Psychology of Addictive Behaviors

Test of a Deviance Regulation Theory Intervention Among First-Year College Student Drinkers: Differential Effects via Frequency and Quantity Norms

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Objective: First-time-in-college (FTIC) students are relatively inexperienced with alcohol and have pressure to assimilate to new norms, and, therefore, are at a heightened risk of alcohol-related consequences. The present study investigates the use of a brief deviance regulation theory (DRT) intervention to increase the use of protective behavioral strategies (PBS) among FTIC students. ***Method:*** Participation took place completely online. Participants were first-year college students ($n = 147$, $M_{age} = 18.11$, 77.68% female) at a large southwest U.S. university. Participants were randomly assigned one of three conditions: (a) a positive message about individuals who use PBS, (b) a negative message about individuals who do not use PBS, or (c) an assessment-only control group. Participants then completed weekly assessments for 5 weeks, examining alcohol use and consequences, PBS use, and perceived PBS norms. Contrasting previous research, the present study investigated weekly effects of the intervention. In addition, norm type (quantity vs. frequency) was examined as moderators of intervention messaging. ***Results:*** Across conditions, both quantity and frequency norms increased over time. The positive message produced immediate and lasting effects on SLD PBS among those with higher ($+1$ *SD*) frequency norms. The intervention effects for the negative message, using the quantity norm, grew across time on all PBS. ***Conclusions:*** These results provide initial support for the use of a DRT prevention program for FTIC students. Negative messages may promote long-term PBS use, while positive messages may be most effective in addressing immediate and lasting changes in the use of alcohol protective strategies.

Public Health Significance Statement
This study supports the efficacy of a deviance regulation theory (DRT) intervention for increasing protective behavioral strategies among first-time-in-college (FTIC) students. The findings emphasize the importance of "fitting in" among this population of students, which may be important to incorporate in FTIC-targeted alcohol interventions.

Keywords: deviance regulation theory, protective behavioral strategies, alcohol, college students, first-time-in-college or FTIC or college freshmen or first-year students

The first year of college is an incomparable life transition where social identity development accelerates (Borsari et al., 2007). This distinct developmental period accompanies identity exploration and rapid behavior change (Arnett, 2005). Alcohol consumption peaks during this period, particularly in the first few weeks of college when risky drinking increases and the utilization of safe drinking practices decreases (Fromme et al., 2008). Additionally, first-time-in-college (FTIC) students have several social experiences (e.g., going to fraternity parties, meeting others in their dormitories) during the first few weeks of college, many of which involve alcohol. These experiences lead to the development of perceived alcohol norms (Pedersen et al., 2010) and predict alcohol consumption during the first year of college (Borsari et al., 2007). Notably, perceived alcohol norms have been consistently shown to predict alcohol involvement in college students (Neighbors et al., 2007).

Alcohol Norms Among FTIC Students

Perceptions of normative alcohol use are comprised of two distinct types of norms. *Descriptive norms* highlight the perceived *quantitative value* of a given behavior. These norms can take the form of a *quantity* norm (e.g., the belief about *what percent* of people engage in a behavior) or a *frequency* norm (e.g., the belief about *how often* people engage in a behavior). *Injunctive norms*, in contrast, highlight the perceived approval of a given behavior (e.g., the extent to which people believe a behavior to be *acceptable* vs. *unacceptable*). Both perceived descriptive and injunctive norms have been linked to alcohol use (Borsari & Carey, 2003). One common component of interventions for college student drinking has been to use normative feedback to modify consumption levels (Lewis & Neighbors, 2006). These intervention components hinge on pluralistic ignorance, the notion that individuals have inaccurate perceptions of the true norm. It is posited that by highlighting this discrepancy, individuals bring their behavior in line with the true norm. These interventions involve asking individuals to list their normative perceptions and then providing them with information on the true norm (Lewis & Neighbors, 2006). With only a few exceptions (see Prince et al., 2013), these interventions leverage the perceived *descriptive*, rather than the perceived *injunctive*, norm (Lewis & Neighbors, 2006). Further, the majority use the *frequency norms* (e.g., how many drinks do individuals consume?), rather than the *quantity norms* (e.g., what percent of individuals drink?) as a way to target and change behavior (see Lewis & Neighbors, 2006).

However, recent large-scale meta-analyses have indicated normative feedback approaches may not be as successful as once believed (Huh et al., 2015). Thus, to aid FTIC students make a healthy college transition, alternative approaches may be critical. For example, while targeting consumption is a necessary component to reduce alcohol consequences, it is also important to target other outcomes, such as responsible drinking strategies, that are not strictly limited to consumption level but have a direct impact on alcohol consequences. Furthermore, interventions should address additional psychological processes underlying drinking behavior. Evidence indicates that drinking behaviors among FTIC students hinge on the desire to stand out in meaningful ways from peers (Ferrer et al., 2012). Thus, approaches that allow FTIC students to identify themselves as unique from the broader social context may provide new ways to target maladaptive drinking.

Protective Behavioral Strategies

Protective behavioral strategies (PBS) are behaviors shown to reduce rate and severity of alcohol-related outcomes (Pearson et al., 2013). Motivating people to increase their use of PBS is a basic harm reduction approach to decrease the adverse effects experienced by alcohol consumption (Marlatt et al., 1995). Three subtypes of PBS exist (a) manner of drinking (MD; e.g., avoiding mixing different types of alcohol), (b) stopping/limiting drinking (SLD; e.g., stopping drinking at a predetermined time), and (c) serious harm reduction (SHR; e.g., having a designated driver). Previous research has found that students who implement PBS can avoid or reduce negative alcohol-related outcomes (Lewis et al., 2010; Peterson et al., 2020; Pearson et al., 2013; Treloar et al., 2015). Interestingly, research has shown that the three subscales of PBS are differentially related to alcohol outcomes. MD and SLD are often linked to consumption, but not consequences. In contrast, SHR is often linked to problems, but not consumption (Pearson, 2013). Thus, although some PBS interventions have examined PBS as a single construct (see Dvorak, Troop-Gordon, et al., 2018; Martens et al., 2013), it has been suggested that interventions targeting PBS examine each subscale independently, rather than using a combined single construct (Peterson et al., 2021).

PBS-Based Interventions

Incorporating PBS into prevention programs may minimize the alcohol-related problems (Dvorak et al., 2017; Lewis et al., 2010; Martens et al., 2007). Despite consistent negative relations between PBS use and alcohol outcomes in both cross-sectional and longitudinal research (Barnett et al., 2007; Larimer et al., 2007; Martens et al., 2007), the evidence for stand-alone PBS interventions has been mixed. Martens et al. (2013) implemented an intervention comparing alcohol personalized normative feedback (PNF) and PBS feedback (PBSF; a form of normative feedback based on individuals perceived PBS norms) to increase the use of PBS. Across three consumption measures, PNF was more effective at reducing alcohol consumption than PBS. However, at the 6-month follow-up, PBSF showed the only significant increase in PBS use and the most robust decrease in alcohol consequences. LaBrie et al. (2015) found evidence that a stand-alone PBS skills training and personal PBSF intervention increased PBS use. Sugarman and Carey (2009) found that simply instructing students to use more PBS resulted in greater PBS use but no change in alcohol consumption. In contrast, Kenney and colleagues found that a stand-alone PBS intervention produced increased PBS use and subsequent decreases in heavy alcohol consumption and alcohol consequences (Kenney et al., 2014). In summary, stand-alone PBS-based interventions appear to increase PBS consistently. Though effects on consumption are less consistent, they may be most effective at reducing alcohol consequences.

Normative feedback interventions for PBS highlight pressures to "fit in." The value of a normative correction intervention is that it works off that existing motive, so that "fitting in" transforms from a desire to drink heavily/irresponsibly to a desire to drink in moderation/responsibly. However, college students are also motivated by the desire to "stand out," and this motive can influence alcohol-related decisions (Dvorak et al., 2015, 2016, 2017; Dvorak, Kramer, et al., 2018; Dvorak, Troop-Gordon, et al., 2018). Ferrer et al. (2012) found that transitions in drinking among FTIC students

may hinge on a need to differentiate themselves from the norm, suggesting two potentially viable norm-based strategies for promoting PBS in college. One would be to encourage PBS use to fit in and the other to stand out. *Deviance regulation theory* (DRT) provides guidance on implementing such approaches.

