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Effects of Normative Feedback for Drinkers Who Consume Less than the Norm: Dodging the Boomerang

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Abstract

A number of alcohol interventions designed for college students attempt to correct exaggerated perceptions of alcohol use on college campuses through the use of personalized normative feedback. Personalized normative feedback has been shown effective in reducing drinking both as a stand-alone intervention and as a part of a multi-component intervention. Typically, this feedback is targeted to heavier drinkers, in order to create a discrepancy between their personal beliefs and behavior and the actual lower levels of use on campus. However, little is known about how this form of normative feedback might affect lighter drinkers who learn that they are drinking less than the typical student at their school. The risk is a potential boomerang effect, or an increase in drinking among lighter drinkers receiving personalized feedback. The current study examined four samples from three geographic locations, two employing computer delivered personalized normative feedback alone and two delivering personalized feedback in the context of a brief motivational intervention. We found no evidence for a boomerang effect among lighter drinkers receiving personalized normative feedback in any of the four samples. These findings help to assuage fears of increasing drinking among lighter drinkers through widespread implementation of normative interventions for college students in the absence of screening for current drinking status.

Although the majority of college students are underage, an estimated 80% have consumed alcohol and 36% have had five or more drinks in a sitting in the past two weeks (Johnston, O'Malley, Bachman, & Schulenberg, 2011). Negative consequences associated with heavy alcohol use are also prevalent among college students. Arrests for liquor law violations on campuses have steadily increased (Hoover, 2005), and alcohol use contributes to 599,000 injuries and 1,825 deaths among college students each year (Hingson, Zha, & Weitzman, 2009). To address these negative consequences, targeted interventions have successfully

reduced alcohol use and alcohol-related problems among college students (Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012).

Personalized normative feedback has been widely incorporated into alcohol risk reduction interventions for college students. Generally, personalized normative feedback seeks to compare three pieces of information: (a) an individual's own alcohol use, (b) the individual's perceptions of the descriptive norms in his or her environment, that is, perceptions of the extent of alcohol use among peers, and (c) the actual descriptive norm in the environment, typically an estimate of alcohol use among peers derived from surveys. The goal of normative feedback is to highlight discrepancies between an individual's behaviors and perceptions and the prevailing population norms. Research supports that this is an effective means for reducing alcohol use when used alone (Lewis & Neighbors, 2007; Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007; Neighbors, Larimer, & Lewis, 2004; Neighbors et al., 2010) or in multicomponent interventions (Carey, Scott-Sheldon, Carey, & DeMartini, 2007).

Alcohol risk reduction interventions differ in the subset of the student body they intend to reach. Prevention interventions designed for universal delivery might target all undergraduates; selective prevention may target a high risk group (such as all incoming freshmen), and indicated prevention targets students demonstrating some problems, such as those who have violated campus alcohol policy (cf. Muñoz, Mrazek, & Haggerty, 1996). Norms based interventions have been utilized across these levels of prevention (Reid, Cialdini, & Aiken, 2010). When interventions target heavy drinking or high risk students, most would be expected to exhibit personal behavior that suggests greater alcohol use than the descriptive norm. As a result, the population descriptive norm should serve its intended purpose among these individuals, providing downward corrective influence on both exaggerated perceived norms as well as personal use that exceeds the population norm. But what about individuals who are light or moderate drinkers, for whom personalized normative feedback may reflect a descriptive norm that is actually higher than their personal alcohol use? This would be expected to occur among 50% of the population when interventions are universally delivered, or among a minority of students who find themselves in an indicated prevention intervention despite their lighter drinking, perhaps because they were in the "wrong place at the wrong time." Rather than remaining at a low level of alcohol use, it is possible that these individuals who are exposed to a descriptive norm that is higher than their typical rate of drinking may actually *increase* their alcohol use in response to learning the true norm.

This type of negative treatment outcome (i.e., increasing alcohol use following an intervention) is often referred to as an iatrogenic effect. Iatrogenic effects have been well documented in response to alcohol prevention programs (Werch & Owen, 2002) as well as in response to psychosocial interventions (Moos, 2005). However, limited research has examined iatrogenic effects of norms-based interventions for college drinking.

