & Papadaratsakis, 2005), are at higher risk for alcohol-related problems, and are more likely to develop an alcohol use disorder later in adulthood (Barnett et al., 2003; Lanza & Collins, 2006; Muthén & Muthén, 2000; White et al., 2005). Rates of heavy episodic drinking are decreasing among college students, but are on the rise among same-aged peers not in college (Hingson, Zha, & Smyth, 2017).

Efforts to develop interventions focusing on this underserved group are critically needed. While there have been a number of intervention and treatment studies administered in noncollege settings (see Davis, Smith, & Briley, 2017), there have been but a few investigations specifically targeting and tailoring brief interventions for nonstudent young adult drinkers. Existing interventions are often tailored to the risks and factors most relevant for college drinkers. Noncollege young adults may benefit less from existing alcohol treatments than college-attenders (Davis et al., 2017), thus raising questions about the generalizability of the college drinking literature to nonstudents and suggesting that a tailored approach is needed to maximize program benefits.

Evidence supports personalized feedback interventions (PFIs) as an effective intervention approach to reduce alcohol use and problems among college students (Miller, Leffingwell, Claborn, Meier, Walters, & Neighbors, 2013; Walters & Neighbors, 2005). PFIs involve providing objective feedback pertaining to a person's alcohol use and related risk factors and are delivered within a brief motivational intervention (BMI) session or may be computer-delivered. Despite evidence supporting the use of personalized feedback with college drinkers, evaluation of the efficacy of PFIs with nonstudent populations remains an area in need of investigation. While one prior investigation examined a BMI with nonstudents, the study focused specifically on underage drinkers between 17–20 years and short-term (i.e., 3 months) drinking changes (Magill et al., 2017).

Most recently, one investigation evaluated the preliminary efficacy of a brief, in-person PFI tailored for nonstudent drinkers across the young adult period of 18 to 25 years (Lau-Barraco, Braitman, & Stamates, 2018). The study examined intervention impact on both short- (1 month) and long-term (9 months) drinking outcomes. Results showed the tailored PFI led to drinking reductions at 1-month relative to no-treatment controls, while both conditions continued to show gradual decline through 9 months. The intervention was equally effective for both women and men and acceptability of the intervention was high. These preliminary findings are encouraging. However, efforts to identify potential mechanisms of change and factors impacting the influence of the intervention are warranted as such knowledge could inform intervention refinement to improve care for this at-risk group of drinkers.

Mediators and Moderators of Feedback Interventions

Mechanisms of behavior change (or mediators of intervention efficacy) are the psychological and motivational constructs contributing to behavior that are targeted in an intervention (Kazdin & Nock, 2003; Nock, 2007). Moderators of intervention efficacy allow for determining for whom the intervention is most effective. In comparison to identifying mediators (see Reid & Carey, 2015), there has been far less research devoted to identifying moderators of brief alcohol intervention efficacy. As intervention efforts have only recently been tailored to nonstudent young adults (Lau-Barraco et al., 2018) and underage drinkers (Magill et al., 2017), it is crucial to identify salient mechanisms and factors associated with improved response to intervention with nonstudents to direct future work and maximize efforts to help reduce problematic drinking in this group.

Drinking norms—Descriptive drinking norms, or perceptions of how much and how often peers drink, are strongly and positively associated with personal consumption (e.g., Borsari & Carey, 2003; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). A recent review of mediators of intervention efficacy among college students indicated that norms were the most consistently supported mediator across 22 constructs assessed (e.g., outcome expectancies, self-efficacy, intentions; Reid & Carey, 2015). Specifically, providing normative feedback on one's alcohol consumption relative to others leads to correction of misperceived norms of others' drinking and also reduces one's own consumption in college students (Carey, Henson, Carey, & Maisto, 2010). Normative feedback on drinking has also shown utility in community-based young adult samples. One recent study found decreased perceptions of others' drinking to mediate the association between efficacy of a BMI and alcohol-related consequences 6 weeks later (Magill et al., 2017). Thus, it appears that providing normative feedback on others' drinking can elicit change in one's own use.

Only a handful of studies have examined descriptive norms as a moderator of intervention efficacy. An investigation examining a combined college student and parent alcohol intervention did not find support for norms (Grossbard et al., 2016), but another study found norms to moderate the effect of an electronic feedback intervention with a community sample of male drinkers (Bertholet, Daepfen, Cunningham, Burnand, Gmel, & Gaume, 2016). Given limited research testing norms with young adults, we drew from the adolescent literature. Paz Castro and colleagues (2017) did not find support for norms to predict the response of a technology-based intervention among adolescents. Clearly, findings on the moderating effect of norms are inconclusive and additional research is needed to clarify their influence on intervention efficacy.

Protective behavioral strategies—Protective behavioral strategies (PBS) are drinking-control strategies (e.g., alternate alcoholic and non-alcoholic drinks) that can be used to protect one against heavy drinking and related harms (see Pearson, 2013). More frequent use of PBS is associated with lower consumption and fewer consequences (e.g., Linden, Lau-Barraco, & Millettich, 2014; Sugarman & Carey, 2009). Evidence as a mechanism of change has been mixed but promising, as there is limited support for PBS as a mediator of reductions in alcohol use with college samples (Reid & Carey, 2015). PBS also has garnered support as a mediator of drinking outcomes in a BMI administered to an underage sample of

nonstudent young adults (Magill et al., 2017), but further testing of this finding is warranted to establish consistency across trials.

Examinations of pre-intervention PBS use as a moderator of intervention efficacy have been limited. However, it has been demonstrated that college drinkers who use fewer PBS benefitted more from emailed personalized feedback across several measures of alcohol use (e.g., drinking frequency, peak number of drinks) than those using more PBS at pre-intervention (Braitman & Henson, 2016). In assessing the moderating role of PBS, examining subtypes of PBS (i.e., stopping/limiting drinking, manner of drinking, and serious harm reduction; Martens, Ferrier, Sheehy, Corbett, Anderson, & Simmons, 2005) may also be useful as they differentially associate with alcohol use outcomes (e.g., Frank, Thake, & Davis, 2012; Napper, Kenney, Lac, Lewis, & LaBrie, 2014). Examining sub-types of PBS will help inform their specific role in impacting intervention efficacy.

