Experimental Test of Social Norms Theory in a Real-World Drinking Environment

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ABSTRACT. Objective: Social norms theory articulates that behavior is influenced by perceptions of behavioral norms. Social norms interventions attempt to modify perceptions of what behavior is normative as a means of influencing actual behavior. Social norms interventions have been widely used on college campuses to reduce the level of student drinking. The effectiveness of these interventions has been mixed. A social norms program might fail because the intervention operations failed to sufficiently implement social norms theory in the real world or because of the theory's limitations. Our research involves an experimental examination of the impact of social norms information on actual drinking behavior within a real-world drinking environment. **Method:** Nearly 3,000 participants were interviewed and randomly assigned to one of nine social norms feedback conditions before heading to bars and

nightclubs in Tijuana, Mexico. These same participants were resampled, interviewed again, and subjected to breath alcohol analysis when they returned to the United States. **Results:** We found that persons whose perceptions of normative drinking changed (became more accurate) during their visit to Tijuana consumed relatively less alcohol. We also found that providing participants with social norms feedback produced more accurate perceived norms. However, the effect sizes were too small to produce statistically significant results showing that social norms feedback could effectively reduce drinking via changing normative perceptions. **Conclusions:** Our research demonstrated that providing social norms feedback changed perceived drinking norms and that changes in perceived norms were correlated with reduced drinking. Effect sizes, however, were quite small. (*J. Stud. Alcohol Drugs*, 73, 851–859, 2012)

ALCOHOL USE IS HIGHLY PREVALENT among U.S. college students (Substance Abuse and Mental Health Services Administration, 2009), with an estimated 1,825 alcohol-related deaths and 500,000 alcohol-related injuries among college students annually (Hingson et al., 2009). Social norms marketing—campaigns to correct misperceptions about alcohol use—is one popular strategy for tackling the problem of student drinking. The National Institute on Alcohol Abuse and Alcoholism (2002) described social norms marketing as having “logical and theoretical promise” but lacking convincing and comprehensive evaluations (p. 20). Nevertheless, an estimated 48% of all 4-year colleges and universities in the United States have implemented a social norms marketing campaign on their campuses in an effort to reduce college drinking (Wechsler et al., 2003; also see Keeling, 2000).

Social norms theory

Social norms interventions are predicated on the fact that people are influenced by the real, imagined, or implied behavior of their peers. Because drinking tends to be a social activity and is done in groups of peers, alcohol consumption should be subject to intragroup processes, pressure to

conform (Asch, 1956; Cialdini and Trost, 1998; Deutsch and Gerard, 1955), and the desire to increase group identification (Mackie et al., 1990; Tajfel, 1982; Tajfel and Turner, 1986). People's drinking behavior and perceptions about existing norms regarding alcohol consumption (Clapp and McDonnell, 2000; Perkins, 1985, 1997; Perkins and Wechsler, 1996) should be influenced.

Considerable evidence has shown, however, that across contexts and demographic groups, people misjudge the actual normative drinking tendencies and perceive that peers consume alcohol more frequently and in greater volume than they actually do (Berkowitz, 2004a, 2004b; Borsari and Carey, 2003; Perkins, 2002). Given that group members' behavior can be influenced by the perceived norms of their group, and people often overestimate normative drinking, it follows that excessive drinking may be engendered, at least in part, by pressure or motivation to match behavior to perceived drinking norms that are inaccurately high. Social norms interventions attempt to reduce drinking by correcting this misperception and communicating to drinkers that normative consumption is actually lower than they perceive. The desired consequence of more accurate drinking perceptions is that normative influence should facilitate more moderate alcohol consumption.

Efficacy of social norms interventions

Social norms interventions typically rely on mass-marketing campaigns or brief personal interviews that include normative feedback to correct inaccurate perceived norms. Many empirical evaluations of these approaches have

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been supportive. For example, in a pre-post study, Mattern and Neighbors (2004) observed reductions both in perceived norms and in reported drinking following a social norms intervention conducted in a college residence hall. Comparable results were observed following a multimodal social norms campaign targeting student athletes (Perkins and Craig, 2006). Another campus-wide social norms program (Foss et al., 2000) used breath-test surveys of students (not merely self-reported drinking) to document reductions in student alcohol consumption following the campaign.