Schultz and colleagues (2007) documented iatrogenic effects in the context of normative feedback and used the term "boomerang effect" to describe an increase in energy usage in response to receiving normative feedback regarding household energy use. Households that

received information indicating that they used more energy than the descriptive norm for their neighborhood demonstrated the desired effect and subsequently reduced their household energy use. However, a boomerang effect was observed among households that received feedback indicating that they used *less* energy than the descriptive norm for their neighborhood—these households subsequently *increased* their energy use. The boomerang effect was ameliorated by including an injunctive norm – in this study conveyed by a smiley face conveying a positive evaluation and approval of lower levels of energy use. When the descriptive and injunctive norms were coupled, households that used less energy than the descriptive norm for their neighborhood remained low in their energy use.

There has been mixed evidence for iatrogenic effects of descriptive norm interventions on college student drinking. Wechsler et al. (2003) compared 37 colleges nationwide that had implemented social norms campaigns to reduce alcohol use with 61 colleges that had not. Colleges with social norms campaigns experienced increased alcohol use and very heavy consumption (20 or more drinks) in the past month. However, it is unclear whether these increases in drinking were due to the social norms campaigns or to differential responding by heavier versus lighter drinking individuals at different assessments, or other factors. Larimer and colleagues (2007) evaluated the efficacy of a multicomponent mailed intervention that included descriptive norm feedback. Abstainers, who could have shown a boomerang effect after receiving descriptive norm feedback, did not demonstrate increased likelihood for subsequently becoming drinkers. Rather, abstainers who received the intervention were more likely to still be abstainers one year later than were abstainers in the control group. The lack of a boomerang effect in this context may reflect that the multicomponent (e.g., BAC feedback, protective behavioral strategies) content of the mailed intervention that may have invoked an injunctive norm of approval for abstaining, which would be expected to mitigate a boomerang effect (Schultz et al., 2007). However, this study did not report the outcomes of lighter drinkers, who might have been more likely to increase drinking than abstainers were to initiate drinking.

Given these mixed results and the relatively few studies that have reported on treatment response among lighter drinkers, it is unclear whether we should be concerned about the potential for boomerang effects in alcohol interventions. As the use of personalized normative feedback interventions becomes more widespread (Reid, Cialdini, & Aiken, 2010), it is important to understand whether such interventions may have detrimental effects on the behaviors of abstainers and lighter drinkers. To the extent that many colleges and universities implement alcohol risk reduction programming for all incoming students, which often incorporate some type of descriptive norms feedback, the existence of boomerang effects among abstainers and light drinkers could pose a serious public health concern.

To our knowledge only one study has previously examined the effects of normative feedback specifically on abstaining and lighter drinking students (Neighbors et al., 2011). Normative feedback was associated with a reduction in drinks per week relative to a control group. However the personalized feedback was modified intentionally to prevent boomerang effects (e.g., you are among the 81% of students who drink moderately or not at all) and cannot rule out the possibility of boomerang effects for personalized normative feedback as it is typically delivered.

The present research examined whether boomerang effects exist in alcohol risk reduction interventions for college students that employ personalized normative feedback. We conducted secondary analyses on four separate trials of feedback-based interventions to examine the existence of such effects. Two studies examined personalized descriptive norm feedback as the sole active ingredient in a computer-delivered intervention (Neighbors et al., 2004; Neighbors, Lewis, Bergstrom, & Larimer, 2006); two examined personalized descriptive norm feedback in the context of a multi-component, brief motivational, BASICS-style intervention delivered by a counselor (Carey, Carey, Henson, Maisto, & DeMartini, 2011; Carey, Carey, Maisto, & Henson, 2006). Each of these studies compared intervention and assessment-only control conditions and reported significant drinking reductions associated with the interventions.

