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The Influence of a Brief Alcohol Intervention on Alcohol Use Trajectories in Nonstudent Emerging Adult Drinkers

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Abstract

Background—This study sought to inform research with noncollege-attending emerging adults, an at-risk and understudied population, by identifying patterns of response following a brief alcohol intervention. The present study was a reanalysis of data from a randomized controlled intervention trial testing a brief, personalized feedback alcohol intervention targeting nonstudent emerging adult drinkers.

Objectives—Study aims were to (1) model intervention response by identifying subgroups characterized by changes in heavy drinking (i.e., peak use, number of binges during a typical week, proportion of binge days, peak estimated blood alcohol concentration [eBAC]) following the alcohol intervention, and (2) distinguish subgroups on factors related to intervention response (i.e., perceived norms regarding how much peers drink, alcohol use severity, mental health symptoms, and readiness to change).

Methods—Participants were 81 (64.2% men) nonstudent heavy drinkers between ages 18 to 25 years (average age = 22.04) recruited from the community.

Results—Findings revealed two latent subgroups that exhibited differential response to the intervention (i.e., intervention “responders” and “nonresponders”). Further, responders reported higher pre-intervention descriptive normative perceptions and alcohol use severity.

Conclusions/Importance—The current investigation contributed to knowledge regarding for whom brief alcohol interventions work in the short term within nonstudent emerging adults and could inform future research to facilitate behavior change in those unresponsive to intervention efforts.

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Keywords

alcohol intervention; heavy drinking; nonstudents; noncollege; growth mixture modeling; intervention response

Emerging adults (ages 18–25) with lower educational attainment report higher rates of heavy episodic drinking compared to their college-attending peers (Hingson, Zha, & Smyth, 2017) and may be more likely to develop an alcohol use disorder later in adulthood (Barnett et al., 2003; Lanza & Collins, 2006; Muthén & Muthén, 2000; White, Labouvie, & Papadaratsakis, 2005). Though numerous intervention and treatment studies administered outside of academic settings exist (see Davis, Smith, & Briley, 2017), there is a lack of research targeting nonstudent emerging adult drinkers despite their risk. Given that nonstudents may experience prolonged drinking-related harms (Evans-Polce, Maggs, Staff, & Lanza, 2017) and may benefit less from existing alcohol programs than college-attending peers of the same age (Davis et al., 2017), efforts to develop effective interventions that are tailored for nonstudents are needed.

Recently, Lau-Barraco, Braitman, and Stamates (2018) assessed the efficacy of a personalized feedback intervention (PFI) tailored for nonstudent heavy drinkers, which was based on formative research (Lau-Barraco, Linden-Carmichael, Hequembourg, & Pribesh, 2017). Lau-Barraco and colleagues (2018) found that the PFI led to one month reductions in alcohol use compared to an assessment-only control group, and both conditions reduced drinking over nine months. In a follow-up study (Lau-Barraco, Braitman, Linden-Carmichael, & Stamates, 2018), moderators of the PFI were examined. Of the moderating factors tested (i.e., descriptive drinking norms, protective behavioral strategies [PBS], drink to cope motivations, age, gender), only PBS was supported. Although the investigation found limited moderating effects using a traditional *variable-centered* approach, an exploratory *person-centered* approach may better identify who benefited most from the intervention.

One person-centered approach includes Growth Mixture Models (GMMs; Muthén et al., 2002), which explores unique, longitudinal data patterns to identify heterogeneity in intervention response among drinkers. GMMs indicate the number of subgroups that best fit the data, including each participant's probabilistic estimate of group membership, and determine growth trajectory for each subgroup. Prior work using GMM to identify post-intervention drinking patterns is limited and mainly focused on college students or more severe drinkers. Among college students, multiple distinct groups have been identified, as Henson, Pearson, and Carey (2015) found six subgroups that differed in response to alcohol intervention and Mun, White, and Morgan (2009) identified four subgroups whereby intervention effects were strongest for those with greater problematic drinking at baseline. Among community samples, distinct groups have also been identified, as Witkiewitz and Masyn (2008) revealed three subgroups of drinkers following relapse post-intervention and Beadnell, Crisafulli, Stafford, and Casey (2016) found two low- and two high-risk groups that varied in intervention response. Thus, research supports heterogeneity in intervention response, but to our knowledge, has not identified subgroups of nonstudent emerging adults

post-intervention. GMM would provide a more fine-grained understanding of intervention response in this at-risk population.