Experimental and quasi-experimental evaluations also support the efficacy of social norms approaches. One study of a multicampus mass-marketing campaign (DeJong et al., 2006) found a small but statistically significant reduction in self-reported drinking at schools that used social norms strategies (relative to controls), and another statewide evaluation found significant changes in perceived norms and self-reported driving after drinking in counties that received the intervention relative to counties that did not (Perkins et al., 2010). Importantly, a recent meta-analysis of 22 studies (Moreira et al., 2009) that met the criteria of random assignment to experimental condition found that social norms messaging (relative to a control) reduced short- and moderate-term heavy drinking and alcohol-related problems.

There are limitations to what the literature reports about the validity of the social norms theory. This is true both for studies that have demonstrated reductions in alcohol misuse and for studies that have failed to find significant effects (Carter and Kahnweiler, 2000; Clapp et al., 2001, 2003; Granfield, 2002; Wechsler et al., 2003; Werch et al., 2000). First, social norms programs could fail to show program efficacy for several reasons. Null findings could be attributable to limitations of the social norms theory or to inadequate implementation of the theory in natural drinking environments (Berkowitz, 2004b; Thombs et al., 2004). Unfortunately, little of the social norms research has collected information on mediating variables that would allow more direct testing of the proposed theory; neither have studies typically collected information on process data that might inform the fidelity of the study operations.

Second, even studies that attributed significant reductions in alcohol misuse to social norms interventions may suffer from plausible alternative explanations. The research to date has relied almost exclusively on drinking data derived from self-reported consumption, which may be subject to demand characteristics or socially desirable responding. This is particularly plausible regarding social norms interventions, given that they involve informing heavy drinkers that their behavior is not normal.

The research described herein addresses some limitations of the literature. The research involved experimental tests of social norms theory in a natural drinking environment using objective measures of alcohol consumption

(e.g., breath-based blood alcohol concentrations [BrACs] expressed in units of grams/deciliter). We did not evaluate a program; rather, we conducted an experiment designed to test whether the theory underlying social norms campaigns is supported.

Potential moderators of social norms feedback

In addition to testing whether providing social norms feedback has affected perceived norms and subsequent drinking behavior, research has examined whether variables might moderate the effect of this feedback (e.g., Borsari and Carey, 2003; Thombs et al., 2004). Factors that increase the persuasiveness of the social norms feedback should have a greater effect on behavior.

For a normative message to change a recipient's initial perceived norms, recipients must first attend to the normative message and become aware of the discrepancy between their beliefs and the true norm. Therefore, in our study we manipulated the salience of the social norms feedback under the hypothesis that social norms messages that stress this discrepancy should be more effective in correcting perceived norms. Second, social norms messages that are personally relevant to recipients may be more effective. Thus, we manipulated whether participants received accurate drinking norm feedback in reference to people in general or whether they received norms regarding specific gender and racial/ethnic groups. We hypothesized that the normative information would be more effective if it referred to a group with whom participants more closely identified (e.g., LaBrie et al., 2010; Lewis and Neighbors, 2007; Neighbors et al., 2010). Third, participants might not believe social norms information if it is inconsistent with their actual experiences. Therefore, we instructed some participants to seek out examples that confirmed the social norms information (whereas other participants received no such instructions). We hypothesized that participants who sought out specific examples consistent with the social norms information would be more influenced by the feedback that they received.

Method

Data were collected using the portal survey method (e.g., Johnson and Clapp, 2011; Lange et al., 2006; Voas et al., 2006) used at the San Ysidro border crossing between San Diego, CA, and Tijuana, Mexico. The portal survey method requires access to the "portal" of a high-risk drinking environment where participants can be sampled before entering the drinking environment and then resampled as they exit the environment. We have used the border crossing between San Diego and Tijuana in several studies because Tijuana represents a high-risk drinking environment, and the flow of pedestrian traffic through the border-crossing portal is well controlled, allowing for easy sampling of participants.

Participant recruitment

Data were collected on Fridays and Saturdays 1 weekend per month by two or three small teams of data collectors. During the "entry" portion of the study, participants were recruited just before they crossed into Mexico between 10 P.M. and 1 A.M. on survey nights. Groups of participants were randomly sampled from the flow of foot traffic as they approached the border crossing and were invited to take part in the study. These potential participants were offered a \$20 retail store gift card (to be given after completing the "exit" portion of the survey) for taking part in the study.