However, we chose these studies for reanalysis because the modality of intervention delivery may influence lighter drinkers' response to normative feedback. Unlike the computer-delivered feedback, counselor-delivered feedback is often paired with affirmations for low consumption or less risky use patterns, essentially providing the mitigating injunctive approval shown to be effective in the Schultz et al. (2007) study. It follows then that boomerang effects may be most likely to occur: (a) in descriptive norm only rather than multi-component interventions, where additional active ingredients are not present to counteract any boomerang effects; and (b) in computer-delivered rather than counselor-delivered interventions, where a counselor is not present to provide approval for and reinforce low levels of alcohol use. Thus, we hypothesized that, among participants in the descriptive norm only, computer-delivered interventions, individuals who drank less than the presented peer descriptive norm would subsequently increase their alcohol use, relative to baseline levels of use. We further hypothesized that, among participants in the multicomponent, counselor-delivered interventions, individuals who drank less than the presented peer descriptive norm would remain at low levels of alcohol use. Finally, we hypothesized no change in drinking in the control conditions, which did not receive normative feedback.

Method

Sample Characteristics

This study analyzed data from four independent samples of college students each of which contained an active intervention condition and an assessment only condition; Table 1 contains descriptive information for each sample. All consisted primarily of Caucasian students and freshmen and, with the exception of the mandated student sample, the majority of participants were female. The two computerized personalized normative feedback studies (CPNF-1; Neighbors et al., 2004 and CPNF-2; Neighbors, Lewis, Bergstrom, & Larimer, 2006) recruited heavy drinking students using gender-specific criteria (i.e., 5 or more drinks in a sitting for men, 4 or more drinks for women). The multi-component studies (BMI-1; Carey, Carey, Henson, Maisto, & DeMartini, 2011 and BMI-2; Carey, Carey, Maisto, & Henson, 2006) recruited different samples of students; BMI-1 recruited volunteer students who reported at least one heavy drinking episode (using gender specific criteria) in a typical week or four episodes in the last month. BMI-2 recruited mandated students who had

violated campus alcohol policy and required only that they reported consuming alcohol in the last month. The BMI-1 and BMI-2 studies included multiple intervention conditions; however, we focus only on the subset of participants who were assigned to the BMI and assessment-only control conditions.

Procedures

In each study, participants were randomized to either the intervention condition or to an assessment-only (AO) control condition. All participants completed a baseline assessment, from which the descriptive norm feedback was derived. In the CPNF-1 and CPNF-2 studies, feedback compared participant behavior to local campus norms for typical number of drinks per week, number of drinks per occasion, and drinking frequency. In the multi-component BMI-1 and BMI-2 studies, feedback compared local and national norms to participant behavior for typical number of drinks per week and number of heavy drinking days in the last month. Follow-up assessments occurred at multiple time points in both studies. Because we expected boomerang effects to be evident closer to completion of the interventions, we focused on the earliest follow-up available for each study—2 or 3 months in the CPNF studies and 1 month in the BMI studies. Since all studies included feedback on the typical number of drinks per week, participants were distinguished as falling above or below the local campus norm based on their baseline level of typical drinks per week. Typical drinks per week (DPW) at follow-up was the primary outcome of interest and was assessed using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) in all four studies.

Analysis Plan

We classified individuals whose reported level of alcohol use fell below the local norm for typical drinks per week as lighter drinkers; individuals whose alcohol use was the same as or above the local norm were considered heavier drinkers. Our analyses focused only on participants classified as lighter drinkers because a boomerang effect was not expected for heavier drinkers. In order to test the hypothesis that lighter drinkers would report increased drinking at follow-up compared to baseline, we conducted a separate mixed effects ANOVA on each sample. All mixed effects models contained a repeated measures component assessing change in drinking from baseline to follow-up, a between subjects component comparing the intervention group to the AO control group, and a time by condition interaction. The boomerang effect would be reflected in the time by condition interaction, with simple effects suggesting larger increases in alcohol use among intervention than among control participants.

Results

Figure 1 is a summary of the changes in drinking from the baseline to the follow-up assessment for each of the four samples included in this study. Baseline and follow-up drinking rates are presented with separate bars. A detailed description of the statistical tests performed is provided below.