Heterogeneity in intervention response may be related to key psychological variables. Specifically, perceived drinking norms, alcohol use severity, mental health symptoms, and readiness to change (RTC) have been associated with drinking following intervention in young adults. Descriptive drinking norms are perceptions of how much peers drink and are the most consistently supported mediator associated with improved intervention response among college-attending emerging adults, with decreases in norms related to improved outcomes (Reid & Carey, 2015). Further, interventions may be more efficacious for individuals with greater alcohol use severity (Baumann et al., 2018; Mun et al., 2009). Mental health problems are associated with greater alcohol use (e.g., Geisner, Larimer, & Neighbors, 2004; Weitzman, 2004) and may limit the effectiveness of intervening efforts (e.g., Burns, Teesson, & O'Neill, 2005; Merrill, Reid, Carey, & Carey, 2014). Lastly, greater RTC has been associated with stronger intervention effects (e.g., Carey, Henson, Carey, & Maisto, 2007). Examination of these factors would shed light on who is most likely to benefit from intervention.

The present study was a reanalysis of data from an intervention study testing a PFI for nonstudent, emerging adult drinkers (Lau-Barraco et al., 2018¹). This initial study found significant short-term change (1 month) in drinking in the active intervention group but intervention effect was attenuated in later time points (6 and 9 months), which is generally consistent with the brief motivational interventions with college drinkers (Huh et al., 2015). Despite the lack of long-term, sustained impact of the intervention, there are benefits to examining intervention responsiveness, even in the short-term. One is that heavy drinking is a prevalent problem, peaking in emerging adulthood (Substance Abuse and Mental Health Services Administration [SAMHSA], 2014), and is associated with a magnitude of negative consequences that could be enduring and even fatal (e.g., alcohol-related car crashes, physical and sexual assaults, sexually transmitted diseases, and legal involvement; Hingson, Zha, & Weitzman, 2009; Wechsler & Nelson, 2008). From a public health standpoint, even brief impact on one's drinking could have meaningful benefits to those receiving the intervention and may also have a population-level impact if such interventions are disseminated widely. Another benefit is that any effort toward increasing our knowledge base on drinking interventions with nonstudents is needed. There is a growing body of research supporting nonstudents' vulnerability to drinking-related harms (e.g., Harford, Yi, & Hilton, 2006; Lau-Barraco, Braitman, Stamates, & Linden-Carmichael, 2016; White et al., 2005), but this group has been understudied. Thus, efforts to identify who is most likely to respond to intervention efforts could guide intervention refinement and may potentially inform research aiming to bolster potency of brief interventions and to develop strategies to maintain their impact long-term. Consequently, we aimed to (1) identify subgroups characterized by changes in heavy drinking (i.e., peak use, number of binges during a typical week, proportion of binge days, peak estimated blood alcohol concentration [eBAC]) following a brief alcohol intervention, and (2) distinguish subgroups on factors related to intervention response. We hypothesized that there would be heterogeneity in post-intervention drinking patterns. We also expected that higher norms (i.e., greater estimation

of peer drinking), higher alcohol use severity, and higher RTC, as well as lower mental health symptoms, would be associated with more favorable intervention response.

Method

Participants and Procedure

Data were drawn from a pilot randomized controlled trial of a PFI tailored to nonstudent heavy drinkers between 18–25 years recruited from the community (see Lau-Barraco et al., 2018 for complete eligibility criteria and procedures). This parent trial consisted of 164 participants randomly assigned to either a PFI or an assessment-only control group.

The PFI involved providing personalized feedback regarding the person's alcohol consumption, alcohol-related consequences, and personal risk factors. It also included didactic material related to alcohol (e.g., tolerance) and drinking moderation strategies. Through formative research with the nonstudents, the PFI was tailored for nonstudents by addressing stress management, co-morbid substance use, nonstudent-specific normative drinking comparisons, and goal attainment. The PFI was delivered within the context of a 50–60 minute brief motivational interview session. Participants in the assessment-only group did not receive the intervention, but attended an in-person meeting and completed the same assessment measures as the PFI group.

