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Social-norms interventions for light and nondrinking students

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Abstract

Social-norms approaches to alcohol prevention are based on consistent findings that most students overestimate the prevalence of drinking among their peers. Most interventions have been developed for heavy-drinking students, and the applicability of social-norms approaches among abstaining or light-drinking students has yet to be evaluated. The present research aimed to evaluate the impact of two types of online social-norms interventions developed for abstaining or light-drinking students. Identification with other students was evaluated as a moderator. Participants included 423 freshmen and sophomore college students who reported never or rarely drinking at screening. Students were randomly assigned to one of three conditions: (a) personalized-norms feedback, (b) social-norms marketing ads, or (c) attention control. Data were analyzed using generalized linear mixed models. Results provided some support for both interventions but were stronger for social-norms marketing ads, particularly among participants who identified more closely with other students.

Keywords

social norms; social identity; feedback; abstainers; alcohol

Social influences are central factors underlying the use of alcohol among young adults (Baer, 2002; Borsari & Carey, 2001). An extensive body of research has evaluated associations between perceived social norms for drinking, and alcohol consumption among young adults (Borsari & Carey, 2003). It has been consistently found that individuals tend to overestimate the prevalence of drinking among their peers, and misperceptions of prevalence are associated with heavier drinking (Baer, Stacy, & Larimer, 1991; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Perkins & Berkowitz, 1986). Correction of these misperceptions has become a primary objective in many alcohol prevention programs, brief interventions, and treatments for problem drinking (Chan, Neighbors, Gilson, Larimer, & Marlatt, 2007; Perkins 2003). The theoretical rationale for this approach is that if students overestimate the drinking of other students and this overestimation contributes to heavier drinking, then correction of these overestimates should lead to a reduction in drinking. This approach is

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based on the assumption that perceived norms typically cause behavior, however some evidence has suggested that behavior can also influence perceived norms (Neighbors, Dillard, et al., 2006). It is also important to consider that most social-norms researchers have assumed that identification of relevant reference groups is important and some evidence suggests that social identification with specific groups moderates the influence of perceived norms on drinking (Neighbors et al., 2010; Reed, Lange, Ketchie, & Clapp, 2007). Based on these findings, two strategies for correcting normative misperceptions have emerged: the social-norms marketing approach and the personalized normative-feedback approach (Lewis & Neighbors, 2006).

Social norms marketing advertising (SNMA) consists of presenting accurate norms information via media advertisements, which may include television and radio ads, newspaper ads, posters, flyers, etcetera. For example, a typical SNMA message may say, "Four out of five University of X students drink twice a week or less." Evaluations of SNMA programs have generated mixed findings. Some studies have found no support for the efficacy of SNMA (e.g., Carter & Kahnweiler, 2000; Clapp, Lange, Russell, Shillington, & Voas, 2003; Wechsler et al., 2003; Werch et al., 2000). A greater number of studies have found support for this method of intervention, although many of the early social-norms marketing studies lacked sufficient control groups and were conducted on small college campuses with homogenous samples (e.g., Glider, Midyett, Mills-Novoa, Johannessen, & Collins, 2001; Gomberg, Schneider, & DeJong, 2001; Haines & Spear, 1996; Mattern & Neighbors, 2004; Perkins & Craig, 2006; Perkins, Haines, & Rice, 2005). The largest studies to date include a statewide campaign (Perkins, Linkenbach, Lewis, & Neighbors, 2010) and two large multicampus studies (DeJong et al., 2006, 2009). Perkins et al. (2010) found strong support for SNMA in reducing drinking and driving among young adults. The DeJong et al. studies provided equivocal support. In the first study (2006) SNMA campuses had a significantly lower relative risk of alcohol consumption than control campuses. The second study (2009) failed to find significant effects for SNMA.

Personalized normative feedback (PNF) provides individually framed feedback consisting of information regarding participants' own drinking, perceived norms, and actual norms. Delivery of PNF follows an assessment of an individual's drinking and perceived norms. A PNF intervention might read something like this: "You said you drink an average of 10 drinks per week and that you think the typical University of X student drinks about 15 drinks per week. Based on a recent survey of 2,500 UX students, the actual average number of drinks per week for UX students is 4.6 drinks." As a stand-alone intervention for heavy drinkers, computer-delivered PNF has received consistent support (Carey, Scott-Sheldon, Elliott, Bolles, & Carey, 2009; Lewis & Neighbors, 2007; Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007; Neighbors, Larimer, & Lewis, 2004; Neighbors, Lewis, Bergstrom, & Larimer, 2006); however it has only been evaluated with heavy drinkers.

A difference between these two approaches, SNMA and PNF, lies in the level of individual attention that is given to the targets. While SNMA programs typically target all students, and therefore can be described as a *universal* intervention strategy, individually focused interventions incorporating normative feedback almost exclusively target heavy-drinking students, and thus can be described as an *indicated* intervention strategy.

The impact of social-norms interventions on students who rarely or never drink has not previously been examined in isolation. This is a critical gap because abstainers and light drinkers represent a significant proportion (20–30%) of college students. Moreover, roughly half of the students who enter college as abstainers will initiate under-aged drinking (Lo & Globetti, 1995). This suggests that abstinent students are an important, if often-ignored, target of prevention efforts. In general, less is known about non-drinking college students, although some evidence suggests that many abstainers do not feel a sense of connection with their peers and tend to experience social adjustment difficulties (Cook, Young, Taylor, & Bedford, 1998; Nezlek, Pilkington, & Bilbro, 1994), although this seems to be less evident among women (Murphy, McDevitt-Murphy, & Barnett, 2005).