CPNF-1

The CPNF-1 sample consisted of 252 students, 24% ($n = 62$) of which were classified as lighter drinkers and therefore were the focus of the present re-analysis. The CPNF-1 sample received computerized feedback that the typical college student consumed on average 5.1 DPW (regardless of gender) or if assigned to the assessment only condition received no feedback. The AO control group reported baseline drinking levels that did not significantly differ from the CPNF condition (AO: $n = 31$, $M = 3.06$, $SD = 1.65$ DPW; CPNF: $n = 30$, $M = 3.53$, $SD = 1.52$ DPW; $t(60) = -1.01$, $p = .32$). Similarly, at the 3-month follow-up the AO control group did not differ from the CPNF group (AO: $M = 3.66$, $SD = 3.34$ DPW; CPNF: $M = 3.90$, $SD = 2.56$ DPW; $t(59) = -.31$, $p = .76$).

Results of the mixed effects ANOVA for the CPNF-1 sample revealed no change in DPW from baseline to follow-up ($F(1, 59) = 1.38$, $p = .25$, partial $\eta^2 = .02$), no overall difference between the CPNF and AO conditions, ($F(1, 59) = .60$, $p = .44$, partial $\eta^2 = .01$), and no interaction between condition and time ($F(1, 59) = .08$, $p = .78$, partial $\eta^2 < .01$). Taken together there was no evidence for a boomerang effect in the CPNF-1 sample because there were no changes in DPW across time or in either condition among the subset of lighter drinkers.

CPNF-2

The CPNF-2 sample consisted of 214 students 24% (i.e., $n = 51$) of which were classified as lighter drinkers. The CPNF-2 sample received computerized feedback that the typical college student consumed on average 5.12 DPW (regardless of gender) or if assigned to the AO condition received no feedback. Baseline drinking levels did not significantly differ (AO: $n = 26$, $M = 2.64$, $SD = 1.68$ DPW; CPNF: $n = 18$, $M = 2.50$, $SD = 2.04$ DPW; $t(49) = -.88$, $p = .38$). Similarly, at the 2-month follow-up the AO group did not differ from the CPNF group (AO: $M = 3.77$, $SD = 3.76$ DPW; CPNF $M = 3.28$, $SD = 2.42$ DPW; $t(42) = .49$, $p = .63$).

Results of the mixed effects ANOVA for the CPNF-2 sample revealed a small but significant overall increase in DPW from baseline to the 2-month follow-up regardless of intervention condition ($F(1, 42) = 4.67$, $p = .04$, partial $\eta^2 = .10$). However, there was no overall difference between the CPNF and AO conditions, ($F(1, 42) = .16$, $p = .69$, partial $\eta^2 < .01$), and no interaction between condition and time ($F(1, 42) = .24$, $p = .63$, partial $\eta^2 < .01$). Taken together there was no evidence for a boomerang effect among lighter drinkers in the CPNF-2 sample because even though the light drinkers reported increases in DPW those increases were consistent across both conditions and thus cannot be attributed to exposure to the descriptive norm.

BMI-1

The BMI-1 sample consisted of 342 students 63% (i.e., $n = 214$) of which were classified as lighter drinkers. The BMI-1 sample received gender-matched feedback in the context of a multi-component BASICS style intervention that the typical male college student consumed on average 17 DPW or that the typical female college student consumed on average 10 DPW. Baseline drinking levels did not significantly differ across groups (AO: $n = 102$, $M =$

12.49, $SD = 3.58$ DPW; BMI: $n = 106$, $M = 12.37$, $SD = 3.78$ DPW; $t(212) = .30$, $p = .77$). At the 1-month follow-up the AO control group reported drinking significantly more than the BMI group (AO: $M = 12.00$, $SD = 5.99$ DPW; BMI $M = 9.74$, $SD = 6.49$ DPW; $t(206) = 2.60$, $p = .01$).