Because the aim of the current investigation was to model intervention response, the sample was restricted to those receiving the PFI ($n = 90$). However, of the 90 participants, nine individuals were omitted due to missing data on one or more covariates (five individuals did not report race, three did not report age, and two did not report income). Thus, the resulting sample was 81 (64.2% men) nonstudents with a mean age of 22.04 ($SD = 2.09$) years. The majority identified as Caucasian (46.9%) or African American (44.4%) and single/never married (67.9%). Participants completed online follow-up surveys at 1, 3, 6, and 9 months, but the present study only used data from 1 and 3 months given the lack of intervention effect observed at 6 and 9 months (Lau-Barraco et al., 2018). Informed consent for the study was obtained from participants prior to the parent study.

Measures

The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) assessed typical weekly alcohol use over the past three months. The Alcohol Use Disorder Identification Test (AUDIT; Babor, de la Fuente, Saunders, & Grant, 1992; baseline $\alpha = .78$) assessed alcohol severity. The Descriptive Norms Rating Form (DNRF; Baer, Stacy, & Larimer, 1991) measured participants' perceived weekly number of drinks consumed by "closest friends of the same gender." The Readiness to Change Questionnaire – action subscale (RTCQ; Rollnick, Heather, Gold, & Hall, 1992; α at baseline = .79, 1-month = .85, 3-month = .90) assessed motivation to change drinking (e.g., Heather, Rollnick, & Bell, 1993). The Brief Symptom Inventory-18 (BSI-18; Derogatis, 2000; α at baseline = .92, 1-month = .97, 3-month = .97) assessed mental health symptoms (i.e., anxiety, depression, somatization).

Data Analytic Plan

All analyses were conducted using Mplus version 7.4 (Muthén & Muthén, 1998–2012) using maximum likelihood estimation with robust standard errors. Extreme outliers were winsorized (Barnett & Lewis, 1994) to match the next highest value. Nine individuals were omitted from analysis due to missing data, which resulted in a final sample of 81 participants. Power and sample size calculations were conducted for the original efficacy examination (Lau-Barraco et al., 2018) rather than the current study aim to examine intervention response trajectories.

Latent class growth analysis was used to identify profiles of intervention participants based on several high-risk drinking indicators (see Figure 1) that were combined into a single latent variable for each timepoint. The drinking indicators for the high-risk drinking latent variable included (1) heaviest number of drinks during a typical week (“peak alcohol use”), (2) number of binge drinking episodes in a typical week (“number of binges”), (3) proportion of drinking days that involved binge drinking (“proportion of binge days”), and (4) eBAC during one’s heaviest drinking occasion during a typical week (“peak eBAC”) at each timepoint. Loadings were constrained to equality across time. Growth model parameters should be interpreted with respect to the peak alcohol use metric. The latent growth model (LGM) was specified with an intercept and two slopes: the intervention effect (i.e., changes from baseline to 1-month follow-up) and maintenance effect (i.e., changes from 1-month to 3-month follow-up) for the intervention participants were examined with respect to latent class. The LGM intercept was allowed to vary freely both across and within classes; and all baseline, 1-month, and 3-month latent high-risk drinking variances were fixed to zero. LGM slopes were fixed within class (i.e., different slopes for different classes, but variances fixed to zero). Sex, age, race, and individual income were included as covariates in the model.

Several fit indices were used to determine the optimal number of classes. This included Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), and the sample size-adjusted BIC, in which lower numbers indicate better model fit. Entropy statistics were used to examine level of classification accuracy (ranging from 0 to 1), with higher values indicating greater accuracy. The bootstrapped likelihood ratio test (BLRT) also was used to determine if the current class solution (k) fits better than a model with one fewer class ($k - 1$). Once the best fitting model was identified, classes were compared based on drinking norms, alcohol use severity, RTC, and mental health using a three-step approach in Mplus (Asparouhov & Muthén, 2013). Descriptive statistics are presented in Table 1.