Drinking motivations—Coping motives, or drinking to cope with negative internal states, are positively associated with heavy consumption and alcohol-related problems (Goldsmith, Thompson, Black, Tran, & Smith, 2012). However, coping motives have been found to have limited support as an underlying mechanism of behavior change in alcohol interventions with college students (see Reid & Carey, 2015). Despite the lack of compelling evidence supporting coping motives as a mediator among college students, the intervention in the present study specifically included intervention content focusing on adaptive coping based on formative research with the target nonstudent population (Lau-Barraco et al., 2017). Many nonstudents indicated drinking as a way to cope and to manage the stress stemming from the multiple responsibilities of their daily lives. This subsequently guided the inclusion of intervention content that encouraged adaptive coping and stress management strategies. It remains to be tested whether an intervention with the inclusion of this component was associated with drinking reductions through a reduction in drinking to cope motives.

Drinking to cope has been found to moderate intervention efficacy among heavy college student drinkers (Young, Neighbors, DiBello, Sharp, Zvolensky, & Lewis, 2016) and among young adult veterans (Young, Pedersen, Pearson, & Neighbors, 2018). Young adults with higher coping motives may be particularly responsive to normative feedback interventions. Given that drinking to cope is a prominent theme surrounding nonstudent drinking behavior (Barnett et al., 2003; Lau-Barraco, Linden-Carmichael, Hequembourg, & Pribesh, 2017), and there are psychological harms related to drinking to cope in general (e.g., Bravo, Pearson, Stevens, & Henson, 2016; Clerkin, Werntz, Magee, Lindgren, & Teachman, 2014), it is important to examine drinking to cope as a moderator of intervention efficacy within this population.

Gender and age—The potential impact of key demographic factors, including gender and age, on brief intervention efficacy warrant further examination. Regarding gender, prior support for gender differences is mixed. While one meta-analysis of college drinkers found studies with more women proportionally were more successful (Carey, Scott-Sheldon, Carey, & DeMartini, 2007), another did not find gender to impact intervention response with mandated college drinkers (Carey, Scott-Sheldon, Garey, Elliott, & Carey, 2016). Specifically relating to prior studies examining in-person alcohol interventions or feedback-

based interventions, there is little evidence supporting differential impact based on gender (e.g., Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012; Walters & Neighbors, 2005). Regarding the impact of age on intervention response, research has been scarce. However, there is some evidence supporting differential impact of brief interventions for college drinkers based on the age status (e.g., over 21 years, upper classmen) of the drinker (Baer et al, 1992; Braitman & Lau-Barraco, accepted; Henson, Pearson, & Carey, 2015). Given the dearth of studies examining gender and age as moderators of brief intervention response, and especially so with nonstudent young adult drinkers, additional research efforts are needed to determine the impact of age and gender on intervention outcomes.

Current Study

Data for the current investigation came from a pilot randomized controlled trial of a PFI tailored to nonstudent heavy drinkers between 18–25 years (Lau-Barraco et al., 2018). The brief intervention led to significant reductions in drinking as compared to controls one month following the intervention. The aim of the present study was to test proposed mediators and moderators of the PFI's impact on short-term alcohol use. Three putative mediators include: normative drinking perceptions, PBS use, and drinking to cope motives. It was expected that decreased norms, increased PBS use, and decreased drinking to cope motivations would mediate the effects of the PFI on reduced alcohol consumption. Given some prior support for these same constructs to also serve a moderating role in intervention efficacy, norms, PBS use, and drinking to cope motives were explored as moderators of intervention impact. It was expected that higher normative perceptions of peers drinking, lower use of PBS, and higher drinking to cope motivations at baseline would be associated with greater drinking differences at 1-month follow-up between the PFI and control groups. We also examined gender and age (i.e., under vs. over 21 years of age) as possible moderators, hypothesizing that women (e.g., Carey et al., 2007) and drinkers over the legal drinking age (e.g., Braitman & Lau-Barraco, accepted) would be most responsive to the PFI.

Materials and Methods

Participants

Participants were 164 (65.9% men) individuals from a community-based sample of a mid-size, urban southeastern city in the United States. The sample mean age was 21.98 ($SD = 2.02$) years, and participants were mostly single/never married (71.3%), nonparents (66.7%), and employed (54.25%). The ethnicity of the sample included 48.2% African-American, 40.9% Caucasian, 6.7% Hispanic, 1.2% Native American/Indian, and 3.0% "Other." To be eligible, participants must have: been 18 to 25 years old, had no prior or current college attendance, and not been currently enrolled in high school. They also had to report engaging in a minimum of two heavy drinking episodes (i.e., 4+/5+ standard drinks for women/men on one occasion) in the past month. During screening, individuals were excluded if they reported consuming above 40 drinks weekly and/or a previous history of substance use treatment. These individuals were excluded as they may be more appropriate for extended individual treatment rather than a brief secondary prevention session.

All participants provided informed consent at baseline. The study was approved by the university's Institutional Review Board and followed the American Psychological Association (2010) guidelines. Participants were awarded up to \$180 for completing the entire study.

Procedure

A randomized controlled trial design was used to compare a tailored PFI versus an assessment-only (AO) control group. Participants were recruited from the community through newspaper advertisements, flyers, and internet postings (e.g., Craigslist.com, Facebook). Following a short telephone screening to determine study eligibility, participants were scheduled for an in-person baseline assessment, followed immediately by the PFI or AO session. Of those screened ($n = 1943$), 412 were eligible and randomized, of which 164 attended the in-person meeting.

Participants in the PFI condition were administered a single-session brief personalized feedback intervention. The intervention consisted of a 50- to 60-minute meeting modeled using the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) manual. Participants first completed a computerized baseline assessment. Part of this data was used to generate an immediate personalized feedback report. During the intervention meeting, an interventionist delivered personalized feedback including information on the participant's alcohol consumption and consequences, alcohol-related cognitions (i.e., expectancies), normative drinking comparisons (using nonstudent drinking data from the National Survey on Drug Use and Health; SAMHSA, 2010), and personal risk factors (e.g., family history of alcoholism). Participants in the AO condition only completed the baseline assessment, and then were given instructions on the follow-up procedure. With the exception of the feedback given by an interventionist, procedures for the AO and PFI conditions were identical. Follow-up assessments were administered via online at 1, 3, 6, and 9 months post-intervention. For full description of the study and procedures, see Lau-Barraco et al. (2018).