Deviance Regulation Theory

DRT posits that we form identities based on how we deviate from surrounding norms (Blanton & Christie, 2003). Positive self-perceptions are grounded in how we stand out in positive ways. People come to think of themselves as happy, charitable, and competent to the extent that they feel counter-normatively (or unusually or exceptionally) happy, unselfish, and qualified concerning the norms surrounding these attributions. Their negative perceptions arise from an equivalent system, one in which they see that they are distinguishing themselves in ways that bring disfavor, either in their own eyes or in others. This theory then posits two ways that people might regulate their identity concerning the surrounding norms. The desire to "stand out" is an approach regulatory system oriented toward achieving positive identities that contrast in desirable ways from prevailing norms. The desire to "fit in" is an avoidance regulatory system, oriented toward avoiding negative identities that deviate in undesirable ways from prevailing norms.

The initial empirical tests of this theory focused on applications in the health domain. Blanton et al. (2001) found that messages designed to encourage or promote healthy behavior were most effective when unhealthy behaviors were perceived to be most common (normative). In contrast, messages designed to discourage or prevent unhealthy behaviors were most effective when healthy behaviors were perceived to be most common (normative). Since this early work, a series of studies by Dvorak and colleagues have tested the effects of DRT-based interventions on substance use behaviors and found it has utility (Dvorak et al., 2015, 2016, 2017; Dvorak, Troop-Gordon, et al., 2018; Sargent et al., 2018). DRT has been shown to increase PBS use and subsequently decrease alcohol consumption and consequences in college student drinkers (Dvorak et al., 2015, 2017; Dvorak, Troop-Gordon, et al., 2018; Sargent et al., 2018). DRT-based interventions have been observed in regular drinking environments (Dvorak et al., 2015; Dvorak, Troop-Gordon, et al., 2018) and unique environments such as during spring break (Dvorak et al., 2017; Sargent et al., 2018). Neighbors et al. (2019) have shown that DRT can be used to modify heavy alcohol use by emphasizing heavy use as uncommon/unhealthy, thereby leveraging a desire to avoid standing out negatively.

Recently, Dvorak and colleagues (Dvorak, Troop-Gordon, et al., 2018) showed that DRT messaging might differentially affect how PBS use changes. Specifically, they found that, among individuals who believed PBS use was uncommon among peers, a positive message about individuals that use PBS resulted in immediate and sustained changes in PBS use. In contrast, among those that believed PBS use was common, a negative message about non-PBS users had no immediate effect but produced significant growth across time. These changes translated to fewer alcohol consequences, supporting a mediational model whereby the intervention produced safer drinking behaviors and subsequently lower alcohol-related risk. However, they did not examine how this intervention may exert influence on PBS, alcohol consumption, and alcohol consequences at the subject level.

Current Concerns

Standing Out (Approach) or Fitting In (Avoid)?

DRT posits two motivational systems and guides what messages to apply within a given normative context. With PBS, for instance, DRT would indicate emphasizing the positive qualities of people who practice PBS among those that perceive PBS use to be uncommon. This messaging communicates PBS can be a positively defining choice. In contrast, DRT would emphasize the negative qualities of those who do not use PBS in populations that perceive PBS as typical. This messaging communicates the failure to use PBS can be a negatively defining choice. Unclear in this analysis, however, is what one should do in populations where PBS norms are *not* known. This is relevant to message designs seeking to promote PBS in FTIC students with no strong sense of PBS norms in this new environment.

Blanton and Hall (2009) argued that there would typically be value in adopting a negative frame for two reasons. According to prospect theory, a negative outcome (loss) is more aversive than a positive outcome (gain) of the same or similar magnitude (Tversky & Kahneman, 1974), and so this particular framing might engage a stronger self-regulatory mechanism. Second, by choosing to describe an unhealthy choice as bad, a communicator also communicates that the unhealthy choice is uncommon, a message that is consistent with the messaging goal. In contrast, by choosing to describe a healthy choice as good, a communicator also communicates that it is the healthy choice that is uncommon, a message that is consistent with the messaging goal (Stuart & Blanton, 2003). This suggested to them that, although there are risks of framing messages negatively, negatively framed messages have more tremendous potential to impact behavior, all other things being equal.

Norms in DRT Interventions

The early empirical tests of DRT operationalized behavioral norms in terms of prevalence—actions are more normative to the extent that they are practiced by larger numbers of individuals (i.e., the percent of individuals that use PBS). Research applying this framework to promote responsible drinking have considered a more comprehensive range of operationalizations. In their original study, Dvorak et al. (2015) divided participants into high and low norm groups based on perceptions of PBS use *quantity* (percent of peers that use PBS). However, in their most recent study, Dvorak, Troop-Gordon, et al. (2018) used a norm based on the *frequency* of PBS use (e.g., how often people use PBS), rather than the *quantity*, or percentage, of peers that use PBS. Notably, in their 2018 study, Dvorak and colleagues found that a negatively framed message about individuals that *do not* use PBS became stronger across time. Despite not targeting perceived PBS norms, a recent study showed increases in perceived PBS *quantity* norms across time as a function of a DRT prevention program (Dvorak, Kramer, et al., 2018). Thus, the intervention itself may influence perceived norms, perhaps to bring norms more into alignment with current behaviors or perhaps simply as a function of monitoring, but it is unclear if it will influence both *frequency* and *quantity* of norms. This is important

to understand given that the effect of a message depends on the norm (e.g., as norms increase, a negative message should become stronger). To date, no studies have examined the extent to which changes in PBS norms may affect the efficacy of the intervention messages across time. Further, if norms are changing at the moment level, this may impact the association between PBS use and alcohol outcomes at that level. Thus, examining within-person links between changing norms, PBS use, and alcohol outcomes may provide additional insight into how this intervention can be used to effect momentary changes in alcohol outcomes.

Overview

The present study aimed to examine the effect of a DRT-based intervention on alcohol PBS use, alcohol use, and alcohol-related consequences among FTIC students both within and across weeks. Previous research has suggested that DRT may increase norms across time, thereby increasing the effectiveness of the negative message (which should become stronger because a person believes there are fewer and fewer individuals not engaging in PBS). Thus, our first analysis tests the hypothesis (H1) that norms increase across time as a function of the DRT intervention, precisely due to receiving a negative message. The second set of hypotheses examines the effects of the intervention at the weekly level. It was hypothesized that, in a given week, individuals with high descriptive PBS use norms would engage in more PBS use if they received negatively framed messages about PBS *nonusers* (H2a). In contrast, individuals with low descriptive PBS use norms would engage in more PBS use if they received positively framed messages about PBS *users* (H2b). The final hypothesis examines the intervention across time. Specifically, we hypothesized that the effect of the negative message would grow across time as PBS norms increased (H3). These effects were expected to lead to lower alcohol consumption and fewer alcohol-related consequences within the week.

Method

Participants

Participants were current FTIC students who indicated drinking alcohol at least twice a month. Participants were recruited at the beginning of the Fall semester (2017) from a large, Southeastern State University. This semester was the participants' first time enrolled in a university. The analyzed sample ($n = 141$) ranged in age 18–20 years ($M = 18.09$, $SD = 0.31$). The sample was predominately female (74.83%), with 74.15% of participants identifying as White or Caucasian, 13.61% identified as Biracial, 4.08% identified as Black or African American, 2.04% identified as Asian, 5.44% did not respond; 27.21% of participants identified as ethnically Latino/a. The University of Central Florida's Institutional Review Board reviewed and approved this study. The clinical trial record for this study is NCT04699955. All project measures, stimuli, data, and analyses can be found at https://osf.io/akef9/.

Procedure

Screening

In Phase 1, participants were recruited via emails sent to all FTIC students at the university to complete a survey called "Longitudinal Use of Protective Strategies (Phase 1)." The online screening survey assessed demographics, weekly alcohol consumption, alcohol consequences, use of PBS, and perceived norms of PBS use. Participants who indicated consuming alcohol at least twice a month were invited to participate in Phase 2. The screener took participants about 30 min to complete. In addition, a random number generator in Stata was used to randomly select eligible participants to continue into Phase 2 of the study and randomly assign the eligible participants to one of three interventions to ensure statistical assumptions of random sampling and assignment were met.

Intervention and Follow-Ups

Phase 2 consisted of a 6-week program (1 preintervention week followed by five follow-up weeks with intervention reminders). In the first week, participants reported on past week alcohol use, PBS use, alcohol consequences, and PBS frequency and quantity norms. After this, they were randomly assigned to a condition. Those in the positive message condition received 10 brief positive messages about PBS users. Those in the negative message condition received 10 brief negative messages about PBS nonusers. Each Monday for the next 5 weeks, participants were emailed a link to a secure online survey that assessed the same variables from the preintervention week. The assessment period for each week asked the student to report on drinking, consequences, PBS use, and PBS norms from the past week. In the intervention groups, this was followed by a brief intervention reminder.