An important question naturally arises: how will abstaining or very light-drinking students be affected upon learning that the average student drinks *more* than they do themselves? It is possible that abstainers will feel pressured to start drinking, while very light drinkers will feel pressured to drink more. Different perspectives can be offered regarding this debate. On one hand, information suggesting that one's drinking is below normal may serve as a motivation to initiate drinking or to drink more. On the other hand, people who practice behaviors that do not fit the norm, such as abstainers, have already demonstrated immunity to the particular norm and may therefore be unaffected by the intervention. Moreover, informing students that others actually drink less than they believe they do should theoretically lessen any pressure they might feel to drink (National Social Norms Resource Center, 2010). Normative feedback emphasizing that abstinence and light drinking are “normal” practices among college students could also enhance social adjustment and subjective well-being among students who might otherwise feel socially isolated. Moreover, a study of Canadian students demonstrated that misperceptions of norms may lead to social isolation among abstainers and light drinkers.

The impact of normative information on light-drinking or abstaining students is likely to depend on the framing of the information. For example, it is accurate and reinforcing to tell abstaining students that “3 out of 5 students either drink moderately or abstain” (O'Malley & Johnston, 2002). However, telling abstaining students that “only 1 in 7 students nationally abstain from alcohol” (Wechsler et al., 2002) is also accurate, but suggests their behavior is atypical. Social-norms messages, when framed such that light drinkers or abstainers feel that their behavior is consistent with the behavior of the majority, are likely associated with lower levels of subsequent alcohol consumption as well as an increase in psychological adjustment.

Social identity theory (SIT; Tajfel & Turner, 1986) describes how identification with a group influences individual and group behaviors, norms, and cognitions. A central issue of SIT is the overlap between one's self-perceptions and one's view of others with whom one feels connected, versus others to whom one does not feel connected (Abrams & Hogg, 1999). According to SIT, people view themselves and others as group members with a common or shared social identity, which is primarily derived from group memberships (Abrams & Hogg, 1999; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Importantly, with respect to between-group influence, the more an individual identifies with other members of his or her group (e.g., other students on one's campus), the more influence perceptions of the group

norms should have on the individual. Moreover, information that suggests inconsistency between an individual and his or her group creates cognitive dissonance (Glasford, Pratto, & Dovidio, 2008). For example, individuals have been found to experience dissonance when they learn that other members of one's own group have opinions that are discrepant from one's own (Matz & Wood, 2005). Similarly, individuals experience psychological discomfort when viewing members of their group expressing values that are inconsistent with those presumed to be held by the group (Norton, Monin, Cooper, & Hogg, 2003). Previous research has shown that social identity moderates the relationship between perceived social norms and drinking (Neighbors et al., 2010; Reed et al., 2007). Among heavy drinkers, group identification was also found to moderate the efficacy of gender-specific PNF in reducing drinking, at least among women (Lewis & Neighbors, 2007). Based on these findings, we expected that presenting normative information to abstainers and light drinkers, suggesting they are behaving similarly to the typical student, should lead to a delay in initiation of drinking or to a reduction in the frequency of drinking.

The present study

The present research aimed to evaluate the impact of two types of normative feedback on students who abstain or drink below the norm: SNMA and PNF. We predicted that light-drinking and abstaining students who received either intervention, would report lower levels of alcohol consumption in the subsequent 3 to 6 months and would have reduced normative perceptions, relative to an attention control group. We were also interested in evaluating differences between the two interventions but did not have specific hypotheses regarding which might be more effective. We expected that social identity would moderate the effects of both interventions, such that effects would be strongest among students who identified more strongly with the typical student. Finally, we wished to evaluate potential gender differences in intervention efficacy.

Method

Participants

Participant flow throughout this study is presented in Figure 1. Freshmen and sophomore students at a large public northwestern university who met never/rarely drinking criteria in a larger screening survey, and indicated willingness to participate in future studies, were invited to complete the baseline survey ($n = 480$) during the fall quarter of 2008. Participants who met the never/rarely drinking criteria drank once per month or less during the previous three months and had no more than two drinks per drinking occasion. Thus, at screening, at most, participants could have consumed alcohol on three occasions in the past three months and consumed six drinks in the past three months. Among the participants at the initial screening survey, 76.4% ($n = 323$) reported not drinking any alcohol in the past three months (abstainers). Of those invited, 423 (88.13%) completed the baseline survey. The gender and ethnic representation of those who completed the baseline survey was 60.8% female, 52.5% Asian, 32.9% Caucasian, 9.9% multiracial, and 4.7% other ethnicities or not indicated.

Procedures

The present study employed an Internet-based 9-month longitudinal experimental design. In the fall of 2008, freshmen and sophomore students completed an online screening questionnaire. Eligible participants were invited to the baseline survey immediately upon completion of the screening assessment. Email invitations were also sent and included a brief description of the survey.

Participation involved the completion of three computer assessments, including a baseline assessment and intervention administration, a 3-month follow-up, and a 6-month follow-up. Each survey took approximately 50 minutes to complete and participants were compensated \$25 for each of them. Immediately following completion of the baseline assessment, each participant was randomly assigned to one of three intervention conditions: SNMA ($n = 141$), PNF ($n = 141$), or attention control ($n = 141$). A computer algorithm making use of block randomization was used to assign participants to conditions while ensuring equal cell sizes. All measures and interventions were delivered online. Examples of materials for each intervention condition are presented in the Appendix.

Approximately 3 and 6 months after completing the baseline assessment and intervention administration, participants were invited via email to complete the follow-up surveys. Participants received email and phone reminders to complete each assessment. A Federal Certificate of Confidentiality (AA-79-2005) was obtained to ensure the privacy of participants and all procedures were approved by the university's Institutional Review Board.