Measures

Demographics—A basic background questionnaire was used to assess information about demographics (e.g., age, gender, ethnicity, employment, income, parent status, relationship status).

Alcohol use—The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to assess typical alcohol use. For each day during a typical week over the past three months, participants self-reported the number of standard drinks (e.g., 12-ounce beer, 5-ounce wine, or 1.5-ounce liquor) consumed and duration of the alcohol use occasion. Six alcohol use indices were calculated: total weekly quantity, frequency of drinking days, number of heavy drinking days (days where 4+/5+ drinks for women/men were consumed), proportion of heavy drinking days out of total drinking days, maximum number of drinks on the heaviest drinking day (i.e., peak), and typical estimated blood alcohol concentration (eBAC; see Matthews & Miller, 1979).

Norms—The Descriptive Norms Rating Form (DNRF; Baer, Stacy, & Larimer, 1991) was used to assess descriptive drinking norms of close friends. Participants estimated the number of standard drinks members in their social group consume on each day of a typical week during the past three months. Three drinking indices were calculated: total weekly quantity, frequency of drinking days, and maximum number of drinks on the heaviest drinking day (i.e., peak).

PBS—The Protective Behavioral Strategy Survey (PBSS, Martens et al., 2005) is a 15-item measure that assesses the use of cognitive-behavioral strategies aimed at reducing risky drinking behaviors. Respondents rated the degree to which they engaged in certain behaviors when drinking using a 5-point scale ranging from 1 (*never*) to 5 (*always*). Three types of protective behaviors were assessed: stopping/limiting drinking (e.g., “stop drinking at a predetermined time”), manner of drinking (e.g., “avoid drinking games”), and serious harm reduction (e.g., “use a designated driver”). Scores for each scale were summed, with higher scores indicating more frequent use of this strategy. A total PBS score was created by summing the three subscales. Baseline and 1-month internal consistencies, respectively, were .73 and .87 for stopping/limiting, .58 and .64 for manner of drinking, .57 and .79 for serious harm reduction, and .76 and .88 for total PBS score.

Drinking to cope motives—The Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) is a 20-item measure assessing one’s motives for drinking. There are four subscales: coping, conformity, social, and enhancement. For the present study, only the coping subscale (5 items) was used. Participants rated how often they drank for each reason (e.g., “to forget your worries”) on a 5-point scale ranging from 1 (*almost never/never*) to 5 (*all of the time*). A total coping motive score was calculated by summing all items on the coping motives subscale, with higher scores indicating greater endorsement. Baseline and 1-month internal consistencies were .88 and .87, respectively.

Analysis Approach

Mediation—To examine potential mechanisms of change, a series of mediation models were examined. To focus on which constructs were most relevant for specific drinking indicators, each variable representing alcohol consumption was examined separately. Rather than using all six indicators and potentially inflating the possibility of a Type I error, we focused on quantity and frequency as indicators of typical drinking, and peak drinks as an indicator of riskiest drinking. To reduce mild skewness, square-root transformations were used on both quantity and peak drinks for self as well as perceptions of drinking by close friends (i.e., indicators of norms). The initial PFI efficacy trial found that the intervention led to drinking reductions at 1 month relative to no-treatment controls while both conditions continued to show gradual decline through 9 months. Because intervention response was observed at the 1-month assessment only, latent difference score (LDS) models (see Selig & Preacher, 2009) focusing on change from baseline to 1 month post-intervention were used. In these models, a single latent variable representing change from baseline to the 1-month assessment is regressed onto the 1-month indicator, with the loading fixed at 1. Similarly, the influence of the baseline indicator on the 1-month indicator is also fixed at 1, allowing change over time to be captured in the mean and variance of the latent variable. Identical

LDS models were used for the mediator as well as the outcome, with change over time for the mediator being regressed on condition (the a path), change in the outcome being regressed on change in the mediator (the b path), and change in the outcome being regressed on condition (the c' path; see Figure 1). Whereas c' represents the direct effect of condition on change in the outcome while controlling for the mediator, the product of the a and b paths represents the indirect effect. Accordingly, code defining the indirect effect as the product of a and b was used to obtain exact estimates of the indirect effect, including confidence intervals (CIs) for that estimate, allowing for assessment of its significance. Separate models were conducted for each potential mediator (including norms indicators, PBS subscales, and drinking to cope motives).

Moderation—To determine for whom the intervention was most effective, a series of moderation models were examined. The moderation models included data from baseline, 1-month and 3-months follow-up. Latent growth modeling (LGM) was used to examine the initial intervention response (baseline to 1-month; slope 1: coded as 0, 1, 1) and maintenance over time (baseline to 3-months; slope 2: coded as 0, 0, 2 to represent 2 additional months passing). The inclusion of 1-month and 3-months timepoints permit for a more complete check of moderation, focusing on overall trajectory (both immediate change and initial maintenance) rather than simple change. To examine intervention response, overall consumption was represented with a series of latent variables representing all alcohol consumption indicators at that timepoint (i.e., a curve-of-factors model). Consistent with prior work using these data (Lau-Barraco et al., 2018), the latent variable consisted of drinking quantity, drinking frequency, number of heavy days, proportion of heavy drinking days, maximum number of drinks, and typical BAC. Loadings for each indicator were constrained to equality across time (see Figure 2). Each latent slope (i.e., the intercept, slope 1, and slope 2) was regressed onto condition (coded as 0 = *AO*, 1 = *PFI*). Gender was controlled for at baseline (with the exception of the model examining gender as a potential moderator). A multigroup analysis approach was used, whereby the structural parameter estimates for the latent growth model (i.e., the influence of condition on the latent slopes) were allowed to vary by group membership. For variables representing norms, PBS, and drinking to cope motives, median splits were used to define group membership (i.e., high or low in that construct). For age, the groups were defined as being under legal drinking age (i.e., younger than 21 years) or of legal drinking age (i.e., 21+ years). For each moderation model conducted, a companion model was used to determine if there was significant moderation. In this companion model, the effects of condition on latent growth variables (i.e., intercept, slope 1, slope 2) were constrained to equality across groups. Likelihood ratio tests for nested models using chi-square analyses indicated if constraining these parameters yielded significantly worse model fit (i.e., significant moderation) or not (i.e., no moderation).