Results of the mixed effects ANOVA for the BMI-1 sample revealed a small to medium and significant overall decrease in DPW from baseline to the 1-month follow-up across intervention condition ($F(1, 206) = 14.68$, $p < .01$, partial $\eta^2 = .07$), a small but significant difference between the BMI and AO conditions, with the BMI group drinking significantly less than the control condition averaged across time, ($F(1, 206) = 4.14$, $p = .04$, partial $\eta^2 = .02$), and a significant interaction between condition and time ($F(1, 206) = 6.85$, $p = .01$, partial $\eta^2 = .03$). Students in the BMI condition reported greater decreases in drinking than those in the AO condition. Taken together there was no evidence for a boomerang effect among lighter drinkers in the BMI-1 sample because all groups reduced their drinking and those who received normative feedback in the context of a multi-component intervention reduced their drinking to a greater extent than did individuals in the AO control group.

BMI-2

The BMI-2 sample consisted of 338 students 65% (i.e., $n = 219$) of which were classified as lighter drinkers. The BMI-2 sample received the same gender-matched feedback as those in BMI-1: the typical male college student consumed on average 17 DPW or the typical female college student consumed on average 10 DPW. Baseline drinking levels did not differ across conditions (AO: $n = 116$, $M = 8.28$, $SD = 4.78$ DPW; BMI: $n = 98$, $M = 9.21$, $SD = 4.61$ DPW; $t(217) = .05$, $p = .96$). Similarly, at the 1-month follow-up the AO group did not differ from the BMI group (AO: $M = 8.42$, $SD = 6.84$ DPW; BMI $M = 7.40$, $SD = 5.89$ DPW; $t(212) = 1.16$, $p = .25$).

The mixed effects ANOVA for the BMI-2 sample revealed no changes in DPW from baseline to the 1-month follow-up by intervention condition ($F(1, 212) = .85$, $p = .36$, partial $\eta^2 < .01$), no differences between the BMI and AO conditions, ($F(1, 212) = .65$, $p = .42$, partial $\eta^2 < .01$), and no significant interaction between condition and time ($F(1, 212) = 1.79$, $p = .19$, partial $\eta^2 = .01$). Taken together there was no evidence for a boomerang effect in the BMI-2 sample because there were no changes in DPW across time or in either condition among lighter drinkers.

Discussion

In light of the widespread use of feedback-based alcohol interventions to reduce alcohol consumption among college drinkers, it is important to understand whether these interventions might have unanticipated effects on subsets of the target population. The goal of this study was to reanalyze data from four randomized controlled studies to determine if a boomerang effect would be observed among lighter drinkers, defined as individuals who received feedback that the norm for alcohol use on their campus exceeded their own consumption level. We did not find any evidence of a boomerang effect in any of the four samples. That these studies varied by region, type of institution, sampling strategy, and intervention composition enhances confidence in the generalizability of these findings.

Previous research has provided mixed results with respect to whether a boomerang effect might occur in the context of alcohol interventions. Our findings are consistent with Larimer et al. (2007), who showed that an individually delivered, multicomponent normative feedback intervention seemed to be protective, rather than detrimental, among abstainers. Similarly, examination of Figure 1 suggests that light drinkers who received the BMI in fact reduced their alcohol consumption, significantly so in the BMI-1 sample. Figure 1 also supports that any slight, though non-significant, increases in behavior in the CPNF studies are consistent with natural fluctuations in alcohol use in the college setting (Baer et al. 2001).

Previous non-intervention research indicates that holding exaggerated perceptions of the norms for alcohol use is associated with increases in alcohol use over time (Carey, Borsari, Carey, & Maisto, 2006; Sher, Bartholow, & Nanda, 2001). Carey et al. observed such increases in alcohol use among a fairly heavy drinking sample (at least 4 binge episodes in the previous month), while Sher et al. studied children of alcoholics. Although overestimated normative perception predicts increases in alcohol use, the present results suggest that becoming aware of behavioral discrepancy from the norm may not similarly impact alcohol use. Future research is needed to clarify whether these different types of discrepancy (normative and behavioral), both of which often appear in normative feedback, have different implications for behavior.