Feedback interventions

Interventions were administered immediately following the baseline assessment. Thus, feedback was provided after asking participants about their perceptions.

Personalized normative feedback—The PNF was originally developed based on the normative feedback component of the BASICS intervention (Brief Alcohol Screening and Intervention for College Students; Dimeff, Baer, Kivlahan, & Marlatt, 1999). The PNF intervention we used was similar to previously employed normative feedback interventions for heavy-drinking students (Lewis & Neighbors, 2007; Neighbors, Lewis, et al., 2006). However, it differed from the PNF for heavy-drinking students in its intention to reveal the similarity (versus dissimilarity) between the participants' drinking behavior and typical drinking. In addition, the PNF was presented in a gender-specific fashion, and percentile comparison feedback aimed at heavy drinkers was replaced by a statement informing students they are among the majority of students who do not drink at all or drink only in moderation.

The PNF was presented in text and bar graph formats and consisted of three elements: (a) one's own drinking behavior, (b) one's perceptions of other students' drinking behavior, and (c) other students' actual drinking behavior. Together, these three pieces of information illustrated that participants overestimate the prevalence of drinking among their peers and, more importantly for students who never/rarely drink, that the actual drinking norms are lower than they might expect. Two bar graphs illustrated weekly frequency and number of

drinks consumed per week. Each graph consisted of three bars representing actual same-sex campus norms, the participants' reported perception of the same-sex campus norm, and the participants' reported behavior. Text was provided in the column next to the bar graphs stating: (a) the quantity and frequency that the participant reported drinking in a typical week, (b) the participants' reported perceptions of the quantity and frequency that typical same-sex students drink in a typical week, and (c) the actual average quantity and frequency that typical same-sex students drink in a typical week. Participants were also provided with their percentile rank comparing them with other students (e.g., "You are among the 81% of students who do not drink at all or drink only in moderation.") Participants were informed that the information in the PNF came from a 2007 self-report study that included a random sample of 1,876 University of Washington students.

SNMA—Participants in the SNMA intervention condition were presented with normative feedback modeled after information provided in social marketing campaigns. These included messages such as "81% of UW students have 0, 1, 2, 3, or at most 4 drinks on a given weekend evening," and "4 out of 5 University of Washington students drink twice a week or less." Specific messages were chosen based on a review of frequently used messages in social-norms marketing campaigns and were consistent with suggestions which have been offered in the *Handbook on the Social Norms Approach* (Perkins, 2002) and examples provided on the National Social Norms Institute website (<http://www.socialnorm.org/>). All messages were given equal emphasis in the computer intervention. Immediately following the baseline assessment, students in the SNMA intervention condition were exposed to a series of five such messages. Each message was displayed on the computer screen in random order. These messages were identical to the kinds of messages students on many campuses across the country are exposed to in SNMA messages. Like the PNF intervention, participants were informed that the information came from a 2007 self-report study that included a random sample of 1,876 University of Washington students.

Attention control feedback—Similar to the PNF, the attention control feedback for the control condition was gender-specific (Lewis & Neighbors, 2007). Participants in this condition were presented with information about the amount of time that the typical male/female UW student spends text messaging, downloading music, and playing video games, as well as the average hours/week spent studying, working, and volunteering. Information was presented in text and bar graphs. While the layout was the same as the PNF, none of the information presented was directly related to alcohol nor was it personalized for the participant.

Measures

Alcohol consumption and perceived norms were measured at baseline, 3-month, and 6-month follow-up assessments. Social identity was measured at the baseline assessment.

Alcohol consumption—Typical weekly drinking was assessed using the Daily Drinking Questionnaire (DDQ; Dimeff et al., 1999), which asks the participant to report the average number of drinks consumed on each day of a typical week over the previous 3 months. This measure has been extensively used in the college drinking literature and has

demonstrated good construct validity and test-retest reliability (Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006). The DDQ was scored by summing the responses for each day of the week. Thus, scores reflect average number of drinks per week over the previous 3 months. Peak drinking was assessed with an item from the Quantity/Frequency/Peak (Q/F/P) Alcohol Use Index (Dimeff et al., 1999): “Think of the occasion you drank the most this past month. How much did you drink?” Response options ranged from 0 to 25 or more drinks.

Perceived drinking norms—Perceived drinking norms were measured using the Drinking Norms Rating Form (DNRF; Baer, Stacy, & Larimer, 1991; Dimeff et al., 1999). The DNRF mirrors the DDQ and asks participants to estimate the number of drinks they think the typical student on their campus has on each day of the week. Participants were asked to estimate the drinking norms for the typical same-sex student, the typical opposite-sex student, and their close friends. Perceived weekly descriptive drinking norms were calculated by summing the participants’ estimations for each day of the week. This measure has demonstrated good test-retest reliability and convergent validity (Neighbors, Dillard, et al., 2006).

Social identity—The Inclusion of Other in the Self (IOS) scale (Aron, Aron, & Smollan, 1992; Tropp & Wright, 2001) was modified to measure identification of interrelatedness or closeness with the typical student on one’s campus. Participants were presented a series of seven Venn diagrams ranging from nonoverlapping circles to completely overlapping circles and asked to select which diagram best represented their level of identification with the typical student. Higher scores indicated greater identification with other students. The IOS has demonstrated good test-retest reliability, and good concurrent, discriminant, and construct validity (Tropp & Wright, 2001).