All analyses were conducted using Mplus version 7.4 (Muthén & Muthén, 1998–2015). Outliers for the current study were identified using boxplots, then Winsorized (i.e., reduced to less extreme scores just above non-outliers while maintaining rank; Barnett & Lewis, 1994; Ruppert, 2006) to reduce their influence on outcomes. To allow for missing data, maximum likelihood estimation was used. To account for small departures from normality,

bootstrapping with $n = 5,000$ resamples was used, with 95% bias-corrected bootstrap CIs (BCCIs) that do not contain zero indicating significance at the $p < .05$ level.

Results

Boxplot examinations revealed 41 extreme values across 30 variables (i.e., 10 variables across three time points each), which were reduced to less extreme values. The two conditions did not significantly differ at baseline on age, gender, ethnicity, living situation, relationship status, employment, or having children. They also did not differ on either overall alcohol consumption or alcohol-related problems. For additional details, including missing data checks, see Lau-Barraco et al. (2018).

Mediation

Norms—As seen in Table 2, 95% BCCIs corresponding with $p < .05$ indicate that descriptive norms served as a mediator of the intervention effect in all three models. When both norms and alcohol use were operationalized as drinking quantity, those in the PFI condition reduced their norms regarding close friends' quantity at the 1-month follow-up relative to the AO group, $\beta = -0.167$, which in turn was associated with a stronger reduction in their own drinking quantity, $\beta = 0.486$, indicating an indirect effect on quantity through norms, $\beta = -0.081$. Similarly, when both norms and alcohol use were operationalized as drinking frequency (i.e., number of drinking days), those in the PFI condition reduced their norms regarding close friends' frequency of drinking at the 1-month follow-up relative to the AO group, $\beta = -0.230$, which in turn was associated with a stronger reduction in their own drinking frequency, $\beta = 0.694$, indicating an indirect effect on frequency through norms, $\beta = -0.160$. Finally, when both norms and alcohol use were operationalized as peak drinks, those in the PFI condition reduced their norms regarding close friends' peak drinks at the 1-month follow-up relative to the AO group, $\beta = -0.230$, which in turn was associated with a stronger reduction in their own peak drinking, $\beta = 0.212$, indicating an indirect effect on peak drinking through norms, $\beta = -0.049$.

PBS—As seen in Table 2, 95% BCCIs indicate that two dimensions of PBS served as mediators of the intervention effect for peak drinking outcomes. For manner of drinking PBS, those in the PFI condition increased their strategy use at the 1-month follow-up relative to the AO group, $\beta = 0.152$, which in turn was associated with a reduction in their highest number of drinks consumed, $\beta = -0.028$, indicating an indirect effect on peak drinks through manner of drinking PBS, $\beta = -0.004$. Similarly, for serious harm reduction PBS, those in the PFI condition increased their strategy use at the 1-month follow-up relative to the AO group, $\beta = 0.171$, which in turn was associated with a reduction in their highest number of drinks consumed, $\beta = -0.053$, indicating an indirect effect on peak drinks through serious harm reduction PBS, $\beta = -0.009$. No significant indirect effects were observed for stopping/limiting PBS or for total PBS, nor for the outcomes of drinking quantity and drinking frequency.

Drinking to cope motives—Also seen in Table 2, no significant indirect effects were observed for drinking to cope motives. This was true across drinking quantity, drinking frequency, and peak drinks.

Moderation

The right-hand columns of Table 3 contain the results of the likelihood ratio tests, indicating if there was significant moderation for the effect of intervention condition on growth trajectories. These indicate that model fit significantly worsened when parameter estimates were constrained to equality (i.e., significant moderation) for serious harm reduction PBS. In addition, age, norms frequency, and norms peak exhibited non-significant trends ($p < .10$). The influence of intervention condition on each latent growth variable (i.e., intercept, growth to 1-month [slope 1], and growth from 1-month to 3-months [slope 2]) for the unconstrained multigroup models are presented in Table 3 as well, for any likelihood ratio tests that exhibited significant misfit ($p < .05$).

For those high in serious harm reduction PBS at baseline, post-intervention reductions in drinking are significantly stronger for the intervention group than the assessment-only condition. Significant condition effects were not observed post-intervention for those low in serious harm reduction PBS at baseline. However, long-term declines (slope 2) were significantly stronger for the intervention group if people were low in harm reduction skills at baseline, and no condition effect were observed for slope 2 for the group high in serious harm reduction PBS. No significant moderating effects were found for stopping/limiting PBS, manner of drinking PBS, or total PBS.

No significant moderating effects were found for norms, drinking to cope motivations, age, or gender. However, several non-significant trends were observed. For age, drinking reductions post-intervention (slope 1) were more substantial for the intervention group among individuals of legal drinking age (i.e., 21+), an effect that did not reach statistical significance, $p < .10$ corresponding with a 90% BCCI $[-8.42, -0.71]$. Similarly, condition effects post-intervention (slope 1) were relatively stronger for individuals low in frequency norms at baseline ($\beta = -0.170$) than the high norms group ($\beta = -0.123$). Finally, condition effects post-intervention (slope 1) were stronger, and significant, for individuals who perceived their close friends to have higher peaks in drinking (peak norms).

Discussion

The present investigation sought to identify mechanisms of behavior change and to examine factors predicting intervention response in a brief alcohol intervention tailored to nonstudent drinkers. In general, evidence supports the efficacy of PFIs, but investigations on why and for whom such interventions work continues to be an area that warrants further study, particularly with noncollege young adult drinking populations. Our ultimate aim was to inform and improve the development of effective interventions that target a vulnerable group of drinkers. Toward this goal, the current research involved the analysis of data from Lau-Barraco et al.'s (2018) randomized controlled trial of a PFI for heavy drinking nonstudent young adults. Three factors were evaluated in mediating the influence of the intervention on drinking reduction: perceived drinking norms, PBS use, and drinking to cope motivations.

We also explored whether the intervention's impact on drinking reduction varied by these same factors as well as by age or gender to differentiate for whom the intervention was most efficacious.