Intervention Description

Participants were randomly assigned to one of three conditions: Positive messages about people that use PBS, negative messages about people who DO NOT use PBS, or assessment-only control (no messaging). The messages were adapted from previous DRT studies (see Dvorak et al., 2016; Dvorak, Troop-Gordon, et al., 2018) and focus groups with FTIC students. Messages were presented on a screen as part of the assessment process. Each set of 10 messages takes ∼1 min to read and respond. Participants received the same 10 messages each week, following the completion of the weekly assessments. The assessment-only control received no messaging. The messages followed the rating of past week PBS use (i.e., the PBS-20), alcohol use, and experience of alcohol-related consequences (i.e., Young Adult Alcohol Consequences Questionnaire [YAACQ]). Positive messages stated: "Last year, we started examining the perceptions of Univeristy of Central Florida (UCF) students about other UCF students who DO USE these strategies. In general, we have found 10 basic perceptions about UCF students who DO USE these strategies regularly. Here is what other UCF students have told us. People who DO USE these strategies … " followed by positive statements (i.e., "tend to be seen as more responsible by their peers," "are seen as leaders by their peers," "are less impulsive and have better self-control"). In the negative message condition, the message stated: "Last year, we started examining the perceptions of UCF students about other UCF students who DO NOT USE these strategies. In general, we have found 10 basic perceptions about UCF students who DO NOT USE these strategies regularly. Here is what other UCF students have told us. People who DO NOT USE these strategies … " followed by socially harmful statements (i.e., "tend to be viewed as less responsible by their

peers," "are seen as outsiders by their peers," "are more impulsive and have worse self-control").

Measures

Demographics

Demographic information including sex assigned at birth, gender, age, race, ethnicity, sexual orientation, and high school and college Grade Point Average (GPA).

Daily Drinking Questionnaire-Modified

A modified version of the DDQ (DDQ-M) was used to assess alcohol consumption over a set period of time (Collins et al., 1985; Dimeff et al., 1999). The DDQ-M is a free-text grid where individuals report the number of drinks typically consumed for each day of the week over a specified period. In Phase 2, the DDQ-M was used to measure the number of drinks consumed each day of the past week. Each grid began with Monday and ended with Sunday, as surveys were sent out on Mondays. The DDQ-M has previously been used to assess alcohol use in a weekly timeline follow back manner for college students (see Dvorak et al., 2016; Dvorak, Troop-Gordon, et al., 2018) and shown excellent test–retest reliability (Dvorak et al., 2011; Kivlahan et al., 1990; Simons et al., 2009). In these data, the DDQ-M had correlations across weeks ranging from $r = .63$ to $.32$, $ps < .001$, and good internal consistency with Cronbach's α of .82 across all 6 weeks.

Young Adult Alcohol Consequences Questionnaire

The YAACQ is a 48-item survey of alcohol consequences (Read et al., 2006). Items assess eight categories of consequences (Social–Interpersonal, Impaired Control, Self-Perception, Self-Care, Risk Behaviors, Physical Dependence, Academic/Occupational, and Blackout Drinking). During Phase 2, participants reported alcohol consequences experienced in the past week. Previous research has found the YAACQ reliable and valid in college student samples (Read et al., 2007). Research has demonstrated the validity of using the YAACQ in a daily diary format (Pearson et al., 2013; Stevenson et al., 2019). The YAACQ showed excellent internal consistency with a Cronbach's α of .94 across all 6 weeks.

Protective Behavioral Strategies Survey

Current PBS use was measured by the PBS-20 (Treloar et al., 2015). The PBS-20 consists of 20 statements covering three factors of protective strategies: MD, SLD, and SHR. PBS use frequency was reported on a 5-point Likert scale from *never* to *always*. In Phase 1, participants were asked to record their PBS use from the past 3 months. In Phase 2, participants reported their PBS use from the previous week. Previous research supports the reliability and validity of PBS assessment in a weekly diary format (Dvorak, Troop-Gordon, et al., 2018; Pearson et al., 2013). Internal consistency ranged from $\alpha = .77$ to .94 across weeks.

PBS Norm Frequency

PBS frequency norms were assessed by asking, "How often do you think students at UCF use these types of strategies?" This item was rated on a 5-point Likert-type scale (1 = *never*, 5 = *always*). The analyses examine norm frequency each week, test weekly intervention effects on norm frequency, and changes in PBS norm frequency across time.

PBS Norm Quantity

PBS quantity norms were assessed by asking, "What percent of students at [removed] do you believe use these types of strategies?" Participants were presented with a slider that ranged from 0% to 100%. The analyses examine norm quantity each week, test weekly intervention effects on norm quantity, and changes in PBS norm quantity across time.

Analysis Overview

The analysis is divided into three parts to address the three sets of hypotheses conducted in M*plus* 8.6 (Muthén & Muthén, 2021). Missing data were assumed missing at random and handled via full information maximum likelihood. Note that for all models, two dummy coded conditions were used. The positive message was coded as 1 for positive and 0 for negative and control. The negative message was coded as 1 for negative and 0 for both positive and control. Thus, the control condition is set as the comparison condition for both the positive and negative conditions. All model parameters that include interactions with condition are the effects in the control condition. Each analysis uses traditional conventions of model fit indices to assess model fit whereby a nonsignificant χ^2 is indicative of good fit, a comparative fit index (CFI) > .90 indicates adequate fit, a root mean square error of approximation (RMSEA) < .08 indicates adequate fit, and a standardized root mean residual (SRMR) < .08 indicates adequate fit (Bollen, 1989).

To test Hypothesis 1, we specify a dual-process latent growth curve model. For this analysis, we use all data (both drinkers and nondrinkers) across all weeks regardless of whether or not an individual drank that week. After specifying the dual-process growth model, we add the conditions as predictors of the model intercepts and slopes. We hypothesized that a negative message would result in growth across both PBS frequency (FRQ) and quantity (QNT) norms.

A schematic of the paths for the second and third set of hypotheses is located in Figure 1. The second set of hypotheses examines the effect of the intervention on PBS use each week and the indirect effect of PBS on alcohol consumption and consequences that same week. To do this, we use a multilevel structural equation framework. Since PBS use co-occurs with alcohol consumption, weeks with no drinking were omitted. Thus, the second analysis examined the weekly associations between the intervention (Message × Norm), PBS use, alcohol consumption, and consequences. Participants reported on norms each week. Weekly PBS use was regressed onto cross-level interactions of weekly Norms × Condition. Alcohol consumption and problems were then regressed onto PBS use to examine mediated effects from norms across conditions. It was hypothesized that there would be a negative association between norms and PBS use among those that received a positive message and a positive association between norms and condition among those that received a negative message. These effects were hypothesized to translate into indirect effects on alcohol use and problems.