Results

Intervention effects on drinking

Data were analyzed longitudinally with generalized linear mixed models in HLM 6 (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). Primary outcomes included typical number of drinks per week in the past 90 days, frequency of drinking during the past 90 days, and nonabstinence during the past 30 days. Drinks per week and frequency were positively skewed and were therefore modeled on a Poisson rather than a normal distribution. Poisson distributions assume a positive skew and are part of the family of distributions associated with count variables (Coxe, West, & Aiken, 2009). The option for specifying a Poisson distribution, rather than a normal distribution, was added as a feature in HLM 6 (Raudenbush et al., 2004). Nonabstinence was modeled as a binary variable. Thus, three models were evaluated where each outcome was estimated as a function of time, intervention condition, social identity, two-way interactions with time, and three-way interactions between time, intervention condition, and social identity. Intervention was specified by two dummy-coded variables (PNF and SNMA) with control as the reference group. Time of assessment was coded based on weeks from the first follow-up. Thus, baseline was coded as –12, the three-month follow-up was coded as 0, and the six-month follow-up was coded as 12. Time was therefore centered at the first follow-up so that

main effects of intervention condition represent differences at the 3-month follow-up. Social identity was assessed at baseline and grand mean centered in the analyses. Results from Poisson mixed models are presented in Table 1.

Results for drinks per week indicated a significant overall increase in drinking over time in the control group. At first follow-up, neither intervention was associated with a significant difference in drinks per week relative to control. However, time by condition interactions indicated that both intervention conditions were associated with shallower slopes in drinks per week over time relative to control. Thus, there was a steeper slope in increased drinks per week across the 6-month assessment period in the control group relative to both of the intervention groups (see Figure 2). These findings indicate that, over the course of the trial, there was a preventive effect (i.e., shallower increase) of PNF and SNMA on drinks per week.

There was a two-way interaction between social identity and time, suggesting that students who identified more closely with other students at baseline increased their drinking at a steeper rate. In addition, both of the three-way interactions were significant suggesting that the efficacy of interventions was dependent on social identity. Interactions were graphed using values derived from parameter estimates where high and low values of social identity were specified as one standard deviation above and below the mean, respectively (Cohen, Cohen, West, & Aiken, 2003). The pattern of the interactions presented in Figure 2 revealed that SNMA and PNF were more effective in preventing increases in drinks per week, relative to control, among students who were higher in social identity.

Results for frequency revealed a significant main effect for time, indicating an increase in frequency of drinking over time among control participants. The only other effect that approached significance was the three-way interaction between time, SNMA, and social identity. The pattern of the interaction mirrored the interaction for drinks per week presented in Figure 2.

Results for abstinence were comparable to the results for frequency. A time effect revealed an overall decrease in the likelihood of abstinence over time among control participants. The interaction between time, SNMA, and social identity was significant and revealed a pattern consistent with the results for drinks per week (Figure 2).

Intervention effects on perceived social norms

We used an identical analysis procedure for evaluating intervention effects on perceived social norms. Distributions of perceived norms variables mirrored the drinking variables and exhibited significant positive skew. Thus, we again employed Poisson mixed models with the same specifications described above. Perceived norms variables included perceived typical number of drinks per week, perceived frequency of drinking, and perceived percentage of abstaining students. Results are presented in Table 2.

Results for two of the three variables indicated significant time effects, such that control participants' perceptions of the typical number of drinks consumed by other students went up over time and estimated percentage of abstainers went down over time. Results for the

perceived norms for drinks per week indicated no immediate effects at first follow-up. Over the assessment period, relative to control, both interventions were associated with reductions (or shallower increases) in perceived norms for weekly drinking. We also evaluated perceived norms for drinks per week as a mediator of the intervention effects on drinks per week reported above. Recall that drinks per week was the only drinking outcome with main effects of intervention independent of social identity. Thus, this was the only outcome on which we evaluated perceived norms as a mediator. In the mediation analyses we reran the results examining intervention effects on drinks per week controlling for perceived norms for drinks per week. Neither intervention effect remained significant and Sobel tests confirmed support for mediation of the PNF intervention ($Z = 2.03, p < .05$) and the SNMA intervention ($Z = 3.25, p < .01$). We have added this to the results section.

Results for perceived norms for frequency were minimal. There was a time X PNF interaction indicating declining perceptions of typical frequency relative to control. The perceived norm for the percentage of abstainers was higher at first follow-up among PNF participants relative to control. Time X intervention interactions revealed relative increases in the perceived proportion of abstaining students in both intervention conditions relative to control. Three-way interactions between intervention, time, and social identity were evident for two of the three perceived norms variables. Among participants who were higher in social identity, relative to the attention control group, both interventions were associated with lower perceived norms for drinks per week over time (Figure 3). In addition, SNMA was associated with increased perceived norms for the percentage of other students who were abstainers over time relative to control. The pattern of results was opposite of the pattern of results for perceived norms for drinks per week over time.

Differences between SNMA and PNF

In addition to evaluating each intervention relative to the attention control group, we were also interested in whether there were significant differences between the two intervention groups. In order to evaluate differences between the two interventions, the primary analyses reported above were repeated replacing the intervention contrasts. In these analyses, intervention condition was specified by two dummy-coded variables (control and SNMA) with PNF as the reference group. We were specifically interested in evaluating the contrast between SNMA and PNF at first follow-up and over the course of the trial. Results revealed no significant differences over the course of the trial between SNMA and PNF on any of the drinking outcomes and no differences on perceived norms variables at either first follow-up or over the course of the trial. However, results indicated that at the first follow-up, SNMA was associated with significantly fewer drinks per week, $t(415) = -2.37, p < .05$, and a significantly lower likelihood of consuming any alcohol, $t(415) = -2.42, p < .05$, relative to PNF. Evaluations of interactions with social identity revealed three-way interactions between time, social identity, and the SNMA versus PNF contrast for drinks per week, $t(1175) = -5.09, p < .001$, frequency, $t(1175) = -2.26, p < .05$, and likelihood of consuming any alcohol, $t(1175) = -2.54, p < .005$. These interactions are reflected in Figure 2 and indicate SNMA appears to be more effective than PNF for reducing drinking among abstaining and light-drinking students who are higher in social identity. There was also a significant three-way interaction between time, social identity, and the SNMA versus PNF contrast for the

perceived norm for percentage of abstainers, $t(1175) = 3.43, p = .001$, which suggested SNMA was more effective than PNF in increasing the perceived number of abstainers among those who were higher in social identity. Overall, results suggest that differences tended to favor SNMA over PNF, particularly when accompanied by higher social identity.

