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Friend or Foe: Personal Use and Friends' Use of Protective Behavioral Strategies and Spring Break Drinking

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Abstract

The present study examined associations between use of protective behavioral strategies (PBS) by college students and their friends and drinking-related outcomes during Spring Break (SB). Moreover, this study examined the influence of friends' own PBS use on participants' PBS use during SB. Participants included college students ($N = 694$) and their nominated friends ($N = 131$) who were part of a larger study of SB drinking. Data were collected via web-based surveys that participants and friends took after SB, which assessed SB PBS, drinking, and related negative consequences. Results indicated that higher levels of Serious Harm Reduction (SHR) strategies and Limiting/Stopping (LS) strategies were associated with increased consumption, higher likelihood of experiencing any consequences, and an increased number of consequences. A different pattern emerged for Manner of Drinking (MD) strategy use; participants utilizing higher levels of MD strategies drank less and had fewer consequences. LS and MD strategies used by the participant's friends appeared to have less of an impact on the participant's drinking outcomes. However, greater friends' use of SHR strategies was associated with increased alcohol use by the participant, but not with consequences. Greater friends' use of SHR strategies was associated with greater SHR strategy use by the participant. Friends' LS and MD strategies were not associated with participant drinking, consequences, or PBS. These findings highlight the potential utility of

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interventions that focus on drinking behaviors on specific high-risk occasions for those at risk as well as for their friends.

Keywords

Spring Break; protective behavioral strategies; event-specific drinking; friends

1. Introduction

Social influences are among the strongest factors associated with college student drinking (Borsari & Carey, 2001). While findings suggest that friends may negatively impact an individual's drinking behavior, friends may also exert positive influences by reducing one's risks from drinking. Protective behavioral strategies (PBS) are cognitive-behavioral strategies used to reduce or limit alcohol consumption and/or minimize related negative consequences (Martens et al., 2005). Many PBS inherently include or rely on friends to be a positive influence (e.g., having a friend let you know when you have had enough) or to help avoid situations that may have negative consequences (e.g., having a designated driver). The purpose of the present study was to examine whether PBS use by both participants and their friends on a given day of Spring Break (SB) influenced participants' drinking-related outcomes during SB, as well as the influence of friends' PBS use on participants' PBS use during SB.

College student SB is a weeklong vacation from classes and normal school responsibilities. SB is an event associated with high levels of alcohol use among college students (Beets et al., 2009; Goldman, Greenbaum, Darkes, Brandon, & Del Boca, 2011). In particular, students who go on SB trips with their friends drink more alcohol than those who do not go on trips with their friends during SB (Grekin, Sher, & Krull, 2007; Lee, Maggs, & Rankin, 2006; Patrick & Lee, 2012). During SB, friends can have an important influence on behavior. Furthermore, friends often discuss their SB drinking behavior in advance, and those who agree to engage in safer behavior do so, while those who agree to get drunk consume more alcohol (Patrick, Morgan, Maggs, & Lefkowitz, 2011).

College students use PBS to reduce or limit alcohol consumption and/or minimize related negative consequences. Over the past decade, a wealth of literature presenting cross-sectional findings has suggested that greater use of PBS is associated with lower alcohol consumption and fewer negative consequences (for a review see Pearson, 2013). More recently, a handful of studies have examined within-person associations between three types of PBS and drinking behavior. Lewis and colleagues (2012) examined the within-person association between PBS and 21st birthday drinking behavior and found that students used more limiting/stopping (LS) strategies (i.e., limiting number of drinks) and serious harm reduction (SHR) strategies (i.e., using a designated driver), and fewer manner of drinking (MD) strategies (i.e., drink slowly rather than gulp or chug) than usual on days they also engaged in heavier drinking and experienced more subsequent consequences. Findings also indicated that the most common PBS were all SHR strategies and that, for 21st birthday celebrations, students were motivated to use PBS that were likely to reduce the most severe

consequences rather than those that reduced or limited their drinking. Another study conducted by Pearson, D'Lima, and Kelly (2013) used a daily diary approach and found significant within-person variation in PBS use over time. Findings indicated that within-person variation in SHR strategies predicted increased daily alcohol use, negative consequences, and positive consequences. Relatedly, within-person increases in LS strategies predicted increased daily alcohol use and positive consequences. However, on days when participants used more MD strategies than usual, they consumed less alcohol and experienced fewer positive consequences. Thus, both studies found within-person associations such that SHR and LS strategies were positively associated with alcohol consumption and related consequences whereas MD strategies were negatively associated with these outcomes.