Figure 1

Theoretical Model at the Weekly and Between-Subject Levels
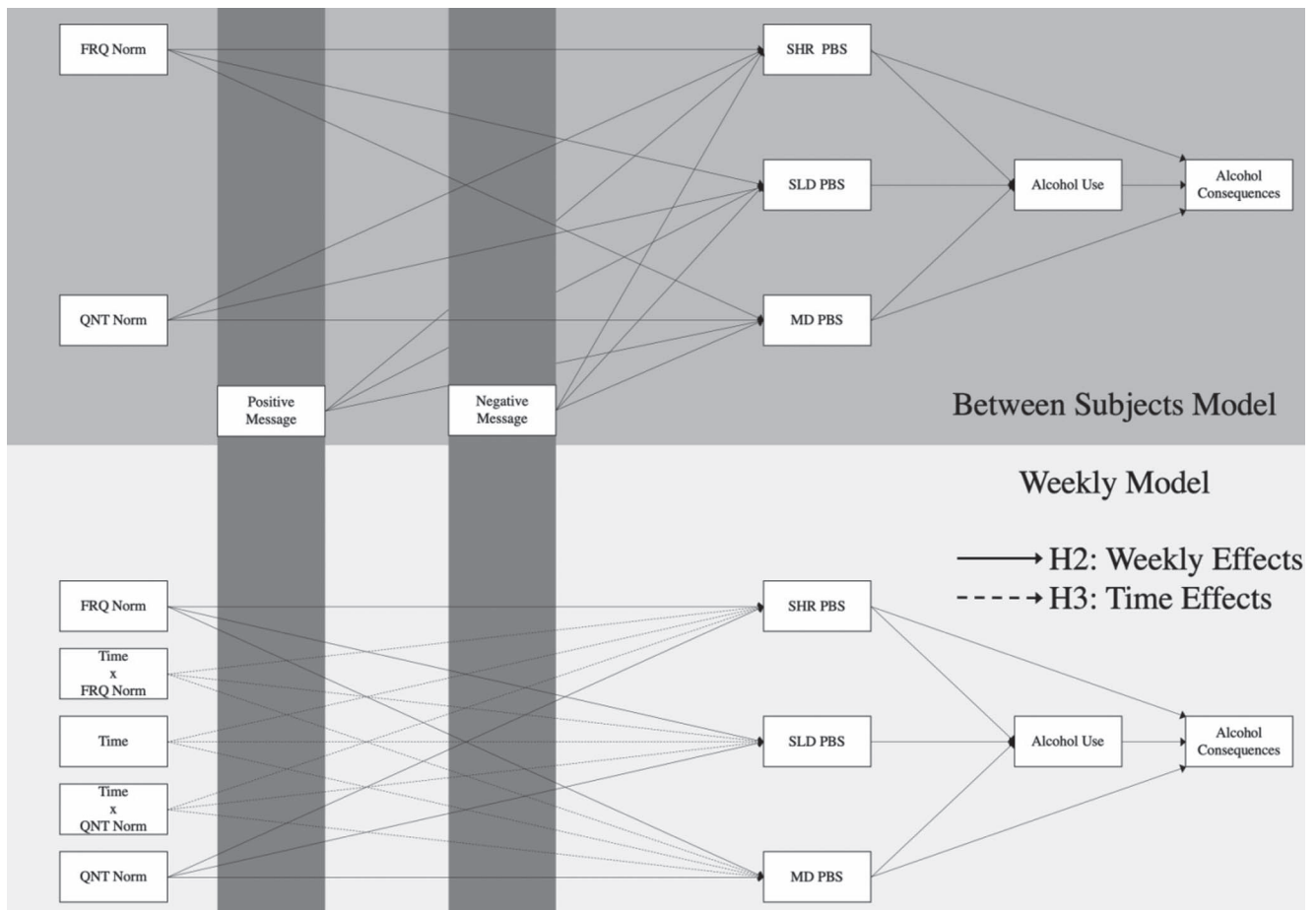
Note. All paths covered by condition bars are moderated by respective conditions.

Time (in weeks) is included in this model as a covariate (see Figure 1).

For the Hypothesis 3, we analyze the change in the DRT intervention effect across time. To do this, we added interactions with time to both norms, both dummy coded condition variables, and the four DRT interactions. It was hypothesized that the interactions with the negative condition from the previous hypothesis set would vary by time (i.e., the DRT effects would become stronger across time for individuals who received a negative message); however, we examine this for both the negative and positive messages (see Figure 1).

Results

Descriptive and Compliance Statistics

Descriptive statistics and bivariate correlations are shown in Table 1. The CONSORT diagram is shown in Figure 2. A total of $N = 157$ participants enrolled in the study. Of those enrolled, $n = 10$ participants never consumed alcohol during the study and were removed from the analysis. Thus, there were $n = 147$ participants for the initial analysis of intervention effects. Of the $n = 147$

participants who were enrolled in the study, $n = 6$ (3.82%) never returned for a postintervention assessment. Thus, Hypotheses 2 and 3, which examine postintervention effects, within-person weeks (H2) and across time (H3), are limited to $n = 141$. There was a total of 621 weeks of data out of a possible 705 weeks (141 participants × 5 weeks) for a compliance rate of 88.09%. Drinking was reported on 443 person-weeks (70.32% of weeks). The initial analysis, examining change in PBS norms across time, utilizes all data as well as all $n = 157$ individuals that received the intervention, regardless of whether or not they drank (unlike PBS behavior, which require alcohol use, PBS normative beliefs do not), for a total of 823 person-weeks. The within-subject examination of weekly PBS use, alcohol consumption, and consequences postintervention were limited to 621 postintervention person-weeks in which individuals reported some alcohol use.

Of the analysis sample, $n = 141$ completed at least one follow-up assessment (94%); though, only $n = 124$ completed the final assessment (84%). Although the intervention did not target abstinence, the likelihood of drinking in a given week declined across time (OR = 0.57, $p < .001$): preintervention week = 28.03% abstinence, Week 1 postintervention = 23.29% abstinence, Week 2

Table 1
Descriptive Statistics and Bivariate Correlations of Between-Subject Variables

Variable	1	2	3	4	5	6	7	8	9
1. Age	—								
2. Drinking days per week	−.01	—							
3. Drinks per week	.04	.72**	—						
4. Problems per week	−.02	.45**	.49**	—					
5. SLD PBS	−.03	.31**	.13**	.13**	—				
6. MD PBS	.01	.31**	.17**	.18**	.69**	—			
7. SHR PBS	.02	.51**	.39**	.28**	.68**	.67**	—		
8. PBS quantity norm	−.05	−.17**	−.15**	−.16**	.17**	.08*	.01	—	
9. PBS frequency norm	−.07	−.08*	−.08*	−.06	.15**	.15**	.08*	.50**	—
M	18.11	1.32	6.35	4.73	2.52	2.36	3.66	55.72	3.41
SD	0.33	1.20	8.05	6.88	1.17	1.19	1.61	19.88	0.63
Range: upper limit	20	6	60	40	5	5	5	97	6
Range: lower limit	18	0	0	0	1	1	1	9	1
Skew	2.90	0.82	2.52	2.02	0.19	0.44	−0.81	−0.01	−0.03

Note. SLD = stop and limiting drinking; PBS = protective behavioral strategies; MD = manner of drinking; SHR = serious harm reduction.
* $p \leq .05$. ** $p \leq .01$.

postintervention = 39.86% abstinence, Week 3 postintervention = 22.97% abstinence, Week 4 postintervention = 41.22% abstinence, Week 5 postintervention = 47.58% abstinence. This effect was not moderated by condition ($ps = .492$–$.607$), and there was no difference in the proportion of abstaining weeks by condition, $\chi^2(2) = 1.67$, $p = .437$. Thus, while there were fewer drinking weeks for analysis across time, this was largely a function of abstinence rather than attrition. Across weeks, when individuals drank, they consumed 9.83–8.14 drinks per week across 2.09–1.67 drinking days per week (4.46–4.89 drinks per drinking day). Finally, there was a positive mean correlation in PBS frequency (FRQ) norms and PBS quantity (QNT) norms across the study ($r = .48$, $p < .001$), with correlations during weeks ranging from $rs = .37$ to $.59$ (all $ps < .001$) suggesting these two concepts are different but strongly related. Similarly, the three PBS indicators were strongly correlated across weeks $rs = .57$–$.79$ (all $ps < .001$).

H1: Changes in PBS Norms Across Time

We specified a dual-process latent growth curve to examine changes in FRQ and QNT PBS norms across time. The model was centered at the first postintervention week for each norm (Preintervention Week Norm@-1, Immediate Postintervention Week Norm@0, Second Postintervention Week Norm@1, ...), so effects on the intercept represent immediate postintervention effects on the PBS norms. The dummy coded conditions were included as predictors of both (FRQ norms and QNT norms) intercepts and slopes in the model. This model showed reasonable fit to the data, $\chi^2(78) = 128.34$, $p = .001$, RMSEA = 0.06, CFI = 0.97, SRMR = 0.06. In this model, there was significant growth in both PBS norms. However, neither condition had a significant effect on the QNT norm slope. Thus, the conditions were removed as predictors of that slope, and the model was reestimated. The new model showed reasonable fit to the data, $\chi^2(82) = 135.81$, $p < .001$, RMSEA = 0.07, CFI = 0.96, SRMR = 0.07; and fit no worse than the previous model, $\Delta\chi^2(4) = 7.47$, $p = .113$.

In this model, FRQ norms had significant growth across time ($b = 0.02$, $p = .032$) that did not vary by condition (a modest increase from 3.33 at baseline to 3.45 at Week 5 on 1–5 scale).

In contrast, QNT norms had modest growth in the control ($b = 0.69$, $p = .082$; increase from 47.64% to 48.68%) and positive message ($b = 1.25$, $p = .004$; increase from 53.45% to 58.88%) conditions, that did not differ significantly from each other ($b = 0.44$, $p = .404$). The negative message condition had robust growth across time ($b = 1.87$, $p < .001$; increase from 51.23% to 63.94%), that did differ significantly from control ($b = 1.18$, $p = .028$). Thus, Hypothesis 1 was partially supported. There was growth in both norms across time, and this was most robust for QNT norms when an individual received a negative message about PBS nonusers.