Entry survey

Once they provided informed consent, the participants completed a questionnaire. Items included were demographics, recent drinking quantity and frequency, how they arrived at the border crossing (e.g., driver, passenger), and their drinking intentions for the evening (i.e., not to drink, to get buzzed, to get drunk, or to get very drunk). In the last part of the questionnaire, participants provided information on their perceived social norms about the typical (normative) drinking levels of persons who visit the bars and clubs of Tijuana. Participants were asked to describe their perceptions of (a) the percentage who do not drink while in Tijuana, (b) the percentage who drink enough to become legally drunk while in Tijuana, (c) the average number of drinks typically consumed while in Tijuana, and (d) the percentage who consume 10 or more drinks while in Tijuana.

After completing the questionnaire, participant groups were randomly assigned to an experimental condition and were given social norms information corresponding to the condition to which they were assigned. Following receipt of the experimental instructions, participants were asked to provide a breath sample to measure alcohol consumption at entry. Finally, each participant was given a hospital-style identification bracelet bearing a unique identification number, which we used to match entry data with exit data for each participant.

Experimental variables

Participant groups were randomly assigned to one of nine experimental conditions, only two or three of which were randomly selected to be administered each survey night. Entire participant groups were assigned to the same experimental condition based on which survey team recruited them. Individuals in the same group were never assigned to different conditions.

One condition served as a nonintervention control, and the participants in the eight remaining conditions received accurate normative information. The method of providing social norms feedback in the remaining eight conditions var-

ied via the manipulation of three independent variables: (a) the salience of the discrepancy between actual and perceived norms, (b) the specificity of the reference group to which the normative information applied, and (c) the believability of information (whether participants received experimental instructions to seek out examples of nondrinkers and light drinkers in Tijuana).

Social norms feedback information was given to participants in a single, brief dose via graphs generated on a tablet-style computer. A separate graph was used to show the actual normative drinking levels for each of the four drinking items (percentage nondrinkers, percentage legally drunk, average standard drinks consumed, percentage consuming ≥ 10 drinks). In the low-salience condition, participants simply saw four graphs that displayed the actual, accurate values (based on pilot data) for each of the four items. In the high-salience condition, each graph not only revealed the accurate norms but also included the mean perceived norms (also based on pilot data), thus stressing the discrepancy between actual drinking norms and the public's perceptions.

In the low-specificity condition, the social norms feedback given to participants was based on the means of the total sample of pilot study subjects (collected previously at the Tijuana border crossing). In the moderate-specificity condition, participants were given information on the perceived norms for each race/ethnicity and gender combination against the actual normative value for each item. This allowed participants to see that even people similar to themselves held inaccurate norms. Finally, in the high-specificity condition, we provided both the actual norms and perceived norms for each Sex $\times$ Race/Ethnicity combination.

These first two experimental variables were crossed to create four social norms feedback conditions: (a) low-salience, low-specificity; (b) high-salience, low-specificity; (c) high-salience, moderate-specificity; and (d) high-salience, high-specificity reference groups. Figure 1 presents social norms feedback graphs that were shown to participants under each condition. During the study, participants saw one graph for each of the four drinking items, but because of space issues, we provide graphs for only one of the four drinking items.

Exit survey

At 1:00 A.M., data collectors relocated to the outside of the border-processing center where individuals pass to re-enter the United States. These data collectors attempted to resample the same participants (identified by hospital-style identification bracelets) to complete the second part of the study. Resampled participants were interviewed and asked about drinking behavior while in Tijuana, means of transportation home, and their current perceived norms (on the four drinking items). Interviewers also asked participants to provide an anonymous breath sample. Finally, data collectors

FIGURE 1. Percentage of people who visit Tijuana and do not drink alcohol: Experimental social norms feedback provided to participants

removed participants' identification bracelets and gave each a \$20 gift card.