While many of the PBS are to be used solely by the drinker, there are a number of strategies that include friends or peers (e.g., having a friend let you know when you have had enough, making sure you go home with a friend, avoiding drinking games, avoiding trying to keep up or out-drink others). Thus, several PBS either incorporate friends as a positive influence or involve avoiding situations when friends may have a negative influence, such as during drinking games. Qualitative research has also shown that friends can positively and negatively influence drinking by influencing responsible or irresponsible drinking (Barry & Goodson, 2012). The aim of this study was to examine whether PBS use by both participants and their friends on a given day during SB was associated with participants' drinking-related outcomes on the same day. We also aimed to examine the influence of friends' PBS use on participants' PBS use during SB.

2. Method

2.1 Participants and Procedures

Participants for the present manuscript consisted of 694 undergraduate college students who intended to go on a SB trip, intended to drink heavily on at least one day during SB, and nominated at least one friend (up to three) to potentially participate in the study. Further, for a subsample of analyses (described below), there were 131 participant-friend dyads.

Participants were all part of a larger study examining the efficacy of multiple conditions of a SB-related brief alcohol intervention (Lee et al., 2014); participants completed online screening and baseline surveys prior to SB, and an online survey of their drinking behavior one week after SB. Upon completion of the screening survey, participants were automatically randomized to one of six conditions: (1) in-person SB BASICS, (2) web-based SB BASICS, (3) in-person SB BASICS plus Friend Intervention, (4) web-based SB BASICS plus Friend Intervention, (5) General BASICS, or (6) Assessment-only Control (see Lee et al., 2014 for further details about interventions and primary study results). In brief, the design for the larger intervention study was a 2 (SB BASICS In-Person or Web-Based) $\times$ 2 (Friend Intervention or No Friend Intervention) + 1 (General BASICS (not specific to SB)) + 1 (Control) design. All interventions were based on the Brief Alcohol Screening and Intervention for College Students (BASICS), a personalized feedback intervention in which information from the baseline survey is piped into feedback (Dimeff, Baer, Kivlahan, & Marlatt, 1999). All Friend Interventions were web-based SB BASICS

interventions, that is each friend received personalized web-based feedback about their own intended SB alcohol use. More detailed information about the friend interventions can be found in Lee et al. (2014).

Contact information for the initial random sample was provided by the Registrar's office and initial recruitment of 11,462 students was by a letter and email to complete an online screening survey to determine eligibility for the larger study. 783 students were eligible and invited to complete the baseline survey via the web, after which they were randomly assigned to either a control (no intervention) condition or to one of five intervention groups as described above. Students completed an additional survey one week post Spring Break. Students were compensated \$10 for screening and \$30 for baseline and 1 week follow up surveys. The university Institutional Review Board approved all procedures.

The sample for the present analyses came from 797 undergraduate college students who reported on their daily SB alcohol use. For present analyses, we restricted the data set to focus only on drinking days (and thus days in which PBS are possible) between the Friday of the last day of classes through the Saturday prior to classes resuming for a total of 3517 participant-days across 694 participants. The final study sample of participants for this study was 57.1% female and included students between the ages of 18 and 25 ($M = 20.5$ years, $SD = 1.3$). Racial composition of the final sample was 68% White, 19% Asian American, 7% multiracial, and 6% other.

Participants who were randomized to the friend conditions (In-Person SB BASICS plus Friend Intervention, Web-Based SB BASICS plus Friend Intervention) had their friends contacted prior to SB. Friends that were previously listed at screening were invited to complete a survey and receive general tips about how to have a safe and fun SB. Friends of participants were contacted via email, completed a baseline and post-SB survey online and were compensated \$20 for each survey. More detailed information about study design, participant sample, interventions, and procedures can be found in Lee et al. (2014).

To examine the association between friends' use of PBS with participants' PBS use and alcohol outcomes, we utilized data in which we had reports from both participants and their friends, thus analyses examining friends' PBS use were restricted to a subsample of 131 (18.8%) participants with a total of 538 participant-days. This subset of participants was similar to the overall sample of participants with respect to each baseline characteristic (e.g., sex, age, typical drinking habits, intended PBS use), and SB behaviors with one exception—drinking tended to be slightly higher among the subgroup of participants (5.5 vs. 6.1 drinks on average per day per participant between the overall sample vs. the subset of participants). The intervention (all interventions vs. control) was controlled for in all analyses.