Results

Latent Classes

A 1- to 5-class solution was compared based on several fit indices (see Table 2). Results revealed that although the 3-class model yielded slightly improved fit and a significant BLRT, one of the classes was too small (4.4%; $n = 4$) to reliably interpret. In addition, the 4- and 5-class solutions failed to converge properly. Consequently, a 2-class solution was found to represent the best fit for the data. As can be seen in Figure 2, Class 1 ($n = 33$; 40.74%) or

“intervention responders” represented a class of individuals who exhibited an intervention effect, such that high-risk drinking decreased from baseline to the 1-month follow-up, $b = -3.58$, $p < .001$. This group did not significantly further reduce their drinking at the 3-month follow-up, $b = -0.29$, $p = .491$ indicating that they experienced a maintenance effect for drinking reductions. Class 2 ($n = 48$; 59.26%) or “intervention nonresponders” was composed of individuals who did not exhibit any changes in high-risk drinking behavior from baseline to 1-month follow-up, $b = -0.64$, $p = .112$ or from 1-month to 3-month follow-up, $b = -0.28$, $p = .145$.

Latent Class Comparisons

The two classes were compared on the mean value of several baseline variables. Class membership significantly predicted baseline perceived drinking norms and alcohol use severity. Specifically, at baseline, drinking norm perceptions were higher for intervention responders ($M = 37.20$, $SE = 4.25$) than intervention nonresponders ($M = 22.64$, $SE = 2.62$), $\chi^2 = 8.40$, $p = .004$. Intervention responders reported significantly higher alcohol use severity at baseline ($M = 15.35$, $SE = 1.20$) than intervention nonresponders ($M = 10.52$, $SE = 0.87$), $\chi^2 = 10.28$, $p = .001$. Class membership did not differ based on RTC, $\chi^2 = 0.40$, $p = .526$ or mental health symptoms, $\chi^2 = 2.23$, $p = .135$.

Discussion

The overall goal of this study was to inform intervention research with noncollege emerging adults and to elucidate patterns of intervention response in this population. Given that prevention findings from college student samples do not necessarily generalize to nonstudent populations (Davis et al., 2017), research efforts are needed to better understand how nonstudents are influenced by alcohol interventions.

Two primary findings emerged from our investigation. First, results showed heterogeneity in intervention response. We identified two latent subgroups that exhibited differential response to the intervention. The intervention responders class (40.74%) exhibited a significant decrease in drinking at 1-month, and remained stable at 3-month following the intervention. The intervention nonresponders class (59.26%) did not show decreases in drinking at either follow-up timepoint and represent those nonresponsive or resistant to efforts to change their drinking. Similar to prior studies with college (Henson et al., 2015; Mun et al., 2009), dependent (Wikiewitz & Masyn, 2008), or court-ordered (Beadnell et al., 2016) samples, we found heterogeneous subgroups in intervention response. However, our study identified two classes whereas prior studies ranged from three to six classes. One potential explanation for this contrast may be related to differences in sample characteristics, with prior studies differing in educational status, level of alcohol use severity, or mandated status. Further, the specific set of inclusion criteria for participation in the present study (e.g., 18–25 years old, no history of postsecondary education, 2+ recent heavy drinking episodes) may have restricted the range of potential intervention response. Finally, the difference in latent classes may be due to the smaller sample size in the present study (prior studies had samples ranging from 348 to 1183).

A second major study finding was that the latent classes differed on two critical constructs. We found descriptive normative perceptions and alcohol use severity to be unique predictors of intervention response. Responders reported higher norms and greater drinking severity at pre-intervention. Thus, nonstudents perceiving greater peer drinking and being a more at-risk drinker were most likely to benefit from brief intervention in the short term in the present study. Prior support for descriptive norms to moderate intervention efficacy has been limited and inconclusive. Some research supports overestimates of perceived drinking norms to be related to greater intervention efficacy (Bertholet et al., 2016; Henson et al., 2015) while others do not support norms to moderate intervention impact (Castro, Haug, Kowatsch, Filler, & Schaub, 2017; Grossbard et al., 2016). In our own prior work with the same data set, we did not find norms to moderate group differences (intervention vs. assessment-only control) on drinking outcomes when utilizing a more traditional variable-centered approach (Lau-Barraco et al., 2018). However, the more nuanced view of a person-centered approach taken in the present investigation revealed elevated baseline norms to be associated with the class demonstrating stronger intervention responsiveness. Norms have been consistently found to be a mediator in feedback-based interventions (Reid & Carey, 2015), and our findings add to the small number of studies supporting heightened norms as a predictor related to whether an individual is likely to change their alcohol use following an intervention. Overall, perceptions of drinking by one's peers appear to be critical in how well a brief feedback intervention works in the short term to reduce drinking and serve as a potential key mechanism of action in alcohol feedback-based programs.