Results

Data collection occurred over 52 weekend nights from January 2008 to August 2009, during which 2,972 individuals (from 935 peer groups) were contacted and invited to participate. Of those contacted, 128 (4.3%) refused to participate, and 499 (16.8%) completed the entry survey but did not return for the exit survey. A total of 2,218 participants (74.6% of those recruited) completed both the entry and exit surveys and provided entry and exit breath tests. The proportion who did not return for the exit survey did not vary by conditions ($p = .84$).

Our working sample was 61.8% male, 59.8% of whom were younger than age 21 and 20.5% of whom drove to the border crossing. The majority were Hispanic (69.6%), with a minority of White (non-Hispanic) (9.7%), racial minority (non-Hispanic) (14.0%), and multiracial or "other" (6.8%) participants. Most participants (80.0%) entered with a blood alcohol concentration of 0 (mean entry BrAC = .010).

Social norms

Participants were asked to provide their perceptions of normative drinking levels during the entry survey (before the experimental manipulations) and again during the exit survey. Table 1 shows the (descriptive) actual and perceived norms of our sample. The table shows that participants' perceived norms overestimated the actual drinking in Tijuana. The last column shows the social norms feedback (based on pilot data) that was provided to participants. The feedback closely matched the actual normative behaviors measured during the study.

Analytic goals

Our analyses addressed three broad goals relevant to understanding the efficacy and limitations of providing accurate social norms information to change behavior. The first goal was to test the hypothesis that changes in perceived drinking norms were correlated with changes in actual drinking. Specifically, we hypothesized that persons whose perceived drinking norms changed toward accuracy (for whatever reason) would drink relatively less. Because we measured perceived norms during entry as well as exit from Tijuana, we could compute the change in perceived norms between the two time points.

The second goal was to test whether the experimental interventions significantly affected participants' perceived drinking norms. This involved comparing control participants with participants who received social norms feedback on degree of change in perceived drinking norms.

TABLE 1. Actual and perceived social norms

Variable	Perceived norms	Actual norms	Norms feedback
% who return with BrAC = .00	17.3%	33.5%	33.3%
% who return with BrAC $\geq$.08	48.0%	28.9%	28.9%
Mean no. of drinks consumed	6.8	4.3	4.1
% who consumed ≥ 10 drinks	43.5%	4.8%	4.7%

Notes: BrAC = breath alcohol concentration.

Additionally, this goal involved comparing mean "change-in-perceived-norm" scores among the different salience, reference-group specificity, and believability conditions. Finally, our third goal was to test whether the social norms interventions significantly reduced participants' BrACs and, specifically, whether this effect was mediated by the change in perceived norms.

Analytic approach

Our portal survey methodology produces data with a nested structure because individual participants are nested within peer groups, thus making the assumption of independent observations untenable. Accordingly, the research goals were addressed using generalized linear mixed modeling (SAS 9.2, SAS Institute, Inc., Cary, NC), with peer group modeled as a random variable.

Hypothesis 1: Changes in perceived drinking norms will predict drinking behavior. We computed the value for each of the four drinking items, scored so that larger (positive) values reflected reductions in perceptions of excessive drinking. We subjected the four difference scores to a principal components analysis and retained a factor score for the first factor (the only factor with an eigenvalue > 1). This factor score was a standardized composite measure where a 0 indicated mean average change in perceptions. Increasingly positive factor scores indicated that participants' drinking perceptions changed toward greater accuracy. Negative scores reflected minimal change toward accuracy or change away from accuracy.

We predicted participants' exit BrACs from their change-in-perceived-norms factor scores. Our analyses also included entry BrAC, sex, race/ethnicity, age, drinking intentions, driver status, and drinking history as covariates. Drinking history was represented as a factor score reduced from three quantity and frequency drinking items. The primary finding of this analysis was a statistically significant main effect of the change-in-perceived-norms factor score on exit BrACs, $F(1, 610) = 5.6, p < .05$. The slope was negative (unstandardized $B = -.003$) and significant above and beyond the covariates. To the extent that participants' perceived norms changed in the direction of less excessive drinking (greater accuracy), their own alcohol consumption was significantly lower. Every change in perceived norms of 1 *SD* was associated with a reduction in BrAC of .003; for example, change

from two standard deviations above the mean to two below the mean was associated with a reduction in BrAC of .012.