Gender differences

Finally, we were interested in evaluating whether gender moderated intervention efficacy. We reran the primary results presented above, replacing social identity with gender, which was dummy-coded (women = 1, men = 0). Results evaluating gender differences in intervention efficacy indicated no effects on drinking or perceived norms at follow-up or over the course of the trial, with one exception. At the first follow-up assessment, relative to control, PNF was associated with increased drinking frequency for women, relative to men, $t(415) = 2.48, p < .05$. There were no three-way interactions between time, gender, and either intervention versus control on any of the drinking variables, but three-way interactions between time, gender, and SNMA versus control were evident for two of the three social-norms variables. SNMA was more strongly associated with lower perceived norms for drinks per week over the course of the trial, relative to control, among women than men, $t(1175) = -2.37, p < .05$. SNMA was more strongly associated with an increased perceived proportion of abstainers over the course of the trial, relative to control, and more so among women than men, $t(1175) = 2.84, p < .01$.

Discussion

The present research evaluated two social-norms-based prevention interventions for abstaining and light-drinking college students. This research builds on a growing body of work which utilizes existing social influences and normative misperceptions to positively impact behavior change. It is the first research of which we are aware to specifically target abstaining and light-drinking students. Findings indicated that over time, alcohol consumption and frequency of drinking increased, and that abstinence decreased among control participants. This finding is not unexpected given that all participants were abstainers or light drinkers at baseline, and that previous research has shown that around half of the students who enter college as abstainers will initiate underaged drinking (Lo & Globetti, 1995). Despite the finding that drinking behavior increased and that abstinence decreased, on average, findings demonstrated that both interventions were associated with consuming fewer drinks per week over time relative to the control group. PNF was also associated with reduced perceived norms for drinks per week and frequency over time relative to the control group. All other effects for intervention conditions relative to the control group were subsumed by interactions with social identity. The most consistent finding was positive effects of SNMA among students who were higher in social identity. Direct comparison between the two conditions also suggested that where differences were apparent, they tended to favor SNMA over PNF, particularly among students who were higher in social identity.

These findings suggest that a SNMA approach is preferable to a PNF approach for abstaining and light-drinking students. This may be because PNF, as typically operationalized, explicitly shows these students that they drink less than others do, whereas

SNMA messages suggest that abstainers and light drinkers are in the majority. A principal difference between the two approaches is the comparisons they communicate. SNMA messages present accurate norms, which are intended to correct overestimations. However, the extent to which viewers of SNMA messages consciously consider whether the norms presented are different from their preexisting perceptions, or how they compare with one's own behavior, is unclear. In PNF, both of these comparisons are explicit and may represent opposing processes when presented to abstainers and light drinkers. In contrast, SNMA messages, as typically operationalized and as framed in the present study, communicate that abstainers and light drinkers are among the majority. These differences may also explain why SNMA was primarily effective among those who were higher in social identification. One function of SNMA messages may be to make abstainers and light drinkers feel "normal" and part of the group, but if the group is not one with which they identify, they are less likely to have any impact. In contrast, in the typical case, PNF reveals that students overestimate the norm for drinking; but also, for abstaining and light-drinking students, it reveals that participants drink less than their peers drink.

The present study indicated emergent effects for both interventions over time, but few effects at the first follow-up point. Previous research has shown evidence of emergent effects for alcohol outcomes over longer follow-ups for personalized feedback interventions. For example, White, Mun, Pugh, & Morgan (2007) compared an in-person personalized feedback intervention to written personalized feedback in a high-risk population of mandated college student drinkers. Findings indicated that although effects were comparable between the two interventions at earlier follow-ups, at 15-months the in-person intervention emerged as more efficacious (White et al., 2007). In the present study, emergent effects may be due in part to the natural course of initiation and acceleration of drinking among abstainers and light drinkers. The main effects of time in the present study suggested that in the absence of intervention, drinking among these participants increased over time. Interactions involving time and intervention conditions revealed diverging slopes over time, particularly among SNMA participants who were higher in social identity. However, the divergence was not statistically significant at the first follow-up assessment.

There are a number of factors important to consider in interpreting the present results. SNMA campaigns have typically been evaluated using traditional media (e.g., flyers, banners, campus newspaper ads) but were administered online in the present study. Thus, SNMA messages in the present study were delivered in a very different manner than they are typically delivered and it is important to keep this in mind when interpreting the results. Interventions among college students are increasingly being administered by computer (Carey et al., 2009). The increasing popularity of social networking applications and websites such as MySpace, Facebook, YouTube, and Twitter suggests that Internet-based interventions are likely to continue to expand. Future research will need to evaluate whether or not, and how, route of administration may affect intervention efficacy.

More generally, it is important not to generalize these findings to heavier drinking college students. This is particularly true for PNF, which has been consistently found to be effective in reducing drinking among heavier drinking college students. The relative absence of findings of PNF efficacy in the present study suggests that previous successes with this

approach in reducing drinking among heavier drinkers may be due in part to the direct comparison between one's own drinking and the actual norm. Thus, correcting normative misperceptions may not be the only active mechanism for the PNF effect of reducing drinking among heavier drinkers. Rather, just presenting information showing that a person drinks less than others may be effective without providing feedback about perceived norms.