The following protocol was used to link data from participants and friends each day. We considered data linked if: (1) The participant answered yes to "Were you with friends?" on a given day, and (2) the participant's friend answered yes to "Were you with friends?" on the same day. If more than one (of up to three) friend was with the participant on a given day, we only considered PBS use of the closest friend available (i.e., as rank-ordered at screening). It should be noted that while we were able to determine which days the friends

spent time with participants over SB, we are unable to determine whether drinking and/or use of PBS occurred while the friend and participant were together on a given day.

2.2 Measures

Variables assessed participant's sex (male or female), intervention status (whether or not participant received any intervention vs. control), trip status (whether the participant was on a trip on each day of SB), trip with a friend (whether the participant was on a trip with a friend for each day of SB), and age.

SB drinking—Participants and friends were asked to report the number of standard drinks they consumed on each day of SB. The questionnaire was similar in format to a brief, time-line follow-back (Sobell & Sobell, 2000) and the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). Participants and friends were asked, "During the 10 day Spring Break period, how much alcohol (measured in number of drinks) did you drink on each day?" A sum score was created for total number of SB drinks consumed by the participant, as well as drinks consumed by the friend, for each of the nine days (first Friday through the last Saturday of SB). We chose not to include the final Sunday because it was the day prior to resumption of classes and we believed drinking on that day would be more similar to typical weekday/weeknight drinking. Consistent with this, the proportion of participants reporting any drinking on the final Sunday of SB was 22%, whereas on average 53% reported drinking on a given day during the first 9 days of SB.

Alcohol-related negative consequences—A combination of the Rutgers Alcohol Problem Index (RAPI [9 items]; White & Labouvie, 1989) and the Young Adult Alcohol Consequences Questionnaire (YAACQ [18 items]; Read, Kahler, Strong, & Colder, 2006) was used to assess SB consequences. Participants and friends were asked about alcohol-related consequences for each day of SB. Internal consistency for the consequences measure in this sample was high (27 items, $\alpha = .88$).

Protective Behavioral Strategies were assessed using a scale measuring strategies used to drink more safely and responsibly (Martens, et al., 2005) and contains three subtypes: serious harm reduction (SHR - 3 items, $\alpha = .62$; i.e., make sure that you go home with a friend), limiting/stopping (LS - 7 items, $\alpha = .68$; i.e., have a friend let you know when you've had enough), and manner of drinking (MD - 3 items, $\alpha = .67$; i.e., avoid drinking games). We modified the PBS to assess the intended and actual use of drinking PBS specifically during each day of SB for both participants and friends. For each day, participants were asked to report whether or not they intended to use or used that strategy (0: no, 1: yes). The sum of the binary items within each subtype was calculated to yield the subscale scores for intended PBS use and actual PBS use.

2.3 Data Analytic Plan

For our statistical analyses, we employed generalized linear mixed effects models including a random intercept for each participant. Since each outcome is a discrete non-zero count, we specified either a Poisson or negative binomial distribution, where the choice of distribution depended on model fit according to Akaike information criterion. Coefficients in count

regression models are connected to the outcome via a log link and are often exponentiated (e^{β}) to yield rate ratios (RRs) that describe the proportional change in the outcome according to a 1-unit increase in the covariate (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013). Because we were interested in the associations between PBS and outcomes, PBS subtypes were specified as time-varying (level 1) covariates. In all regression models, we adjusted for gender, whether or not the participant went on a trip for SB, and a dichotomous variable for intervention by including these variables as time-fixed (level 2) covariates.

Our primary analyses examined alcohol consumption and alcohol-related consequences as outcomes. For each of these outcomes, we ran two separate models with different sets of covariates. The first models included the participants' PBS use and the covariates listed above; the second set of models also included friends' use of the PBS as covariates in order to examine the association between friends' PBS and the outcome.

Different forms of the count regression model were used for these outcomes because of their distributional properties. For models with drinks consumed as the outcome, we used a truncated form of the Poisson model (which conditions on the knowledge that the outcome is greater than zero) because we restricted the data to drinking days. The alcohol consequences variable; however, did include values of zero and, in fact, showed an excess number of zeros. To account for this, we fit hurdle mixed models to examine associations between PBS and consequences (Atkins et al., 2013). The hurdle model consisted of two separate models: 1) a logistic regression model that estimated odds ratios (ORs) for the likelihood of reporting any consequences and 2) a truncated count regression model (i.e., negative binomial regression) that estimated RRs for the number of consequences among those who reported at least one consequence. For both the logit and count portions of the model, the same set of covariates was included. For all models examining consequences, in addition to the covariates used above, we also included, as an additional time-varying covariate, the participants' drinking for the same day. For models examining friends' PBS as a predictor of participants' consequences, we also included friends' drinking on that same day as a time-varying covariate.