Our finding that greater baseline alcohol use severity was related to improved intervention response is consistent with prior research (e.g., Baumann et al., 2018). The responder class had an average pre-intervention AUDIT score of 15.34, and the nonresponder class reported an average AUDIT score of 10.52. While both fall above the recommended cut-off score of 8, indicating harmful alcohol use (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), the responder class scored significantly higher. Thus, the most problematic drinkers in our sample were the most responsive to the intervention. In light of this finding, a practical clinical implication is that agencies working with nonstudent emerging adult drinkers who wish to maximize limited resources could specifically identify high-risk level drinkers, as they may benefit most from intervention efforts.

A concern that emerged from our analysis is the subgroup of nonresponders (class 2). These are nonstudent drinkers who did not exhibit any change following the intervention. Considering that the nonresponder class consisted of 59% of the sample, additional research is warranted to better understand this group of intervention-resistant drinkers and how best to intervene to elicit change. It may be that additional intervention components may be necessary (e.g., ongoing contact with interventionist; integration of in-person with remote contact) or that an entirely new approach is needed. This is a critical area of future research.

The limitations of this study should be considered. First, a larger sample size would likely increase statistical power to detect subgroup differences and more robust estimates to identify latent classes that had few observations. It is possible that additional classes may exist in the underlying population but our identification of two latent classes is consistent with prior work (Mun et al., 2009) whereby multiple groups were collapsed into two larger

groups (i.e., “improved” vs. “non-improved”). Second, we relied strictly on self-report data; however, research supports the validity of self-reported alcohol consumption (Simons, Wills, Emery, & Marks, 2015). Third, the 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.

Despite these limitations, the present research expanded the limited literature focusing on intervention response in the short term with an understudied population. Our findings contributed to knowledge regarding for whom brief alcohol interventions work and could guide future research to facilitate behavior change in those not responsive to current intervention efforts.

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Figure 1.

Latent class growth analysis used to determine sub-groups based on high-risk drinking indicators following intervention. Sex, age, race, and individual income were included as covariates but are not displayed here for simplicity. Factor loadings with matching letters were constrained to equality. eBAC = estimated blood alcohol concentration.

Figure 2. Unstandardized results from the 2-class solution regarding high-risk drinking behavior following intervention.

Table 1

Descriptive Statistics of Latent Class Indicators by Latent Class

	Class 1 <i>M(SD)</i>	Class 2 <i>M(SD)</i>
Peak Alcohol Use		
Baseline	10.79 (6.87)	5.31 (2.91)
1-month	6.48 (3.71)	3.32 (2.93)
3-month	5.91 (3.48)	2.42 (2.39)
Number of Binges		
Baseline	3.64 (1.92)	1.10 (1.08)
1-month	2.26 (2.33)	0.51 (0.87)
3-month	2.00 (2.02)	0.26 (0.58)
Proportion of Binge Days		
Baseline	0.91 (0.14)	0.25 (0.21)
1-month	0.55 (0.40)	0.18 (0.33)
3-month	0.55 (0.40)	0.10 (0.26)
Peak eBAC		
Baseline	0.19 (0.16)	0.09 (0.08)
1-month	0.10 (0.09)	0.06 (0.06)
3-month	0.08 (0.08)	0.05 (0.06)

Note. eBAC = estimated blood alcohol concentration.

Table 2

Summary of Model Fit for Latent Profile Models

Classes:	AIC	BIC	Adjusted BIC	Relative Entropy	BLRT <i>p</i>	Percentage of smallest group
1	1321.51	1390.95	1299.49	--	--	--
2	1292.47	1371.49	1267.42	.91	<.001	42%
3	1280.15	1368.75	1252.06	.91	<.001	5%
4	1242.06	1340.23	1210.93	.99	<.001	21%
5	1200.55	1308.30	1166.39	1.00	<.001	12%

Note. AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, BLRT = bootstrapped likelihood ratio test.