Hypothesis 2: Social norms feedback will influence participants' perceived drinking norms. These analyses included tests of the experimental variables' impact on participants' perceived drinking norms. The standardized change-in-perceived-norms variable served as the dependent measure, although it was rescaled for interpretability when making sense of results.

The analyses focused on five main tests: social norms versus control, low versus high salience, low versus moderate specificity, moderate versus high specificity, and confirmation instructions versus no instructions. These tests were conducted via a series of planned contrasts within an omnibus model, $F(8, 635) = 5.4, p < .01$, that included the nine-level experimental condition variable as the effect of interest. The omnibus model included sex, race/ethnicity, driver status, age category, drinking history, and drinking plans as control variables, as well as peer group as a random variable. Because of space limitations, we did not interpret the covariates.

The first contrast, which compared the mean change-in-perceived-norms score for the control condition with the eight social norms feedback conditions, was statistically significant, $t(635) = 4.2, p < .01$. The second contrast compared the low-salience, low-specificity conditions with the high-salience, low-specificity conditions. The difference in mean change-in-perceived-norms scores between the two was not significant ($p = .82$). The third contrast, comparing the high-salience, low-specificity conditions with the high-salience, moderate-specificity conditions, also was not significant ($p = .32$). The fourth contrast, moderate-reference-group specificity versus high-reference-group specificity (both high salience), was statistically significant, $t(635) = 2.16, p < .05$. Finally, the fifth contrast, which compared the four no-instruction conditions with the four confirmation-instruction conditions, was statistically significant, $t(635) = -2.22, p < .05$.

Our change-in-perceived-norms factor score was standardized so that a 0 indicated mean change in norms, not no change. To make this variable easier to interpret, we rescaled the factor score to the same metric as the change in perceived norms regarding the percentage of Tijuana visitors who consumed 10 or more drinks ($M = 14.5, SD = 26.8$). Accordingly, a factor score of 1.0 was rescaled to reflect a change in perceived norms by 41.3 percentage points (toward perceptions of less drinking). A factor score of -1.0 meant that perceived norms changed by 12.3 percentage points toward perceptions of more perceived drinking.

Table 2 reveals the model-estimated change-in-perceived-norms score (rescaled) for each of nine experimental conditions. Specific hypothesis were tested by contrasting the means of different combinations of these nine groups. For example, a contrast described as (A + B vs. C + D) would test the null hypothesis that the mean score of participants

TABLE 2. Model-estimated change-in-perceived-norm scores per experimental condition

Condition	Salience	Specificity	Confirmation	Change in perceived norms
A	Control	Control	Control	4.1%
B	Low	Low	No	17.0%
C	Low	Low	Yes	19.4%
D	High	Low	No	14.5%
E	High	Low	Yes	23.0%
F	High	Moderate	No	13.4%
G	High	Moderate	Yes	19.3%
H	High	High	No	11.7%
I	High	High	Yes	10.4%

assigned (in aggregate) to conditions A and B was equal to the mean score of participants assigned (in aggregate) to conditions C and D, with + signs indicating which groups of participants were combined before scores were averaged. The statistically significant contrast between the mean of the control condition participants and the mean of participants assigned to the eight social norms conditions (A vs. B through I) reflects a change of 16.1 percentage points (toward less drinking) by those who received the feedback relative to only 4.1 percentage points by the control.

The significant contrast between the moderate-specificity and high-specificity reference group conditions (F + G vs. H + I) was not in the intended direction. Participants in the high-specificity conditions changed their perceived norms 5.3 percentage points less than did those in the moderate condition. We hypothesize that more specific information would be more persuasive.

Finally, the significant confirmation-instruction contrast (B + D + F + H vs. C + E + G + I) showed that participants who were instructed to seek examples of nondrinkers while in Tijuana changed their perceived norms 3.8 percentage points more (toward more accuracy) than did groups that did not receive these instructions. An exploratory analysis examined the effect of the confirmation instructions within each of the four experimental blocks. The analysis found that confirmation instructions had a significant impact on change in norms only in the high-salience conditions with low or moderate specificity ($p < .01$) but not in the low-salience condition ($p = .51$) or high-salience, high-specificity condition ($p = .71$) (see Table 2 for means).