Each of the four original studies reported significant intervention effects, supporting the efficacy of the feedback-based CPNF and BMI. However, in our re-analyses, when the samples were restricted only to those students who reported baseline drinking that was lower than the local campus norm, no differential change between intervention and the AO control conditions was seen in three out of the four samples. This suggests that the original study effects were largely driven by reductions in alcohol use among the above-average drinkers, consistent with previous research finding support for baseline drinking status by intervention condition interactions (Donohue, Allen, Maurer, Ozols, & DeStefano, 2004; Doumas & Andersen, 2009; Moore, Soderquist, & Werch, 2005; Murphy et al., 2001). Our results also provide some support for the efficacy of a multi-component intervention for relatively light drinkers. One potential explanation for the observation that lighter drinkers reduced consumption after one of the multi-component intervention is the personalized feedback was delivered by a trained interventionist using a Motivational Interviewing approach (Miller & Rollnick, 2002), which affirms students light drinking patterns and support any efforts to drink safely. The benefit of such an intervention is also consistent with Schultz et al.'s (2007) finding that applying an injunctive norm, a positive evaluation for using less energy than one's neighbors, ameliorated the boomerang effect.

A strength of this study is the replication of findings across two structurally different types of alcohol interventions in three geographic locations. However, these findings should be interpreted in light of the study limitations. First, after restricting analyses to assess only lighter drinkers, we had relatively small sample sizes in the CPNF studies, potentially limiting power to find effects, though this seems an unlikely explanation for the null results with the extremely small observed effect sizes. Second, the studies varied in time to follow-up, precluding the ability to increase power by pooling the samples or conducting a multi-

level analysis. Third, the samples exhibited a wide range of baseline level of alcohol use, with the BMI samples reporting much higher levels of drinking (and also local campus norms) than the CPNF samples. We note that regional differences in drinking patterns are well-established (O'Malley & Johnston, 2002), thus the lighter drinkers identified in each study were so designated in relation to the local norm rather than an absolute definition of light drinking. Fourth, although participants in all of the studies received feedback on multiple items, we focused our analysis on the feedback item that was common across all studies. However, the consistent pattern of results across the samples supports the generalizability of our findings and helps to assuage many of these concerns.

In sum, there was no evidence for a boomerang effect for lighter drinkers across four samples of college drinkers in three distinct geographic locations and across two modalities for delivering personalized feedback. This encouraging finding is good news for prevention researchers, suggesting that boomerang effects do not apply to all feedback interventions. Thus, personalized normative feedback is safe to deliver without screening for drinking status to college drinkers either in a face-to-face intervention or in a computer delivered intervention, and as a stand-alone intervention or in the context of a multi-component intervention. Importantly, these modalities can all be employed without concern for iatrogenic effects.