The present findings may be applicable to younger school-based populations, which have a higher proportion of abstainers and light drinkers. SNMA, at least when delivered by computer, may be a better fit than PNF, in its current form, for elementary, junior-high, and/or high-school kids. However, the present findings reveal the importance of social identity for this approach. Additional research could evaluate the impact of emphasizing the relevance of the reference group used within SNMA messages as a means of enhancing social identity.

In conclusion, the present research extends previous implementation of social-norms-based interventions for drinking in several ways. It is the first evaluation of these approaches to specifically target abstaining and light-drinking students. It is the first direct comparison between SNMA messages and PNF. It extends a growing literature emphasizing the importance of social identity in constructing norms-based interventions. More generally, it adds to the growing database on college drinking interventions. Alcohol usage is a serious issue on all campuses and decisions regarding how to utilize limited resources available for addressing drinking should ideally be based, at least to some extent, on empirical findings. Based on these findings and previous findings, we would tentatively encourage low cost, high dosage, SNMA campaigns as a primary or universal prevention strategy. Efforts to frame ads in a way that increase social identification are likely to increase efficacy. PNF and other individualized approaches might be considered for students identified as heavier drinkers.

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Appendix

Biography

CLAYTON NEIGHBORS is a Professor of Psychology at the University of Houston. His research focuses on social and motivational influences in etiology, prevention, and treatment of health and risk behaviors. Outcomes of interest include alcohol and substance abuse, problem gambling, body image and eating disorders, intimate-partner violence and aggressive driving.

MEGAN JENSEN is a graduate student at the University of the Pacific. Her research interests focus on social norms and college student drinking.

JUDY TIDWELL is a graduate student at the University of Houston. Her research interests focus on addictions, gender, attitudes and persuasion, and religion.

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References

- Abrams, D.; Hogg, MA. Social identity and social cognition. Blackwell Publishing; Malden, MA: 1999.
- Aron A, Aron EN, Smollan D. Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*. 1992; 63:596–612.
- Baer JS. Student factors: Understanding individual variation in college drinking. *Journal of Studies on Alcohol*. 2002; 14(Suppl):40–53. [PubMed: 12022729]
- Baer JS, Stacy A, Larimer M. Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol*. 1991; 52:580–586. [PubMed: 1758185]
- Borsari B, Carey KB. Peer on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13:391–424. [PubMed: 11775073]
- Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol*. 2003; 64:331–341. [PubMed: 12817821]
- Carey KB, Scott-Sheldon LAJ, Elliott JC, Bolles JR, Carey MP. Computer-delivered interventions to reduce college student drinking: A meta-analysis. *Addiction*. 2009; 104:1807–1819. [PubMed: 19744139]
- Carter CA, Kahnweiler WM. The efficacy of the social norms approach to substance abuse prevention applied to fraternity men. *Journal of American College Health*. 2000; 49:66–71. [PubMed: 11016130]
- Chan KK, Neighbors C, Gilson M, Larimer ME, Marlatt GA. Epidemiological trends in drinking by age and gender: Providing normative feedback to adults. *Addictive Behaviors*. 2007; 32:967–976. [PubMed: 16938410]
- Clapp JD, Lange JE, Russell C, Shillington A, Voas RB. A failed norms social marketing campaign. *Journal of Studies on Alcohol*. 2003; 64:409–414. [PubMed: 12817831]
- Cohen, J.; Cohen, P.; West, SG.; Aiken, LS. Applied multiple regression/correlation analysis for the behavioral sciences. 3 ed.. Lawrence Erlbaum Associates; Mahwah, NJ: 2003.
- Cook M, Young A, Taylor D, Bedford AP. Personality correlates of alcohol consumption. *Personality and Individual Differences*. 1998; 24:641–647.
- Coxe S, West SG, Aiken LS. The analysis of count data: A gentle introduction to Poisson regression and its alternatives. *Journal of Personality Assessment*. 2009; 91:121–136. [PubMed: 19205933]
- DeJong W, Schneider SK, Towvim LG, Murphy MJ, Doerr EE, Simonsen NR, Scribner RA. A multisite randomized trial of social norms marketing campaigns to reduce college student drinking. *Journal of Studies on Alcohol*. 2006; 67:868–879. [PubMed: 17061004]
- DeJong W, Schneider SK, Towvim LG, Murphy MJ, Doerr EE, Simonsen NR, Scribner RA. A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure. *Substance Abuse*. 2009; 30:127–140. [PubMed: 19347752]
- Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. Brief alcohol screening and intervention for college students. Guilford Press; New York, NY: 1999.