As a final set of analyses, we examined the association between friends' PBS and participants' PBS using Poisson mixed regression where each of the three PBS subtypes was analyzed as an outcome in separate models. Friends' actual use of the PBS subtype on that same day was modeled as a time-varying covariate. Participant characteristics, including the participant's intended use of that PBS subtype reported at baseline, were included as time-fixed adjustment variables. In this final analysis, participants' intended PBS use was included as a time-fixed covariate because daily-level data were not available. All analyses were performed in R v2.15.1 (R Development Core Team, 2012) using the *glmmADMB* package for truncated Poisson and hurdle mixed models and the *lme4* package for Poisson mixed models.

3. Results

Characteristics of participants assessed at baseline are presented in Table 1 (N = 694). Participants were on a trip with a friend for an average of 2.3 of the 9 days of SB. Table 2

shows descriptive statistics for average daily participant ($N = 694$) and friend ($N = 131$) SB drinking behaviors and PBS. The distribution of these characteristics in the full sample of participants ($N = 694$) and the restricted sample ($N = 131$) used in analyses with friend-specific variables were similar (data not shown). The mean number of drinks consumed per day by the participant during SB was 5.5 drinks ($SD = 3.5$) and mean number of consequences was 1.5 ($SD = 1.8$). Friends tended to drink less, experience fewer consequences and use fewer PBS over SB compared to the corresponding participants. All differences between participants and friends were statistically significant ($p < .05$) except for use of LS PBS.

3.1 Spring Break Drinking and Negative Consequences

Tables 3 and 4 display findings for associations between PBS subtypes and amount of drinking and alcohol-related consequences, respectively, during SB. Higher levels of SHR strategies and LS strategies were associated with increased consumption, higher likelihood of experiencing any consequences, and, among those reporting at least one consequence, an increased number of consequences. A different pattern emerged for manner of drinking strategy use; participants utilizing higher levels of MD strategies drank less, were less likely to report any consequences, and had fewer consequences if they reported any consequences.

PBS use of participants' friends appeared to have less of an impact on participants' drinking outcomes. However, friends' SHR strategy use was associated with participants' drinking, above and beyond the influence of friends' drinking on participants' drinking. Greater use of SHR strategies by friends was associated with increased alcohol consumption by participants ($RR = 1.07$; $p = 0.039$). There was no statistically significant association between friends' use of SHR strategies and participants' alcohol consequences. Further, LR and MD strategies used by friends were not significantly associated with participants' drinking or likelihood or number of alcohol-related consequences.

3.2 Participants' PBS Use

Table 5 displays model findings for the association between participants' and friends' actual PBS use, controlling for covariates. Although RRs were in the positive direction for all 3 subtypes, the only statistically significant association was between friends' SHR and participants' SHR ($RR = 1.09$, $p = 0.027$), indicating that on days friends used more SHR strategies, participants also used more SHR strategies.

4. Discussion

The current research extends the two studies examining daily-level associations between PBS and drinking behavior. The present findings are consistent with prior research (Lewis et al., 2012; Pearson et al., 2013), such that on days with greater use of SHR and LS strategies students reported heavier drinking and more negative consequences. Furthermore, results are also consistent in that participants drank less and experienced fewer negative consequences on days in which they used more MD strategies. Adding to this emerging literature, this is the first study to examine associations of friends' PBS use on participants' alcohol consumption and negative consequences as well as associations between friends' use of PBS

and participants' use of PBS. Findings suggest that on SB days with heavier drinking by friends, participants also reported heavier drinking. Moreover, on SB days with greater use of SHR strategies by friends, participants consumed more alcohol. Finally, results indicated that greater use of SHR strategies by friends was associated with greater use of SHR strategies by participants. Thus, the current and past studies suggest that SHR strategy use by both friends and individuals is associated with riskier drinking.