Perceived peer drinking norms emerged as a significant mediator of intervention impact, supporting that one of the ways PFIs reduce drinking is indirectly through correcting misperceived drinking norms. We found that those in the PFI condition significantly reduced their perceptions of how much their close friends drink from baseline to one month following the intervention relative to the control group. This, in turn, was associated with a decrease in how much they themselves drank at 1-month follow-up. In addition to operationalizing norms as how much their peers drink, we also defined norms in terms of perceived frequency of peer drinking and also perceived norms of the peak number of drinks in a typical week. Both of these indices of norms were associated with reductions in drinking, such that the intervention was effective in reducing their norms regarding close friends' frequency of drinking and peak drinking, and this was associated with a corresponding decrease in their own drinking frequency and peak drinking, respectively. Our data support that normative perceptions appear to impact a range of drinking behaviors, including alcohol use quantity, frequency and high-risk consumption. Consistent with motivational theory (Miller, Toscova, Miller, & Sanchez, 2000), our findings support the notion that providing feedback regarding other nonstudents' drinking norms created sufficient discrepancy to trigger behavior change. In other words, by correcting misperceived norms regarding how much a typical nonstudent young adult drinks, this presumably led to self-evaluation of one's own drinking to be heavier than actual norms, and this comparison ultimately led to drinking reduction.

The salience of norms as a putative mediator in feedback interventions with college drinkers has garnered a strong body of support (see Reid and Carey, 2015). Whether norms also serve as a mechanism of action in alcohol interventions with noncollege young adult populations remains a needed area of investigation. Also, there currently is a lack of studies with nonstudent samples to determine the consistency of norms to operate as a mediator in feedback-based intervention trials across populations. A recent investigation found that descriptive norms mediated a BMI tested with underage noncollege drinkers (Magill et al., 2017). The current findings expand limited previous work by demonstrating that presentation of nonstudent-specific normative feedback is a salient ingredient in brief drinking interventions with nonstudent drinkers.

We found support for select PBS to mediate intervention efficacy on an index of risky drinking. Specifically, examining three sub-types of PBS as well as overall PBS use, evidence supported the mediational role of manner of drinking strategies (e.g., "drink slowly rather than gulp or chug", "avoid drinking games") and serious harm reduction strategies (e.g., "use a designated driver", "make sure that you go home with a friend"). Findings showed that receiving the intervention led to increases in use of these strategies one month following the intervention. This increase in PBS was then associated with a reduction in their peak drinking (i.e., highest number of drinks consumed) at 1-month follow-up. Mediation was not evident for stopping/limiting drinking strategies or total PBS, and there was no support for mediation by behavioral strategies for drinking quantity or frequency.

Although we did not find support for PBS to mediate typical drinking (quantity and frequency), the fact that PBS use mediated peak drinking is encouraging and important as this peak drinking represents a very risky form of drinking associated with serious physical harms (e.g., overdoses, blackouts, injuries; Gruenewald, Johnson, Light, & Saltz, 2003; Hingson, Zha, & White, 2017). Thus, efforts to decrease peak drinking specifically have the potential to reduce serious harms associated with high-risk drinking practices. Our findings for mediation by PBS use with nonstudents are consistent with the findings from a recent investigation of a BMI which found use of certain behavioral control strategies mediated subsequent heavy drinking frequency and related harms with underage noncollege drinkers (Magill et al., 2017). Thus, for nonstudents, providing and discussing a range of ways to limit drinking and minimize harmful drinking was successful in increasing their use of these strategies which then ultimately reduced their engagement in risky alcohol use.

We did not find support for drinking to cope motivations to mediate intervention effects. This finding is surprising given prior work indicating that many nonstudent drinkers drink for stress reduction and to cope with negative emotions (Lau-Barraco et al., 2017). One reason for the null finding may be due to our focus on alcohol consumption behavior rather than alcohol-related problems. Drinking to cope has been found to be more strongly associated with alcohol-related problems and extreme consumption patterns, over typical alcohol use (e.g., Carey & Correia, 1997; Gonzalez, Reynolds, & Skewes, 2011; Kuntsche, Knibbe, Gmel, & Engels, 2005). Further, our null finding may be related to our approach in assessing coping motives. Perhaps alternative ways to assess for negative reinforcement drinking are needed that consider distinctions in drinking to cope motives, including the consideration of drinking to cope that is more anxiety-driven or depression-driven (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). Finally, a recent investigation directly compared drinking to cope motives between college and non-college young adults and found that both groups exhibited positive associations between coping motives and alcohol problems; however, it was only among the college sample that coping motives mediated the pathway between depressed mood and alcohol problems (Kenney, Anderson, & Stein, 2018). Collectively, these findings highlight the complex nature of coping motivations, and it is an area that warrants additional research, particularly given the salience and harms associated with negative reinforcement drinking (e.g., Bravo et al., 2016; Park & Levenson, 2002).

Of the moderating factors examined, only PBS emerged as having a significant impact on group differences. In particular, of the three subtypes of behavioral strategies and total PBS, only serious harm reduction moderated effects in that participants who endorsed greater use of serious harm reduction strategies at pre-intervention benefitted more from the intervention. This finding is in contrast to our initial prediction that lower baseline levels of PBS use would be associated with better response because low PBS users would demonstrate the greatest acquisition of these skills given perhaps their lack of awareness of their potential benefits in reducing harmful drinking. However, our findings suggest that the intervention may capitalize on existing strengths in the use of harm reduction strategies and reinforce the strategies they already use. This finding will need to be replicated in future research but does highlight the potential utility of targeting nonstudents who engage in some level of harm-reduction strategy use at baseline as one way to maximize intervention efficacy with this population.

Regarding norms, though we found support for norms in mediating drinking, we did not find them to moderate group differences on drinking outcomes. Thus, response to the intervention was independent of their normative drinking perceptions assessed at baseline, and this suggests that similar interventional effects were observed in nonstudents with different degrees of misperceived norms before receiving the intervention. These findings are consistent with prior research with college students (Grossbard et al., 2016) and with adolescents (Paz Castro et al., 2017). However, our findings stand in contrast to a study that found a community-based sample of young adult men who overestimate drinking by others to have a more favorable response to an electronic feedback intervention (Bertholet et al., 2016). Additional research is needed to clarify the inconsistent results regarding the impact of norms.