- Glasford DE, Pratto F, Dovidio JF. Intragroup dissonance: Responses to ingroup violation of personal values. *Journal of Experimental Social Psychology*. 2008; 44:1057–1064.
- Glider P, Midyett SJ, Mills-Novoa B, Johannessen K, Collins C. Challenging the collegiate rite of passage: A campus-wide social marketing media campaign to reduce binge drinking. *Journal of Drug Education*. 2001; 31:207–220. [PubMed: 11487995]
- Gomberg L, Schneider SK, DeJong W. Evaluation of a social norms marketing campaign to reduce high-risk drinking at the University of Mississippi. *American Journal of Drug and Alcohol Abuse*. 2001; 27:375–389. [PubMed: 11417945]
- Haines M, Spear SF. Changing the perception of the norm: A strategy to decrease binge drinking among college students. *Journal of American College Health*. 1996; 45:134–140. [PubMed: 8952206]
- Lewis MA, Neighbors C. Social norms approaches using descriptive drinking norms education: A review of the research on personalized normative feedback. *Journal of American College Health*. 2006; 54:213–218. [PubMed: 16450845]
- Lewis MA, Neighbors C. Optimizing personalized normative feedback: The use of gender-specific referents. *Journal of Studies on Alcohol and Drugs*. 2007; 68:228–237. [PubMed: 17286341]
- Lewis MA, Neighbors C, Oster-Aaland L, Kirkeby BS, Larimer ME. Indicated prevention for incoming freshmen: Personalized feedback and high-risk drinking. *Addictive Behaviors*. 2007; 32:2495–2508. [PubMed: 17658695]
- Lo CC, Globetti G. The facilitating and enhancing roles Greek associations play in college drinking. *International Journal of the Addictions*. 1995; 30:1311–1322. [PubMed: 7591346]
- Mattern JL, Neighbors C. Social norms campaigns: Examining the relationship between changes in perceived norms and changes in drinking levels. *Journal of Studies on Alcohol*. 2004; 65:489–493. [PubMed: 15376823]
- Matz DC, Wood W. Cognitive dissonance in groups: The consequences of disagreement. *Journal of Personality and Social Psychology*. 2005; 88:22–37. [PubMed: 15631572]
- Murphy JG, McDevitt-Murphy ME, Barnett NP. Drink and be merry? Gender, life satisfaction, and alcohol consumption among college students. *Psychology of Addictive Behaviors*. 2005; 19:184–191. [PubMed: 16011389]
- National Social Norms Resource Center. Frequently asked questions about the social norms approach. 2010. Retrieved from <http://www.socialnorm.org/FAQ/questions.php>
- Neighbors C, Dillard AJ, Lewis MA, Bergstrom RL, Neil TA. Normative misperceptions and temporal precedence of perceived norms and drinking. *Journal of Studies on Alcohol*. 2006; 67:290–299. [PubMed: 16562412]
- Neighbors C, LaBrie JW, Hummer JF, Lewis MA, Lee CM, Desai S, Larimer ME. Group identification as a moderator of the relationship between social norms and alcohol consumption. *Psychology of Addictive Behaviors*. 2010; 24:522–528. [PubMed: 20853938]
- Neighbors C, Larimer ME, Lewis MA. Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *Journal of Consulting and Clinical Psychology*. 2004; 72:434–447. [PubMed: 15279527]
- Neighbors C, Lee CM, Lewis MA, Fossos N, Larimer ME. Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies on Alcohol and Drugs*. 2007; 68:556–565. [PubMed: 17568961]
- Neighbors C, Lewis MA, Bergstrom RL, Larimer ME. Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention. *Health Psychology*. 2006; 25:571–579. [PubMed: 17014274]
- Nezlek JB, Pilkington CJ, Bilbro KG. Moderation in excess: Binge drinking and social interaction among college students. *Journal of Studies on Alcohol*. 1994; 55:342–351. [PubMed: 8022183]
- Norton MI, Monin BT, Cooper J, Hogg MA. Vicarious dissonance: Attitude change from the inconsistency of others. *Journal of Personality and Social Psychology*. 2003; 85:47–62. [PubMed: 12872884]
- O'Malley PM, Johnston LD. Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol*. 2002; 14(Suppl):23–39. [PubMed: 12022728]

- Perkins HW. Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol*. 2002; 14(Suppl):164–172. [PubMed: 12022722]
- Perkins, HW., editor. The social norms approach to preventing school and college age substance abuse: A handbook for educators, counselors, and clinicians. Jossey-Bass; San Francisco, CA: 2003.
- Perkins HW, Berkowitz AD. Perceiving the community norms of alcohol use among students: Some research implications for campus alcohol education programming. *International Journal of the Addictions*. 1986; 21:961–976. [PubMed: 3793315]
- Perkins HW, Craig DW. A successful social norms campaign to reduce alcohol misuse among college student athletes. *Journal of Studies on Alcohol*. 2006; 67:880–889. [PubMed: 17061005]
- Perkins HW, Haines MP, Rice R. Misperceiving the college drinking norm and related problems: A nationwide study of exposure to prevention information, perceived norms and student alcohol misuse. *Journal of Studies on Alcohol*. 2005; 66:470–478. [PubMed: 16240554]
- Perkins HW, Linkenbach JW, Lewis MA, Neighbors C. Effectiveness of social norms media marketing in reducing drinking and driving: A statewide campaign. *Addictive Behaviors*. 2010; 35:866–874. [PubMed: 20619177]
- Raudenbush, SW.; Bryk, AS. Hierarchical linear models: Applications and data analysis methods. 2nd ed.. Sage Publications; Newbury Park, CA: 2002.
- Raudenbush, SW.; Bryk, AS.; Cheong, YF.; Congdon, R.; du Toit, M. HLM 6: Hierarchical linear and non-linear modeling [Computer software]. Scientific Software International; Lincolnwood, IL: 2004.
- Reed MB, Lange JE, Ketchie JM, Clapp JD. The relationship between social identity, normative information, and college student drinking. *Social Influence*. 2007; 2:269–294.
- Tajfel, H.; Turner, JC. The social identity theory of inter-group behavior.. In: Worchel, S.; Austin, LW., editors. *Psychology of intergroup relations*. Nelson-Hall; Chicago, IL: 1986. p. 7-24.
- Tropp LR, Wright SC. Ingroup identification as the inclusion of ingroup in the self. *Personality and Social Psychology Bulletin*. 2001; 27:585–600.
- Turner, JC.; Hogg, MA.; Oakes, PJ.; Reicher, SD.; Wetherell, MS. Rediscovering the social group: A self-categorization theory. Basil Blackwell; Cambridge, MA: 1987.
- Wechsler H, Lee JE, Kuo M, Seibring M, Nelson TF, Lee H. Trends in college binge drinking during a period of increased prevention efforts. *Journal of American College Health*. 2002; 50:203–217. [PubMed: 11990979]
- Wechsler H, Nelson TE, Lee JE, Seibring M, Lewis C, Keeling RP. Perception and reality: A national evaluation of social norms marketing interventions to reduce college students' heavy alcohol use. *Journal of Studies on Alcohol*. 2003; 64:484–494. [PubMed: 12921190]
- Werch CE, Pappas DM, Carlson JM, DiClemente CC, Chally PS, Sinder JA. Results of a social norm intervention to prevent binge drinking among first-year residential college students. *Journal of American College Health*. 2000; 49:85–92. [PubMed: 11016132]
- White HR, Mun EY, Pugh L, Morgan TJ. Long-term effects of brief substance use interventions for mandated college students: Sleeper effects of an in-person personal feedback intervention. *Alcoholism: Clinical and Experimental Research*. 2007; 31:1380–1391.