Interestingly, there was also an immediate postintervention effect of the positive message on QNT norms, such that the week after the intervention, norms were significantly higher than control ($b = 8.02$, $p = .025$). Thus, a positive message resulted in an 8% increase in the perceived amount of people using PBS. This is counter to what one might expect from DRT. These results suggest both positive and negative messages can promote increased PBS norms, either immediately or across time.

Thus, we see that both norm types grew across time, regardless of condition. However, the perceived number of people that are using PBS increased more robustly among those who received a negative message. The fact that this growth was more robust, partially supports Hypothesis 1. Growth in both PBS norms, however, may help explain why previous research has shown increases in the effectiveness of negative messages across time.

H2: Weekly Intervention Effects

Next, we tested a multilevel structural equation model of weekly PBS use (separated by SLD, MD, and SHR), alcohol consumption, and alcohol consequences as a function of PBS FRQ and QNT norms across conditions to examine H2a and H2b. The variance was parsed across levels for all nested variables. At Level 1, FRQ and QNT norms were assessed each week and centered within-person week. The variance was decomposed across levels via between- and within-subject centering; thus, interactions between condition and the Level 1 FRQ and QNT norms represent weekly deviations from average FRQ and QNT norms. QNT norms, FRQ norms, QNT × Negative message, QNT × Positive message, FRQ × Negative

Figure 2
CONSORT Diagram
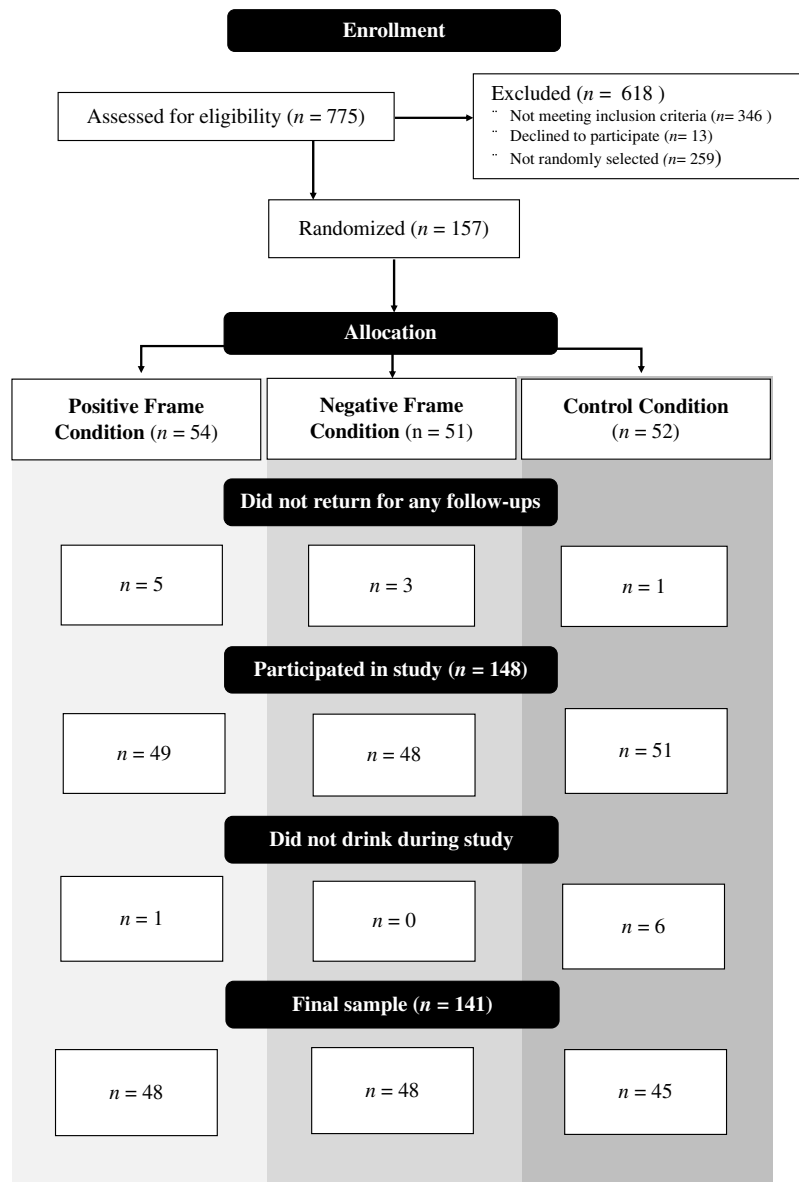
message, FRQ × Positive message predicted MD, SLD, and SHR PBS. MD, SLD, and SHR PBS, in turn, predicted alcohol use and alcohol consequences. Time (in weeks) was a covariate on all Level 1 outcomes. Level 2 mirrored Level 1, though condition was a direct predictor of PBS at Level 2 (as condition is between subjects). The full model is depicted in Table 2, and a schematic is shown in Figure 3. This model showed excellent fit to the data: $\chi^2(33) = 37.82$, $p = .258$, RMSEA = 0.015, CFI = 1.00, Tucker–Lewis index (TLI) = 0.99, $SRMR_{within} = 0.012$, $SRMR_{between} = 0.048$.

In this model, alcohol use was directly associated with alcohol consequences at both Level 1 and Level 2. At Level 1 (weekly level), SLD PBS was inversely related to weekly alcohol use and consequences. However, at Level 2, it was only inversely associated with the use and not associated with consequences. SHR PBS was

positively associated with both use and consequences at Level 1. At Level 2, it was associated with the use, but not consequences. MD PBS was not related to use or consequences at either level. Time (in weeks) was negatively associated with all three PBS, indicating PBS use decreased the longer individuals were in the study (we examine this as a function of the intervention in H3). There were no effects of time on use or consequences. At Level 2, sex assigned at birth was not associated with PBS, alcohol use, or alcohol consequences.

Regarding intervention effects, only the FRQ × Positive message exerted a significant effect. This effect was only observed at Level 1 and was only statistically significant on SLD PBS. Thus, H2a was not supported. It was hypothesized (H2b) that there would be an inverse association between PBS norms (FRQ and QNT) and PBS use among those who received a positive message. Examining the

Table 2
Intervention Effects on PBS Use Within Week

Parameters	SLD PBS B (SE) 95% CI	MD PBS B (SE) 95% CI	SHR PBS B (SE) 95% CI
Within-subject level			
Time	−0.15 (0.04)* [−0.23, −0.07]	−0.16 (0.04)* [−0.24, −0.09]	−0.27 (0.06)* [−0.39, −0.15]
QNT norms (L1)	0.01 (0.01) [−0.01, 0.04]	0.00 (0.01) [−0.02, 0.03]	0.00 (0.03) [−0.05, 0.06]
FRQ norms (L1)	−0.21 (0.24) [−0.69, 0.27]	−0.04 (0.03) [−0.62, 0.54]	−0.03 (0.44) [−0.89, 0.84]
Between-subject level			
Positive message	0.11 (0.19) [−0.26, 0.48]	−0.02 (0.02) [−0.41, 0.37]	−0.16 (0.26) [−0.67, 0.34]
Negative message	0.19 (0.21) [−0.53, 0.29]	−0.12 (0.21) [−0.53, 0.29]	−0.27 (0.27) [−0.79, 0.25]
QNT norms (L2)	0.00 (0.01) [−0.02, 0.02]	−0.00 (0.01) [−0.02, 0.02]	0.00 (0.01) [−0.02, 0.02]
FRQ norms (L2)	0.46 (0.43) [−0.49, 1.30]	0.40 (0.46) [−0.49, 1.30]	−0.16 (0.54) [−1.22, 0.89]
Positive × QNT norms (L2)	0.01 (0.01) [−0.03, 0.03]	−0.00 (0.01) [−0.03, 0.03]	0.01 (0.02) [−0.02, 0.04]
Positive × FRQ norms (L2)	−0.46 (0.53) [−0.88, 1.52]	0.32 (0.61) [−0.88, 1.33]	0.01 (0.71) [−1.34, 1.40]
Negative × QNT norms (L2)	−0.01 (0.01) [−0.04, 0.02]	−0.01 (0.01) [−0.04, 0.02]	−0.02 (0.02) [−0.05, 0.02]
Negative × FRQ norms (L2)	−0.07 (0.57) [−1.24, 1.12]	−0.07 (0.60) [−1.24, 1.11]	0.58 (0.74) [−0.87, 2.02]
Cross-level interactions			
Positive × QNT norms (L1)	−0.01 (0.02) [−0.06, 0.04]	−0.01 (0.02) [−0.05, 0.03]	−0.01 (0.04) [−0.08, 0.61]
Positive × FRQ norms (L1)	1.07 (0.38)* [0.33, 1.82]	0.75 (0.42) [−0.08, 1.57]	0.81 (0.60) [−0.36, 1.98]
Negative × QNT norms (L1)	−0.00 (0.02) [−0.05, 0.04]	0.02 (0.02) [−0.02, 0.05]	−0.00 (0.04) [−0.07, 0.07]
Negative × FRQ norms (L1)	0.20 (0.36) [−0.52, 0.91]	−0.04 (0.37) [−0.77, 0.68]	−0.02 (0.57) [−1.16, 1.10]

Note. SLD = stop and limiting drinking; PBS = protective behavioral strategies; MD = manner of drinking; SHR = serious harm reduction; QNT = protective behavioral strategy quantity norms; FRQ = protective behavioral strategy frequency norms. Control group is comparison condition so all main effects above are those in the control group.
* $p \leq .05$.