Hypothesis 3: Providing accurate feedback on drinking norms will reduce alcohol consumption. If providing participants with accurate drinking norms information caused significant changes in perceived norms, and if changes in perceived norms were associated with lower drinking, it follows that providing social norms feedback should significantly decrease BrACs of participants returning from Tijuana. The largest effect of the experimental variables on perceived norms involved the omnibus contrast between the control group and all of the social norms feedback

TABLE 3. Perceived and actual norms by three conditions

Variable	Initial perceptions	Exit perceptions	Actual behavior
Control condition			
% BrAC = .00	17.2%	12.5%	65.8%
% BrAC $\geq$.08	49.2%	51.6%	26.7%
Mean no. of drinks	6.9	6.5	4.6
% ≥ 10 drinks	46.3%	36.4%	13.2%
Social norms feedback (excluding high specificity)			
% BrAC = .00	16.9%	17.9%	66.9%
% BrAC $\geq$.08	49.3%	46.5%	29.2%
Mean no. of drinks	6.9	5.7	4.2
% ≥ 10 drinks	44.4%	28.0%	9.1%

Notes: BrAC = breath alcohol concentration.

conditions combined. If any comparison among conditions produced significant differences in exit BrAC, it seemed reasonable that this comparison would be most likely. The analysis of control versus social norms feedback conditions on exit BrACs controlled for demographics and entry BrAC. The planned contrast, however, failed to find a significant difference between the conditions on exit BrACs ($p = .42$). We excluded nondrinkers from the analysis because it seemed that they would be unaffected by the intervention even if drinkers were affected, but this effect, too, was non-significant ($p = .50$). We similarly conducted tests including only participants with BrACs of .02 and .04 and higher, and in no case did the effect approach statistical significance. Thus, the chain between the norms feedback, changes in perceived norms, and exit BrAC could not be confirmed. No other planned contrasts (of the salience, reference-group specificity, and confirmation-instruction conditions) produced a statistically significant difference in exit BrACs.

For descriptive purposes, in Table 3, we present raw data (not model adjusted) depicting perceived norms at entrance, perceived norms at exit, and actual drinking behavior separately for control participants and participants who received social norms feedback. Data for the experimental group exclude cases from the high-specificity conditions. The data suggest more accurate pre- versus post-change for participants in the social norms condition but few differences in behavior (expect, perhaps, for the percentage consuming ≥ 10 drinks).

Discussion

This research experimentally tested the effect of providing accurate drinking norm feedback on perceived norms and on objectively measured alcohol consumption in the context of a natural drinking environment. Although the research occurred in the field, this study was a test of theory, not an evaluation of an intervention. We argue, however, that field experiments are an important but overlooked step in the translation of basic research to practical scientific applications. By administering social norms feedback via brief interviews in a real-world environment, we hoped to provide

definitive support for the theoretical mechanisms posited to underlie social norms interventions.

A fundamental aspect of social norms theory is that perceived norms influence behavior and that changing norms should change behavior. Our research demonstrated a significant relationship between changes in perceived norms and alcohol consumption (measured from breath samples). Although this relationship cannot be shown to be causal, the presence of a correlation is necessary for a causal relationship to exist, and the lack of significant correlation would be inconsistent with the theory.

The experimental manipulation of social norms feedback significantly affected participants' perceived norms. Those who received accurate normative information later changed their norms, on average, to be more accurate (toward perceptions of less excessive drinking). Our efforts to moderate the effect of the social norms feedback by increasing the salience and specificity of the norms message were unsuccessful. In fact, providing participants with highly detailed information appeared to reduce the effect. Our only explanation for this is that the high-salience, high-specificity condition offered too much information that was too complex to be processed by participants in the field.

The confirmation instruction manipulation did moderate the effectiveness of the social norms intervention. Participants who were instructed to seek examples of nondrinkers and light drinkers in the bars and clubs they visited experienced significantly more change in their norms than did participants who did not receive such instructions. This finding is consistent with the idea that the efficacy of social norms feedback may be undermined by individual experience. Encouraging individuals to find firsthand experiential evidence that confirms that normative information appeared to increase its effectiveness. Future research will need to explore this effect more carefully.

Theory, effect sizes, and practical significance

Our desire was to demonstrate via mediational analysis that our experimental manipulations reduced drinking by changing perceived norms. However, direct tests of social norms feedback failed to predict significant changes in participants' BrACs. The relationship between changes in perceived norms and exit BrACs, although statistically significant, was quite weak. This weakness reduced the likelihood of detecting significant mediation.