Figure 1.
Participant flow.

Figure 2.
Drinks per week as a function of intervention condition and social identity.

Figure 3.
Perceived norms as a function of intervention condition and social identity.

Table 1

Poisson mixed model results for drinking

Outcome	Predictor	Parameter estimate	Standard error	<i>t</i>	<i>p</i>
Drinks per week	Time	0.072	0.008	8.68	<.0001
	PNF	0.363	0.240	1.52	0.130
	SNMA	-0.215	0.253	-0.85	0.395
	SID	-0.118	0.148	-0.80	0.427
	PNF × SID	0.039	0.188	0.21	0.837
	SNMA × SID	0.306	0.207	1.48	0.140
	Time × PNF	-0.027	0.010	-2.54	0.011
	Time × SNMA	-0.030	0.012	-2.43	0.016
	Time × SID	0.027	0.008	3.43	0.001
	Time × PNF × SID	-0.031	0.009	-3.37	0.001
	Time × SNMA × SID	-0.078	0.011	-6.96	<.0001
Frequency	Time	0.033	0.009	3.60	0.001
	PNF	0.077	0.160	0.48	0.632
	SNMA	-0.183	0.167	-1.09	0.276
	SID	0.074	0.094	0.79	0.433
	PNF × SID	-0.027	0.122	-0.22	0.826
	SNMA × SID	0.064	0.137	0.47	0.642
	Time × PNF	0.000	0.013	0.02	0.981
	Time × SNMA	-0.017	0.014	-1.23	0.219
	Time × SID	-0.001	0.008	-0.23	0.815
	Time × PNF × SID	0.000	0.010	0.02	0.982
	Time × SNMA × SID	-0.023	0.011	-2.06	0.040
Nonabstinence Any drinking	Time	0.046	0.015	3.13	0.002
	PNF	0.270	0.218	1.24	0.215
	SNMA	-0.285	0.238	-1.19	0.233
	SID	-0.018	0.134	-0.14	0.891
	PNF × SID	-0.018	0.169	-0.11	0.916
	SNMA × SID	0.135	0.197	0.69	0.491
	Time × PNF	-0.024	0.020	-1.23	0.219
	Time × SNMA	-0.022	0.022	-1.02	0.311
	Time × SID	0.010	0.012	0.84	0.403
	Time × PNF × SID	-0.017	0.015	-1.09	0.276
	Time × SNMA × SID	-0.058	0.018	-3.20	0.002

Table 2

Poisson mixed model results for perceived norms

Outcome	Predictor	Parameter estimate	Standard error	<i>t</i>	<i>p</i>
Perceived norm: Drinks per week	Time	0.004	0.001	2.91	0.004
	PNF	-0.032	0.060	-0.52	0.601
	SNMA	-0.070	0.060	-1.16	0.249
	SID	-0.034	0.035	-0.97	0.335
	PNF × SID	0.041	0.045	0.90	0.367
	SNMA × SID	0.024	0.050	0.49	0.626
	Time × PNF	-0.004	0.002	-2.13	0.033
	Time × SNMA	-0.008	0.002	-3.72	<.0001
	Time × SID	0.003	0.001	2.91	0.004
	Time × PNF × SID	-0.003	0.002	-2.02	0.043
	Time × SNMA × SID	-0.004	0.002	-2.13	0.033
Perceived norm: Frequency	Time	0.003	0.004	0.90	0.368
	PNF	-0.088	0.058	-1.52	0.129
	SNMA	-0.035	0.057	-0.61	0.545
	SID	-0.022	0.033	-0.68	0.497
	PNF × SID	0.034	0.043	0.79	0.429
	SNMA × SID	0.016	0.047	0.34	0.736
	Time × PNF	-0.014	0.005	-2.53	0.012
	Time × SNMA	-0.009	0.005	-1.65	0.100
	Time × SID	0.004	0.003	1.43	0.152
	Time × PNF × SID	-0.003	0.004	-0.67	0.506
	Time × SNMA × SID	-0.005	0.004	-1.03	0.304
Perceived norm: % Abstainers	Time	-0.003	0.001	-2.17	0.030
	PNF	0.183	0.057	3.19	0.002
	SNMA	0.078	0.057	1.35	0.177
	SID	0.046	0.033	1.38	0.168
	PNF × SID	-0.019	0.043	-0.44	0.658
	SNMA × SID	-0.083	0.047	-1.75	0.080
	Time × PNF	0.009	0.002	5.91	<.0001
	Time × SNMA	0.009	0.002	5.70	<.0001
	Time × SID	-0.001	0.001	-1.46	0.144
	Time × PNF × SID	-0.001	0.001	-1.15	0.251
	Time × SNMA × SID	0.003	0.001	1.97	0.049