Contrary to our prediction and prior findings with college drinkers (Young et al., 2016) and young adult veterans (Young et al., 2018), baseline endorsement of drinking to cope motives did not moderate efficacy of the intervention. Thus, regardless of whether an individual is a coping-motivated drinker, the feedback intervention had a similar impact on drinking outcomes. Regarding demographic factors, our hypothesis that gender and age status would moderate intervention efficacy was not supported, suggesting our intervention to be equally efficacious across nonstudent men and women and across young adults aged 18 to 25. Regarding gender, our findings are consistent with a number of studies showing no differential impact between college men and women (e.g., Murphy et al., 2012; Walters et al., 2009). The null finding regarding age is inconsistent with prior research indicating those in upper-class standing (Henson et al., 2015) or over the legal drinking age (Braitman & Lau-Barraco, accepted) show better response to alcohol intervention efforts.

The present study has limitations that warrant consideration. First, data were collected using retrospective self-reports during assessments, which may be susceptible to recall bias. However, confidentiality of the participants' responses was assured, and the validity of self-report measures related to alcohol use have been verified in previous research using transdermal alcohol assessments (Simons et al., 2015). Relatedly, these assessments spanned large time periods (e.g., behaviors for the past month), precluding a fine-grained examination to establish temporal associations among constructs (such as if reductions in PBS lead to drinking reductions, or vice versa). Ecological momentary assessment data should be used in future research to establish these temporal links. Second, generalizability of our study is limited to nonstudents without prior postsecondary education and who engage in heavy drinking but do not have a history of alcohol treatment. Thus, our findings may not be generalizable to individuals who attended college but did not graduate, and had greater alcohol use severity. Relatedly, our sample may not be representative of the larger nonstudent young adult drinking population given that only individuals who saw our study recruitment materials and attended the in-person meeting were included. However, individuals from both genders (65.9% men) and ethnic minorities (56%) were well represented in the current investigation. These demographic groups have been traditionally underrepresented in brief alcohol intervention research with young adults (e.g., Magill et al., 2017; Scott-Sheldon, Carey, Elliot, Garey, & Carey, 2014). Ultimately, diverse representation across demographic factors are likely to yield findings that are more generalizable and provide information that could help to reduce disparities in intervention

services based on race and/or gender. Third, the present study did not examine other often-implicated factors known to impact intervention efficacy (e.g., age of drinking onset, family history of alcoholism, readiness to change). Fourth, analyses used a latent variable of overall consumption, or only three indicators of drinking (i.e., quantity, frequency, peak drinking) in an effort to reduce inflation of Type I Error. It is possible that other effects may be found using other indices of drinking (e.g., binge drinking, typical eBAC). Finally, it is possible that our sample size did not provide sufficient power to detect significant results, particularly with the moderation analyses which split the sample into smaller groups. However, we present and discuss the results of non-significant trends ($p < .10$) for the moderation analyses, as not to miss any underpowered effects with potential clinical relevance.

The present investigation helped advance our understanding of drinking among nonstudent young adults for several reasons. Our results highlighted the value of addressing normative perceptions as well as certain behavioral strategies in brief interventions. We also contributed to a limited body of literature by identifying and establishing support for individual-level factors that could influence response in feedback interventions. Nonstudent drinkers are a vulnerable and understudied segment of the young adult population. The current study sought to fill a critical gap in our knowledge base of this at-risk group and represents an important step towards the overall goal of achieving parity and minimizing drinking-related harms disproportionately experienced by those with lower educational attainment.

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Figure 1.

Latent Difference Score (LDS) model assessing mediation. Note that (delta) represents “change in”, representing change from baseline to 1 month. Peak = maximum number of drinks on heaviest drinking day. Paths that are bold assess mediation, where a and b represent the indirect effect and c' indicates the direct effect.

Figure 2.

Piecewise latent growth models testing the feedback effect for overall consumption (a curve-of-factors model). Intervention condition was coded as 0 = *Assessment Only*, 1 = *Feedback*. Factor loadings with matching letters (i.e., matching outcome indicators) were constrained to equality. Gender was controlled for at baseline (with the exception of the model examining gender as a potential moderator), but is omitted from the figure for clarity. BAC = blood alcohol concentration.

Table 1

Descriptive Statistics for Study Variables over Time by Condition

	PFI				AO			
	Baseline M (SD)	1month M (SD)	3month M (SD)	Baseline M (SD)	1month M (SD)	3month M (SD)	Baseline M (SD)	3month M (SD)
Quantity	23.06 (20.17)	13.49 (13.68)	11.16 (12.27)	25.50 (23.07)	18.76 (16.67)	18.15 (17.23)		
Frequency	4.07 (1.74)	3.44 (2.40)	3.11 (2.53)	4.77 (2.02)	4.26 (2.20)	4.07 (2.55)		
Peak drinks	8.06 (7.02)	4.74 (3.82)	4.07 (3.53)	8.03 (7.90)	6.28 (4.73)	5.74 (4.91)		
HD days	2.12 (1.90)	1.25 (1.85)	1.09 (1.67)	2.31 (2.24)	1.93 (2.31)	1.31 (1.76)		
Proportion of HD days	0.51 (0.37)	0.32 (0.39)	0.29 (0.38)	0.45 (0.38)	0.40 (0.39)	0.28 (0.33)		
Typical BAC	0.068 (0.068)	0.043 (0.051)	0.035 (0.043)	0.062 (0.066)	0.053 (0.064)	0.057 (0.067)		
Norms: Quantity	29.24 (22.87)	16.33 (16.22)	13.48 (13.08)	32.93 (25.28)	22.75 (19.9)	19.91 (19.11)		
Norms: Frequency	4.60 (1.83)	3.59 (2.37)	3.58 (2.37)	5.17 (1.80)	4.59 (2.09)	4.14 (2.40)		
Norms: Peak drinks	9.08 (5.49)	5.28 (4.04)	4.90 (3.72)	9.28 (5.57)	7.73 (6.17)	6.84 (6.38)		
PBS: Stopping/Limiting	18.66 (6.40)	19.99 (7.72)	18.90 (7.72)	17.01 (6.02)	17.42 (7.46)	17.44 (7.50)		
PBS: Manner of Drinking	13.77 (4.04)	14.63 (4.42)	14.53 (4.27)	13.67 (4.16)	13.48 (4.31)	13.91 (4.03)		
PBS: Serious Harm Reduction	12.56 (2.42)	11.76 (3.03)	10.73 (3.94)	11.65 (2.71)	10.21 (3.97)	10.09 (4.28)		
PBS: Total	44.99 (9.22)	46.38 (12.62)	44.16 (13.21)	42.32 (10.06)	41.11 (12.72)	41.44 (12.67)		
Drinking to Cope Motives	12.81 (5.67)	11.50 (4.77)	11.35 (4.69)	13.83 (5.69)	12.16 (5.61)	12.68 (6.02)		

Note. PFI = personalized feedback intervention, AO = assessment only, HD = heavy drinking (defined as 4+ drinks for women, 5+ drinks for men), BAC = blood alcohol concentration, PBS = protective behavioral strategies. Each cell represents means with standard deviations in parentheses.