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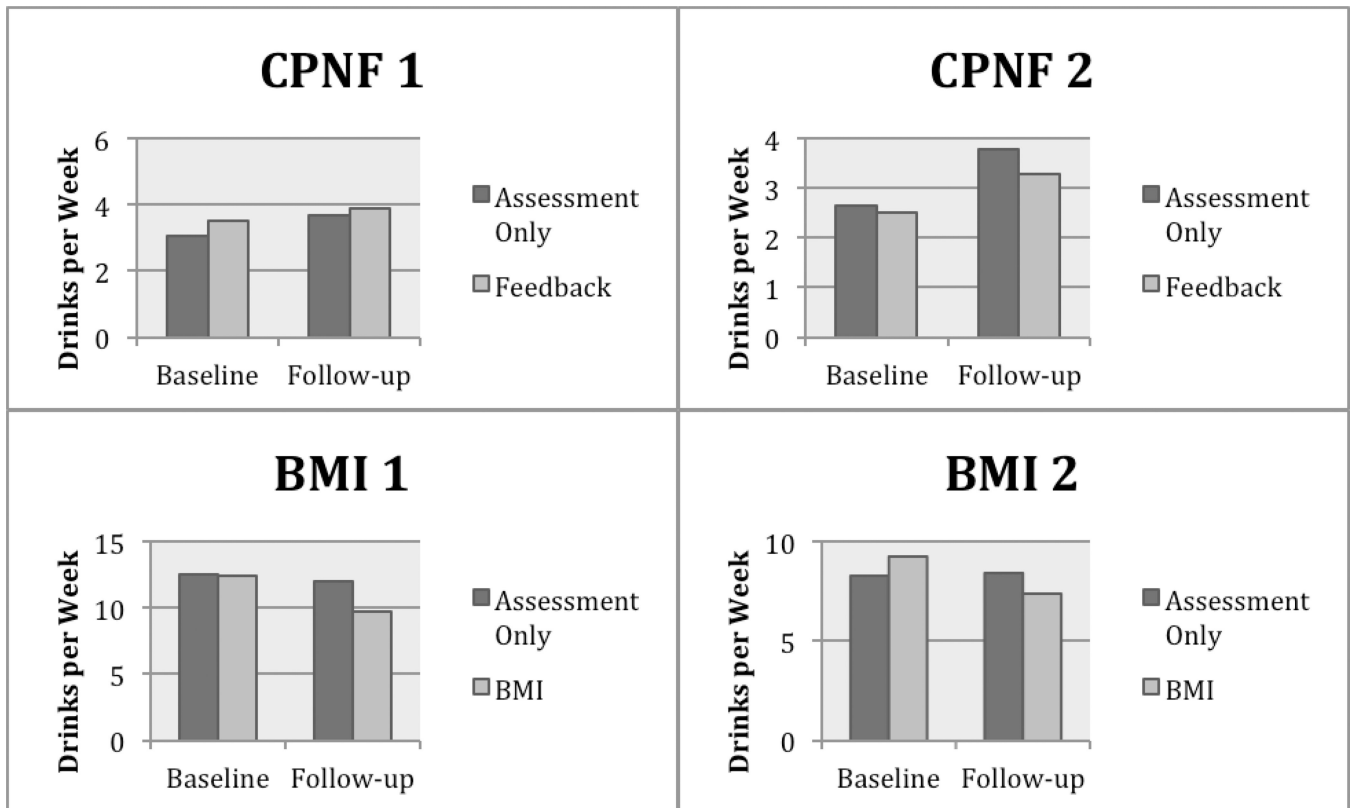


Figure 1. Changes in drinks per week for light drinkers from baseline to follow-up by condition and sample.
Note: CPNF = Computerized Personalized Normative Feedback; BMI = Brief Motivational Intervention

Table 1

Descriptive Comparisons of Four Samples Used in Analyses

	CPNF-1 Neighbors et al. (2004)	CPNF-2 Neighbors et al. (2006)	BMI-1 Carey et al. (2006)	BMI-2 Carey et al. (2011)
Region	Northwest	Midwest	Northeast	Northeast
Eligibility criteria	Volunteer; At least one HD episode in last month	Volunteer; At least one HD episode in last month	Volunteer; At least 4 HD episodes in last month	Mandated; drank alcohol in the last month
Intervention	Computer-delivered PNF	Computer-delivered PNF	Brief Motivational Intervention	Brief Motivational Intervention
Referent group for normative feedback	Typical college student on your campus	Typical college student on your campus	Students of same gender on your campus	Students of same gender on your campus
Time to first follow-up	3 months	2 months	1 month	1 month
Sample N	252	214	342	338
% light drinkers	24%	24%	63%	65%
% female full sample (lighter drinkers only)	59% (77%)	56% (78%)	66% (79%)	36% (33%)
Race/ethnicity full sample (lighter drinkers only)	80% (79%) Caucasian 14% (16%) Asian 0% (0%) Black 2% (5%) Latino(a) 4% (0%) Other	98% (100%) Caucasian 0% (0%) Asian .5% (0%) Black 1% (0%) Latino(a) .5% (0%) Other	89% (88%) Caucasian 3% (3%) Asian 2% (2%) Black 1% (2%) Latino(a) 5% (3%) Other	84% (81%) Caucasian 2% (2%) Black 7% (9%) Asian 7% (7%) Other
% freshmen full sample (lighter drinkers only)	79% (79%)	60% (60%)	53% (58%)	70% (70%)
Mean baseline drinks per week for light drinkers	3.32	2.67	12.39	8.20

Note. HD = heavy drinking episode (5+ for men, 4+ for women). PNF = personalized normative feedback. Lighter drinkers refer to the students whose baseline drinks per week was below the mean for their campus referent group provided in the intervention.