It is important to note, however, that the social norms communication administered via our experimental manipulation was quite brief. Successful social norms marketing programs (DeJong et al., 2006) typically involve considerably greater exposure to the norms message (i.e., years) than our study did, and even successful social norms feedback provided through brief motivational interviews (Carey et al., 2006; Murphy et al., 2001) involves 30 or more minutes

of interaction. Furthermore, these face-to-face normative-feedback efforts typically are personalized for the recipient. Nevertheless, even the 3-minute exposure of general social norm information in our study appeared to influence participants' perceived norms. Second, participants were sampled en route to a drinking environment. Even with a relatively open border between San Diego and Tijuana, trips into Mexico require some effort and often entail waiting in line at Customs to reenter the United States. Thus, these trips are purposeful, and people who cross into Mexico and plan to drink alcohol likely placed some importance on that behavior. A person's drinking intentions strongly predict his or her actual alcohol consumption (Lange et al., 2006). Therefore, it is not unexpected that, in this context, changes in norms only weakly predicted changes in drinking behavior. It might be different if the research were dealing with persons whose drinking decisions were more discretionary. Accordingly, social norms strategies might more effectively shape an individual's drinking intentions.

The research does underscore the importance of message recipients actively processing the normative information. Moreira et al.'s (2009) review suggests that norms-feedback interventions tend to be more effective when participants are engaged in the information presentation, either during face-to-face interviews or over the web (where, presumably, if participants were willing to go to the website to access the information, they had some motivation to attend to it). In our study, the instruction to seek out nondrinkers and light drinkers—which was designed to make the normative information more experiential (thus personal) and less didactic—did influence perceived norms and is consistent with evidence regarding the value of personal engagement. We hypothesized that directly manipulating the salience of the inaccuracy between perceived and actual norms would facilitate engagement with the information, but we have no evidence that our operation had the psychological effect that we intended.

Future endeavors

Field experiments provide opportunities to conduct basic tests of theory in environments with high ecological validity. Such studies may aid in the transition of science to practice by demonstrating that theoretical relationships persist in real-world environments and are not enveloped by countervailing factors and influences. This research found that, even in natural drinking environments, changes in perceived norms correlate with reduced drinking levels and that it is possible to change people's normative perceptions by providing them with information on actual drinking norms.

One important question is "At what point in the drinking-decision process does the perceived norm influence behavior?" Whether individuals make drinking plans with norms in mind or whether they manage their behavior on the fly

and rely on normative information for a given context suggests different obstacles for implementing successful social norms strategies. If perceived norms typically influence the construction of drinking intentions and guide behavior outside of the drinking environment, then the value of confirmation-type instructions in a standard social norms marketing campaign is less clear.

Another larger, theoretical question might be "What is the efficacy of social norms information that has been provided to a particular population?" Presumably, perceived norms operate like any other cognition and follow general rules of cognitive functioning (e.g., accessibility, relevance). Thus, even if a social norms campaign successfully communicates accurate drinking information to an audience, and even if this information is stored in explicit memory, there is no guarantee that this information will be accessible at the times when it has the best opportunity to influence behavior (e.g., in drinking environments or when drinking plans are being formed). Thus, it might be worth studying the accessibility of normative information at different times among populations that have been exposed to accurate social norms feedback. Given that alcohol consumption has been found to influence what cognitions are accessible in memory (e.g., the alcohol myopia model; Steele and Josephs, 1990), the primary obstacle to changing behavior via normative feedback may not be how the information is communicated but whether environmental features reduce its accessibility and consequent use.

Social norms marketing strategies have been widely used to reduce unhealthy behaviors (e.g., excessive drinking, smoking, drunk driving), but the results have been inconsistent. Even when evaluations of large-scale social norms marketing programs demonstrate significant changes in behavior, it is often unclear whether these changes were mediated by perceived norms or whether it was some other mechanism. There still is considerable opportunity, however, to conduct basic research on the processes through which normative feedback might influence behavior. Focused experimental studies may eventually inform public health practitioners regarding how to develop effective social norms programs that reliably reduce unhealthy behavior.

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