Table 2

Mediation Results: Exploring Norms and Protective Behavioral Strategies as Mediators of Intervention Effects on Alcohol Quantity, Frequency, and Highest Number of Drinks

Path	<i>b</i>	β	95% BCCI
Norms (Quantity)			
<i>a</i> : Condition $\rightarrow$ Norms-Quantity	−0.63 [*]	−0.167	[−1.25, −0.08]
<i>b</i> : Norms-Quantity $\rightarrow$ Quantity	0.41 [*]	0.486	[0.27, 0.56]
<i>c'</i> : Condition $\rightarrow$ Quantity	−0.40	−0.126	[−0.83, 0.00]
<i>ab</i> : indirect effect	−0.26 [*]	−0.081	[−0.56, −0.03]
Norms (Frequency)			
<i>a</i> : Condition $\rightarrow$ Norms-Frequency	−1.09 [*]	−0.230	[−1.85, −0.30]
<i>b</i> : Norms-Frequency $\rightarrow$ Frequency	0.69 [*]	0.694	[0.51, 0.83]
<i>c'</i> : Condition $\rightarrow$ Frequency	0.21	0.045	[−0.19, 0.64]
<i>ab</i> : indirect effect	−0.75 [*]	−0.160	[−1.35, −0.21]
Norms (Peak)			
<i>a</i> : Condition $\rightarrow$ Norms-Peak	−0.43 [*]	−0.230	[−0.74, −0.16]
<i>b</i> : Norms-Peak $\rightarrow$ Peak	1.39 [*]	0.212	[0.78, 2.14]
<i>c'</i> : Condition $\rightarrow$ Peak	−0.62	−0.020	[−1.77, 0.48]
<i>ab</i> : indirect effect	−0.60 [*]	−0.049	[−1.18, −0.18]
PBS (Stopping/Limiting)			
<i>a</i> : Condition $\rightarrow$ PBS-Stopping/Limiting	1.84	0.121	[−0.66, 4.42]
<i>b</i> : PBS-Stopping/Limiting $\rightarrow$ Quantity	−0.01	−0.031	[−0.04, 0.03]
<i>c'</i> : Condition $\rightarrow$ Quantity	−0.53 [*]	−0.176	[−1.16, −0.07]
<i>ab</i> : indirect effect	−0.01	−0.004	[−0.14, 0.04]
PBS (Stopping/Limiting)			
<i>a</i> : Condition $\rightarrow$ PBS-Stopping/Limiting	1.84	0.122	[−0.67, 4.42]
<i>b</i> : PBS-Stopping/Limiting $\rightarrow$ Frequency	−0.04	−0.137	[−0.10, 0.02]
<i>c'</i> : Condition $\rightarrow$ Frequency	−0.36	−0.092	[−1.02, 0.31]
<i>ab</i> : indirect effect	−0.06	−0.017	[−0.33, 0.02]
PBS (Stopping/Limiting)			
<i>a</i> : Condition $\rightarrow$ PBS-Stopping/Limiting	1.84	0.121	[−0.66, 4.42]
<i>b</i> : PBS-Stopping/Limiting $\rightarrow$ Peak	−0.06	−0.026	[−0.24, 0.11]
<i>c'</i> : Condition $\rightarrow$ Peak	−3.01 [*]	−0.035	[−5.45, −0.67]
<i>ab</i> : indirect effect	−0.11	−0.003	[−0.91, 0.12]
PBS (Manner of Drinking)			
<i>a</i> : Condition $\rightarrow$ PBS-Manner	1.22 [*]	0.152	[0.02, 2.50]
<i>b</i> : PBS-Manner $\rightarrow$ Quantity	0.02	0.050	[−0.05, 0.08]
<i>c'</i> : Condition $\rightarrow$ Quantity	−0.57 [*]	−0.189	[−1.06, −0.08]
<i>ab</i> : indirect effect	0.02	0.008	[−0.05, 0.14]
PBS (Manner of Drinking)			