FRQ × Positive message interaction revealed something quite different. In the control condition, there was no association between FRQ and MD ($b = -0.04$, $p = .886$), SLD ($b = -0.21$, $p = .390$), or SHR ($b = -0.03$, $p = .949$) PBS use. In contrast, in the positive message condition, FRQ was positively associated with MD ($b = 0.70$, $p = .019$), SLD ($b = 0.86$, $p = .003$), and SHR ($b = 0.78$, $p = .054$) PBS use. These effects were the exact opposite of prediction, suggesting that within a given week, a positive message may lead to increased social identification and subsequently a stronger desire to "fit in." There were significant indirect effects of FRQ on alcohol use, Indirect Effect; IND = −0.89; 95% CI [−1.62, −0.15], and consequences, IND = −0.98; 95% CI [−1.60, −0.36], through SLD PBS. However, this is complicated by the effects through SHR PBS which resulted in indirect effects on use, IND = 1.72; 95% CI [0.18, 3.25], and problems, IND = 1.31; 95% CI [0.55, 2.07], in the opposite direction.

Thus, the positive message resulted in higher weekly SLD PBS use when individuals perceived a higher than average (for them) use of PBS that week. This translated into lower than average alcohol use and fewer than average alcohol consequences for that week. None of these effects were observed between subjects, which indicates the messaging exerts effects primarily at the subject level and may be based on the perceived frequency of PBS use among their peers that week or in a specific context. Further, at the week level, it appears that individuals were more interested in adjusting PBS use (at least for SLD, though a similar pattern of effects was observed for MD and SHR PBS that did not reach statistical significance) to "fit in" rather than to stand out.

H3: Intervention Effects Across Time

Finally, we examined the intervention effects across time. Previous research has shown growth in the effects of the negative message across time. We found that both QNT and FRQ norms increased across time. Based on this finding, it was expected that the magnitude of the QNT × Negative message and FRQ × Negative message would become more robust across time. Understanding increases in the magnitude of effects across time would provide

Figure 3
Multilevel Structural Equation Model
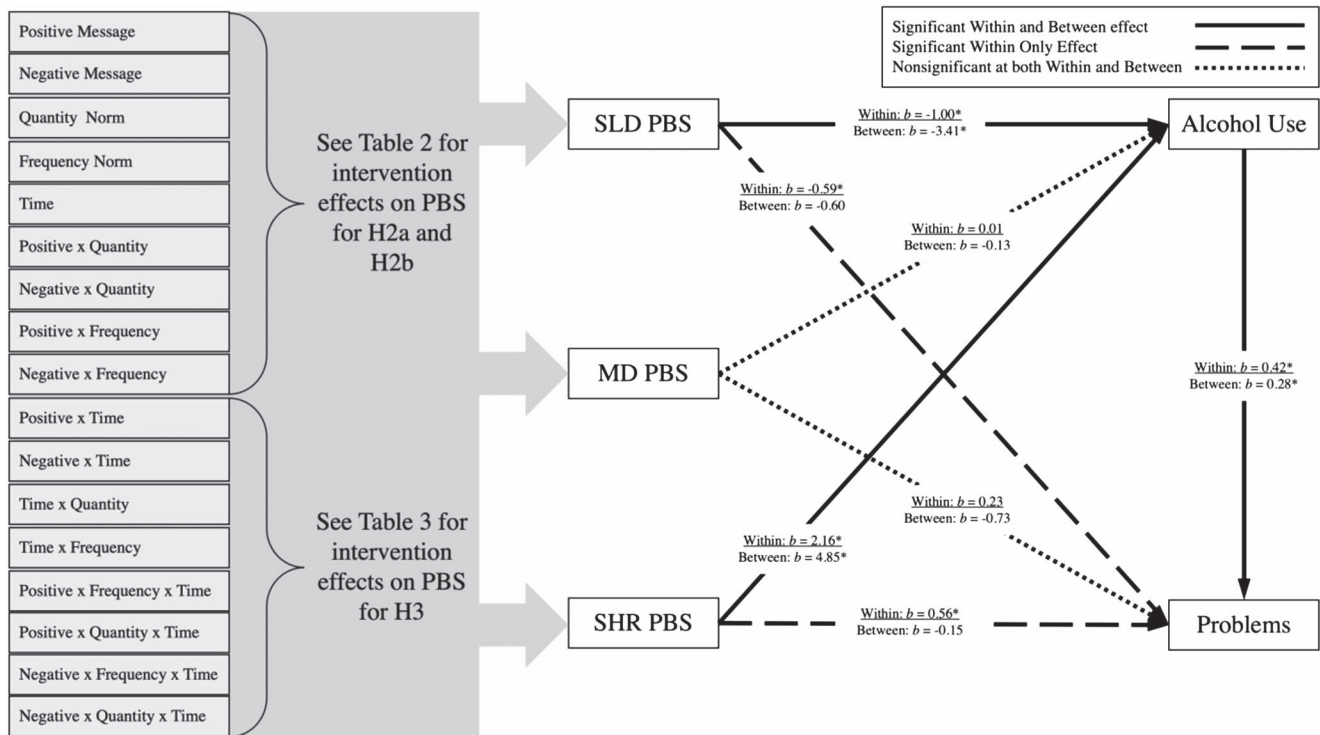
insight into when the intervention begins to exert effects if the effects are not immediately observable. Interactions between time and FRQ norms, QNT norms, FRQ × Negative message, QNT × Negative message, FRQ × Positive message, and QNT × Positive message were added to the previous model (see Table 3). This model showed excellent fit: $\chi^2(42) = 42.29$, $p = .459$, RMSEA = 0.003, CFI = 1.00, TLI = 1.00, SRMR$_{within}$ = 0.016, SRMR$_{between}$ = 0.040.

There were no effects of time on FRQ norms or any FRQ interactions. Thus, the FRQ × Positive message effect observed in H2b appears to be a consistent weekly effect that does not change across time. However, there was a significant QNT × Negative message × Time interaction on SLD ($b = 0.03$, $p = .006$) and MD ($b = 0.02$, $p = .008$) PBS and a modest effect on SHR PBS ($b = 0.03$, $p = .045$). For each week, the two-way interaction between QNT norm × Negative message should be positive, such that receiving a negative message is associated with a positive relationship between weekly QNT norms and PBS use. This effect was examined across the weeks of the study. In the first week, postintervention, this effect was negative for MD ($b = -0.02$, $p = .379$) and SHR ($b = -0.05$, $p = .237$) PBS. For SLD PBS, it was both negative in sign and statistically significant ($b = -0.05$, $p = .045$), meaning that the association between QNT norms and PBS use was negative in the negative condition (MD: $b = -0.00$, $p = .803$; SHR: $b = -0.03$, $p = .284$; SLD: $b = -0.03$, $p = .171$) in the first week. For all three PBS, this is opposite of what DRT would predict (i.e., lower PBS norms is associated more PBS use in the negative message condition). Thus, this effect started in the opposite direction of prediction. However, by the final week, this effect had

changed signs and was statistically significant for MD PBS ($b = 0.09$, $p = .015$; QNT norm → MD PBS: $b = 0.07$, $p = .019$) and moving in that direction for SLD ($b = 0.08$, $p = .066$; QNT norm → SLD PBS: $b = 0.08$, $p = .042$) and SHR ($b = 0.08$, $p = .198$; QNT norm → SHR PBS: $b = 0.05$, $p = .321$). Extrapolating these linear effects out using a *regions of significance* analysis, we find that at approximately 5 weeks and 4 days postintervention, this effect becomes statistically significant for SLD PBS ($b = 0.10$, $p = .050$; QNT norm → SLD PBS: $b = 0.10$, $p = .036$). However, it appears the effect does not become significant for SHR PBS. Even at 6 months (assuming a completely linear postintervention effect, which is unlikely), the effect is not statistically significant ($p = .070$). As with the prior analysis, there were no significant between-subject effects of the intervention.

There are two important findings from this analysis. First, the intervention effect of the positive message did not change across time. Second, the intervention effect of the negative message did increase across time, but only as a function of the quantity norm. Thus, as individuals begin to believe that PBS use is becoming more prevalent, the motivation to avoid standing out in a negative way may exert increasingly more influence.

Summary of Results

The initial analysis to examine H1 (changes on PBS norms across time) found that both FRQ and QNT norms increased across time. For QNT norms, this did not matter which condition a person was in. For FRQ norms, this effect was most substantial among those receiving the negative message (as predicted). Thus, H1 was

Table 3

Weekly Intervention Effects on PBS Use Across Time

Parameters	SLD PBS B (SE) 95% CI	MD PBS B (SE) 95% CI	SHR PBS B (SE) 95% CI
Within-subject level			
Time	−0.13 (0.07)* [−0.26, 0.00]	−0.20 (0.07)* [−0.33, −0.07]	−0.23 (0.12) [−0.47, 0.00]
QNT norms (L1)	0.01 (0.01) [−0.01, 0.03]	0.01 (0.01) [−0.17, 0.03]	0.00 (0.03) [−0.05, 0.05]
FRQ norms (L1)	−0.20 (0.24) [−0.67, 0.27]	−0.06 (0.29) [−0.64, 0.51]	−0.01 (0.43) [−0.86, 0.84]
Time × QNT norms (L1)	−0.00 (0.01) [−0.01, 0.01]	−0.00 (0.00) [−0.16, 0.22]	−0.01 (0.01) [−0.02, 0.01]
Time × FRQ norms (L1)	−0.17 (0.21) [−0.59, 0.25]	0.01 (0.19) [−0.36, 0.38]	−0.04 (0.28) [−0.59, 0.50]
Between-subject level			
Positive message	0.12 (0.19) [−0.25, 0.48]	−0.01 (0.20) [−0.40, 0.37]	−0.15 (0.26) [−0.66, 0.35]
Negative message	0.20 (0.21) [−0.22, 0.61]	−0.12 (0.21) [−0.52, 0.29]	−0.26 (0.26) [−0.78, 0.25]
QNT norms (L2)	−0.00 (0.01) [−0.02, 0.01]	−0.00 (0.01) [−0.22, 0.01]	−0.00 (0.01) [−0.02, 0.02]
FRQ norms (L2)	0.57 (0.42) [−0.25, 1.38]	0.46 (0.45) [−0.42, 1.34]	−0.05 (0.53) [−1.08, 0.99]
Positive × QNT norms (L2)	0.01 (0.01) [−0.01, 0.04]	0.00 (0.01) [−0.03, 0.03]	0.01 (0.02) [−0.02, 0.04]
Positive × FRQ norms (L2)	−0.53 (0.53) [−1.57, 0.51]	0.29 (0.60) [−0.90, 1.47]	−0.06 (0.72) [−1.47, 1.34]
Negative × QNT norms (L2)	−0.01 (0.01) [−0.03, 0.02]	−0.01 (0.01) [−0.04, 0.02]	−0.02 (0.02) [−0.05, 0.02]
Negative × FRQ norms (L2)	−0.03 (0.57) [−1.14, 1.09]	−0.04 (0.59) [−1.20, 1.12]	0.62 (0.73) [−0.80, 2.05]
Cross-level interactions			
Positive × QNT norms (L1)	−0.01 (0.02) [−0.06, 0.03]	−0.02 (0.02) [−0.06, 0.03]	−0.01 (0.04) [−0.08, 0.06]
Positive × FRQ norms (L1)	1.07 (0.39)* [0.31, 1.82]	0.77 (0.42) [−0.06, 1.60]	0.79 (0.60) [−0.39, 1.97]
Negative × QNT norms (L1)	−0.00 (0.02) [−0.04, 0.04]	0.02 (0.02) [−0.02, 0.05]	−0.00 (0.04) [−0.07, 0.07]
Negative × FRQ norms (L1)	0.21 (0.35) [−0.48, 0.90]	−0.00 (0.36) [−0.71, 0.71]	−0.01 (0.56) [−1.11, 1.09]
Positive × Time	−0.06 (0.10) [−0.26, 0.13]	0.03 (0.10) [−0.16, 0.22]	−0.09 (0.16) [−0.31, 0.29]
Negative × Time	0.01 (0.10) [−0.19, 0.21]	0.12 (0.10) [−0.08, 0.31]	−0.01 (0.15) [−0.40, 0.22]
Positive × QNT norms (L1) × Time	−0.00 (0.01) [−0.20, 0.02]	0.00 (0.01) [−0.02, 0.02]	0.01 (0.01) [−0.02, 0.03]
Positive × FRQ norms (L1) × Time	0.12 (0.25) [−0.37, 0.61]	0.06 (0.24) [−0.41, 0.52]	0.06 (0.33) [−0.59, 0.71]
Negative × QNT norms (L1) × Time	0.03 (0.01)* [0.01, 0.05]	0.02 (0.01)* [0.01, 0.04]	0.03 (0.01)* [0.00, 0.05]
Negative × FRQ norms (L1) × Time	−0.07 (0.26) [−0.58, 0.44]	−0.15 (0.22) [−0.58, 0.29]	−0.14 (0.34) [−0.81, 0.52]

Note. SLD = stop and limiting drinking; PBS = protective behavioral strategies; MD = manner of drinking; SHR = serious harm reduction; QNT = protective behavioral strategy quantity norms; FRQ = protective behavioral strategy frequency norms. Control group is comparison condition so all main effects above are those in the control group.

* $p \leq .05$.

partially supported. The H2 analysis (weekly effects of DRT on PBS) found no effect for H2a; therefore, the negative message did not exert immediate effects regardless of PBS norms. This is consistent with previous research that indicates it takes time for the negative message to exert effects. However, there were immediate effects of the positive message, but this took the opposite effect of what would be predicted by DRT and was only relevant for FRQ

norms. Among those in the positive message condition, as weekly FRQ norms deviated from average FRQ norms, they were increasingly positively associated with higher than average PBS use that week. Thus, none of H2 was supported, and indeed, the evidence was counter to the hypothesis. The H3 analysis (changes in the effect of the negative message across time) was supported for QNT norms, but not FRQ norms. Immediately after the intervention, this effect

was the opposite of prediction across all three types of PBS. However, this effect began to reverse across the next several weeks, ultimately reaching a statistically significant (and DRT consistent) effect for MD PBS and trended in theory consistent direction for SLD and SHR PBS, offering emerging support for H3. For all models, there were no between-subject effects suggesting that the intervention primarily operates as a function of deviations from typical perceived norms and not as a function of stable perceived normative levels.

Discussion

This study tested a brief DRT intervention among FTIC drinkers. In contrast to previous DRT research, the present study examined the weekly effects of the intervention on PBS use (specifically SLD, MD, and SHR), alcohol use, and alcohol problems. Based on previous research, it was hypothesized that PBS norms would increase across time (H1), which would be more pronounced among those receiving a negative message. We also expected that current weekly PBS norms would be differentially associated with PBS use, based on the type of message a person received. Specifically, if individuals received a negative message about PBS nonuse, we expected a positive association between PBS norms and PBS use to "fit in" and avoid "standing out" in negative ways (H2a). In contrast, if individuals received a positive message about PBS use, we expected a negative association between PBS norms and PBS use to "stand out" in positive ways (H2b). Finally, we expected that, due to increases in norms across time, the effect of the negative message would become more robust throughout the study (H3). Overall, H1 and H3 were partially supported, while H2a and H2b were not.

Changes in Norms

Both QNT and FRQ PBS norms increased across time, and this effect was most robust for FRQ norms if an individual received a negative message. These two norms assess different aspects of PBS beliefs. FRQ norms center on a person's belief about how often individuals use PBS, while QNT norms serve as a reference for the number of people that use these sorts of strategies. It is unclear if this change is a function of changes in perception, or simply a dose–response due to weekly intervention exposure. Though, a dose–response would not explain why there were increases in all conditions for QNT norms nor would it explain why a negative message dose would be stronger for FRQ norms. Perhaps simply having to report on norms each week resulted in an increased observation of the number of people engaging in these behaviors and the frequency with which they seem to be doing so. This is in line with many theories of behavior and previous research that indicates reactance (heightened awareness of personal observations) increases simply due to observation (Kavvouris et al., 2020; Rosenberg & Siegel, 2018; Shorey-Fennell & Magnan, 2019). Among those receiving a negative message, increases in FRQ norms were more robust. Perhaps individuals that receive this message are particularly attuned to FRQ because, within a given week, it becomes easier to gage how much PBS use is occurring versus how many are doing it, especially if those individuals also perceive increases in the number of people in their environment. Indeed, from a self-evaluative perspective, it may be easier to compare yourself to others based

on how much PBS you use relative to peers versus how many people in a given week are using any PBS (Mussweiler & Bodenhausen, 2002; Mussweiler & Strack, 2000; Strickhouser & Zell, 2015).