Path	<i>b</i>	β	95% BCCI
<i>a</i> : Condition → PBS-Manner	1.22 *	0.152	[0.02, 2.50]
<i>b</i> : PBS-Manner → <i>Frequency</i>	-0.01	-0.026	[-0.11, 0.09]
<i>c'</i> : Condition → <i>Frequency</i>	-0.38	-0.099	[-1.07, 0.33]
<i>ab</i> : indirect effect	-0.02	-0.004	[-0.19, 0.10]
PBS (Manner of Drinking)			
<i>a</i> : Condition → PBS-Manner	1.22 *	0.152	[0.02, 2.50]
<i>b</i> : PBS-Manner → <i>Peak</i>	-0.29 *	-0.028	[-0.75, -0.00]
<i>c'</i> : Condition → <i>Peak</i>	-2.75	-0.033	[-6.07, 1.40]
<i>ab</i> : indirect effect	-0.35 *	-0.004	[-1.46, -0.01]
PBS (Serious Harm Reduction)			
<i>a</i> : Condition → PBS-SHR	1.28 *	0.171	[0.03, 2.51]
<i>b</i> : PBS-SHR → <i>Quantity</i>	-0.01	-0.022	[-0.09, 0.08]
<i>c'</i> : Condition → <i>Quantity</i>	-0.53 *	-0.177	[-1.02, -0.06]
<i>ab</i> : indirect effect	-0.01	-0.004	[-0.17, 0.09]
PBS (Serious Harm Reduction)			
<i>a</i> : Condition → PBS-SHR	1.28 *	0.171	[0.03, 2.51]
<i>b</i> : PBS-SHR → <i>Frequency</i>	-0.06	-0.114	[-0.17, 0.05]
<i>c'</i> : Condition → <i>Frequency</i>	-0.35	-0.090	[-1.04, 0.33]
<i>ab</i> : indirect effect	-0.08	-0.019	[-0.34, 0.04]
PBS (Serious Harm Reduction)			
<i>a</i> : Condition → PBS-SHR	1.28 *	0.171	[0.02, 2.51]
<i>b</i> : PBS-SHR → <i>Peak</i>	-0.59 *	-0.053	[-1.48, -0.02]
<i>c'</i> : Condition → <i>Peak</i>	-2.59	-0.031	[-5.70, 1.68]
<i>ab</i> : indirect effect	-0.75 *	-0.009	[-3.01, -0.002]
PBS (Total)			
<i>a</i> : Condition → PBS-Total	4.18 *	0.166	[0.07, 8.57]
<i>b</i> : PBS-Total → <i>Quantity</i>	-0.00	-0.009	[-0.03, 0.02]
<i>c'</i> : Condition → <i>Quantity</i>	-0.54 *	-0.178	[-1.04, -0.07]
<i>ab</i> : indirect effect	-0.01	-0.002	[-0.14, 0.07]
PBS (Total)			
<i>a</i> : Condition → PBS-Total	4.18 *	0.166	[0.08, 8.57]
<i>b</i> : PBS-Total → <i>Frequency</i>	-0.02	-0.126	[-0.06, 0.01]
<i>c'</i> : Condition → <i>Frequency</i>	-0.33	-0.086	[-1.01, 0.34]
<i>ab</i> : indirect effect	-0.08	-0.021	[-0.37, 0.03]
PBS (Total)			
<i>a</i> : Condition → PBS-Total	4.18 *	0.166	[0.08, 8.58]
<i>b</i> : PBS-Total → <i>Peak</i>	-0.00	-0.041	[-0.06, 0.04]
<i>c'</i> : Condition → <i>Peak</i>	-1.06	-0.031	[-2.33, 0.14]
<i>ab</i> : indirect effect	-0.01	-0.007	[-0.29, 0.14]
Drinking to Cope Motives			

Path	<i>b</i>	β	95% BCCI
<i>a</i> : Condition → Drinking-to-Cope	−0.25	−0.029	[−1.62, 1.08]
<i>b</i> : Drinking-to-Cope → <i>Quantity</i>	0.09*	0.256	[0.03, 0.15]
<i>c'</i> : Condition → <i>Quantity</i>	−0.51*	−0.169	[−0.95, −0.05]
<i>ab</i> : indirect effect	−0.02	−0.007	[−0.16, 0.09]
Drinking to Cope Motives			
<i>a</i> : Condition → Drinking-to-Cope	−0.25	−0.029	[−1.62, 1.08]
<i>b</i> : Drinking-to-Cope → <i>Frequency</i>	0.06	0.145	[−0.02, 0.15]
<i>c'</i> : Condition → <i>Frequency</i>	−0.36	−0.094	[−1.02, 0.33]
<i>ab</i> : indirect effect	−0.02	−0.004	[−0.16, 0.06]
Drinking to Cope Motives			
<i>a</i> : Condition → Drinking-to-Cope	−0.25	−0.029	[−1.62, 1.08]
<i>b</i> : Drinking-to-Cope → <i>Peak</i>	0.04	0.004	[−0.56, 0.41]
<i>c'</i> : Condition → <i>Peak</i>	−3.18	−0.038	[−6.51, 0.73]
<i>ab</i> : indirect effect	−0.01	0.000	[−0.53, 0.31]

Note. 95% BCCI = 95% bias-corrected bootstrap confidence intervals, = change in, PBS = protective behavioral strategies, SHR = serious harm reduction. Confidence intervals are for unstandardized estimates. Significant effects at the $p < .05$ level are indicated with bold text.

*
 $p < .05$

Table 3
Moderation Results: Influence of Intervention Condition on Consumption by Moderator Group

Moderator	Low			High			χ^2	<i>p</i>
	<i>b</i>	β	95% BCCI	<i>b</i>	β	95% BCCI		
Age (<21 [low] versus 21+ [high])							7.16	.067
<i>Intercept</i>	-16.01 *	-0.358	[-33.30, -2.47]	2.13	0.059	[-4.57, 7.74]		
<i>Growth to 1 month</i>	4.31	0.147	[-3.34, 18.35]	-4.25	-0.202	[-9.16, 0.01]		
<i>Growth to 3 months</i>	1.18	0.086	[-1.49, 3.90]	-2.24	-0.154	[-5.64, 1.31]		
Gender							0.59	.898
Norms (Quantity)							3.94	.268
Norms (Frequency)							6.61	.085
<i>Intercept</i>	3.04	0.117	[-4.18, 8.52]	-1.33	-0.033	[-10.28, 7.59]		
<i>Growth to 1 month</i>	-4.05	-0.170	[-9.52, 1.28]	-2.36	-0.123	[-9.21, 3.28]		
<i>Growth to 3 months</i>	0.77	0.078	[-0.46, 2.85]	-4.21	-0.235	[-9.38, 0.63]		
Norms (Peak)							6.50	.090
<i>Intercept</i>	-0.87	-0.053	[-5.32, 2.73]	-1.56	-0.048	[-8.99, 5.57]		
<i>Growth to 1 month</i>	-0.50	-0.038	[-4.26, 4.82]	-6.91 *	-0.268	[-13.63, -0.52]		
<i>Growth to 3 months</i>	0.16	0.029	[-0.96, 1.33]	-1.20	-0.066	[-6.79, 4.48]		
PBS Stopping/Limiting							0.78	.854
PBS Manner of Drinking							0.85	.838
PBS Serious Harm Reduction							12.00 *	.007
<i>Intercept</i>	-4.25	-0.114	[-12.40, 3.15]	6.72	0.219	[-0.39, 14.99]		
<i>Growth to 1 month</i>	-1.49	-0.070	[-6.62, 3.11]	-6.81 *	-0.314	[-15.38, -0.83]		
<i>Growth to 3 months</i>	-3.06 *	-0.196	[-5.48, -1.11]	2.17	0.220	[-1.11, 7.55]		
PBS Total							2.16	.540
Drinking to Cope Motives							2.27	.518

Note. 95% BCCI = 95% bias-corrected bootstrap confidence intervals, PBS = protective behavioral strategies.

* $p < .05$ (as indicated by 95% BCCIs that do not contain zero for effect of intervention condition on growth slope).