Weekly Effects

Within a given week, we found a significant interaction between the positive message and FRQ norms. However, this interaction took the opposite effect of what was hypothesized. If individuals received a positive message, then deviations from average FRQ norms (the amount of people using PBS) was broadly and positively associated with greater than average PBS use. This effect was observed immediately after the first intervention message and did not change across time. DRT would suggest that lower norms should lead to more PBS use to "stand out" in a positive way. However, in this instance, the positive message enhanced the primary affiliative effect often attributed to norm-based interventions. As FRQ norms increased, so did PBS use, which, in turn, led to decreases in alcohol use and alcohol-related consequences for that week. This may be a unique feature specific to FTIC students. Perhaps, there is a strong desire to fit in, and a positive message simply enhances that desire. Previous research has shown, among older students, the opposite effect (Dvorak et al., 2016; Dvorak, Troop-Gordon, et al., 2018). Indeed, Ferrer et al. (2012) suggested that FTIC students are initially driven by a need to fit in in their first year, but this desire transitions to a need to stand out in subsequent years. This would suggest that early college interventions focus on enhancing conformity initially and transition to a more nuanced approach as students become more experienced in college student life. This finding may suggest that theories that posit alternative interactions between descriptive and injunctive norms (e.g., focus theory of normative conduct; Cialdini et al., 1991) may be equally influential, depending on the behavior and visibility of behavior or the population.

In contrast to the immediate effects observed for the positive message, the negative message did not have immediate DRT consistent effects but instead grew across time. Indeed, in the first postintervention week, there was a significant negative message by QNT norms interaction. Still, it took the opposite effect proposed by DRT (i.e., QNT norms were negatively associated with PBS use that week). However, across time this effect reversed and, by the conclusion of the study, was statistically significant for MD PBS and trending in this direction for both SLD and SHR PBS. The opposite initial effect is interesting. This may be due to lower QNT norms at the outset, diminishing the impact of the negative message. Indeed, QNT norms grew across all conditions, regardless of the message. Thus, the initial inverse relationship may have been due to the reactivity of receiving a negative message about nonusers while simultaneously believing many of their peers were nonusers. However, across time, individuals appeared to realize that more people were using PBS than they initially thought, which produced a change in the effect of the negative message. This change ultimately resulted in a positive association between QNT norms and PBS use. There is an exciting story emerging from these two findings. In both cases, the effect was to "fit in" with peers, either initially through a positive message about those that use PBS more frequently or across time through a negative message about the minority of students that do not use PBS. These two findings offer an interesting look into the relative saliency of the two different message types.

A gain–loss perspective may help to understand these findings. Prospect theory (Kahneman & Tversky, 1990) suggests that gain-framed messages (such as a positive message about PBS) should be most persuasive when the outcome is inevitable. In contrast, a loss message (such as a negative message about non-PBS use) should be most compelling when a result is uncertain (Rothman & Salovey, 1997). It does not seem to be a stretch to believe that PBS users are viewed more positively. There are frequent campaigns promoting designated drivers and safer/more responsible drinking. Indeed, one would be hard pressed to find "responsible drinking" viewed as unfavorable in any context. Engaging in PBS is almost *certain* to be seen as positive.

In contrast, evidence of the negative aspects of "irresponsible" drinking is perhaps less prevalent and consequently less certain. As individuals begin to notice increases in PBS use norms, they may not observe the "negative" aspects of those that do not use PBS, thus making this evaluation less certain. If it is unclear if they will be viewed negatively, the negative message may become increasingly important. This may be especially true for QNT norms. FRQ norms allow a person to observe the frequency of their own PBS use and PBS use of those around them. Thus, they may develop a relatively stable mental picture of PBS use behaviors among those they know. However, QNT norms require a knowledge base about the use of the broader population. It may be more challenging to determine the proportion of students using PBS, as this requires a way to separate users from nonusers. Further, in contrast to FRQ norms where the rate, or proportion, of different strategies, is both observable and perhaps stands out, not observing someone's use of PBS does not necessarily mean they never use PBS, which adds to the uncertainty.

Finally, there were no intervention effect at the between-subject level. One might expect that negative messages would be more effect, in general, among those with higher than average PBS norms, while positive messages may be more effect for those with lower than average PBS norms. This was not the case. These data seem to suggest that messaging is most important for environments in which norms deviate from the perceived average. Interestingly, this is consistent with a study by Dvorak et al. (2017) and Sargent et al. (2018) who both found that it was deviations in norms from typical drinking environments (in this case PBS norms during spring break vs. typical PBS norms) that interacted with messaging to affect PBS use. This provides insight into how messaging could be framed, not based on average norms, but on momentary deviations in norms from the average. This remains a question for future research.

Broader Effects on Use and Problems

The most significant protective benefit was found for SLD PBS. At the within-subject level, this led to reduced use and fewer alcohol-related consequences. This finding is somewhat surprising. Previous research has suggested that MD PBS engender greater protective benefits (e.g., Pearson, 2013; Pearson et al., 2012). Further, our previous research has shown that this intervention is most effective in changing MD PBS. However, much of these previous studies relied on cross-sectional data. Longitudinal data have suggested that stopping/limiting drinking leads to benefits through reduced drinking over time (Martens et al., 2011; however, see Napper et al., 2013 for contrasting findings using a sample of heavy drinkers). DeMartini et al. (2013) classified PBS as direct (having direct effects on alcohol use) or indirect (having effects on problems). SLD is more in line with direct types of PBS. It is possible that direct strategies, such as SLD, are more rarely used among first-year students. Therefore, increased use of these strategies may be particularly beneficial following the transition to college. As students transition into more experienced college drinkers, PBS that is more closely tied to problematic outcomes may become increasingly important. However, any explanations for the mixed findings regarding the efficacy of different PBS remain speculative and require future testing.

Weekly use of SHR PBS was associated with greater weekly alcohol consumption and directly with alcohol-related problems. This is not the first time this has been observed in the literature, particularly at the within-subject level (see Lewis et al., 2012; Pearson et al., 2013). It is possible that, after considering overlapping use with other strategies, SHR PBS is a reactive strategy implemented when alcohol consumption is high, and problems are detected. Pearson et al. (2013) drew similar conclusions after finding positive within-person associations between SHR PBS and alcohol consumption and consequences. Thus, we are cautious about suggesting that this approach be abandoned due to increases in SHR PBS. Indeed, trying to reduce the most harmful effects of alcohol, despite this seemingly contradictory evidence, seems like a best practice approach. More research is needed to understand why SHR appears to be positively linked to problems across levels of analysis.

Clinical Implications

These results, though preliminary, have some clinical implications for FTIC students. First, intervention programs aimed at increasing responsible drinking strategies might begin by highlighting the positive aspects of using these strategies. This may result in immediate and lasting increases in PBS use and reductions in alcohol use and problems. Second, as student's progress through the semester, messages highlighting the negative aspects of PBS nonuse may help to bolster the effects from the initial step. However, this sort of stepped approach has yet to be tested.

Limitations

The present study has several limitations. First, our study consisted of predominantly White, cisgender female students at a Southeastern University. Thus, our results may not be generalizable to all FTIC students, mainly Black, Indigenous, people of color (BIPOC) students, males, and/or gender minorities. Future research should aim to use stratified random sampling with a more diverse racial/ethnic sample. Additionally, these data were collected in the fall of students' first semester in college. This was purposeful as student drinking at the outset of college often increases to "fit in" with peers (Pedersen et al., 2010). However, the present study does not address how messages may become less salient over more extended periods. Future research should examine possible changes in the efficacy of the DRT intervention based on time in college. Third, while weekly diaries can be a strength, weekly recall may still result in retrospective recall bias (Gmel & Daeppen, 2007). It may be beneficial for future research to include a daily diary or in situ momentary assessments rather than a weekly diary to control for

retrospective recall bias. Lastly, we used PBS norms to refer to all three types of PBS (SHR, SLD, and MD). It might be possible that norms differ among each kind of PBS, which, in turn, could impact message salience. Future research should investigate how specific PBS norms would affect the intervention messaging, rather than viewing PBS norms globally.

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