These current findings indicate that research is needed to examine motivations behind selecting various types of PBS and, in particular, SHR strategies. It may be that students are selecting to use certain types of PBS because they are planning to drink heavily. There may be a motivation to prevent serious harm, such as getting in a car accident or a DUI violation. However, this motivation to prevent harm from drinking and driving might be associated with motivation to drink heavily, hence the reason for needing a designated driver. Interventions have yet to include discussions of or components on motivations to use PBS or motivations to use select strategies. Examining student motivations for use of PBS may help clinicians work with students in various settings (e.g., residence halls, Greek system, health and wellness services, mental health clinics) to reduce or prevent excessive drinking and negative consequences during a known high-risk time.

Consistent with a wealth of literature, our findings indicate that friends have an influence on participants' drinking (Borsari & Carey, 2001; Graham, Marks, & Hansen, 1991; Hussong, 2003; Thombs, Olds, & Ray-Tomasek, 2001; Wood, Read, Palfai, & Stevenson, 2001). New to the literature, this study contributes that friends also influence participants' PBS use. While little research has utilized friends in drinking interventions (Lee et al., 2014; Neighbors et al., 2012; O'Leary et al., 2002; Tevyaw, Borsari, Colby, & Monti, 2007), these findings suggest that careful selection of friends may be necessary. Precautions may need to be taken to ensure that potentially "harmful" friends are not selected in an intervention process. For example, if friends have high use of or encourage use of SHR strategies as a means to drink more heavily, then this may indicate they are not the ideal person to aid the participant in lowering heavy alcohol use.

While the current study contributes to the literature, there are a number of limitations that should be noted. First, the sample size for examining the associations of friends' and participants' PBS use and drinking behavior was lower than the full sample. Second, while we were able to determine which days participants spent time with friends over SB, we were unable to determine whether drinking and/or use of PBS occurred while friends and participants were together on a given day, which makes the peer effects difficult to interpret. Third, students reported on all drinking behavior in retrospect after SB. Thus, future research should examine these relationships with ecological momentary assessment methods. The fourth and final limitation is that this study only examined college students, as is the case with most studies examining PBS. Future research should study these associations for additional high-risk events as well as typical weekly drinking events for adolescent and non-college populations.

In conclusion, the present study is the first study to examine whether PBS use of both participants and their friends on a given day influenced participants' drinking-related

outcomes during SB, as well as the influence of friends' PBS use on participants' PBS use during SB. Findings are preliminary due to limitations but do suggest that future research is warranted to determine how friends influence peers, not just in terms of risk behaviors, but also protective behaviors. Furthermore, this research provides important future steps to further examine how friends could be utilized in interventions as well as care in selecting friends to support intervention goals.

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References

- Atkins DC, Baldwin S, Zheng C, Gallop RJ, Neighbors C. A tutorial on count regression and zero-altered count models for longitudinal substance use data. *Psychology of Addictive Behaviors*. 2013; 27:166–177. doi:10.1037/a0029508. [PubMed: 22905895]
- Barry AE, Goodson P. Contextual factors influencing U.S. college students' decisions to drink responsibly. *Substance Use and Misuse*. 2012; 47:1172–1184. doi:10.3109/10826084.2012.690811. [PubMed: 22662910]
- Beets MW, Flay BR, Vuchinich S, Li K, Acock A, Snyder FJ. Longitudinal patterns of binge drinking among first year college students with a history of tobacco use. *Drug and Alcohol Dependence*. 2009; 103:1–8. doi:10.1016/j.drugalcdep.2008.12.017. [PubMed: 19423242]
- Borsari B, Carey KB. Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13:391–424. doi:10.1016/S0899-3289(01)00098-0. [PubMed: 11775073]
- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*. 1985; 53:189–200. doi:10.1037/0022-006X.53.2.189. [PubMed: 3998247]
- Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. *Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach*. Guilford Press; New York, NY, U.S.: 1999.
- Goldman MS, Greenbaum PE, Darkes J, Brandon K, Del Boca FK. How many versus how much: 52 weeks of alcohol consumption in emerging adults. *Psychology of Addictive Behaviors*. 2011; 25:16–27. doi:10.1037/a0021744. [PubMed: 21219038]
- Graham JW, Marks G, Hansen WB. Social influence processes affecting adolescent substance use. *Journal of Applied Psychology*. 1991; 76:291–298. doi:10.1037/0021-9010.76.2.291. [PubMed: 2055870]
- Grekin ER, Sher KJ, Krull JL. College spring break and alcohol use: Effects of spring break activity. *Journal of Studies on Alcohol and Drugs*. 2007; 68:681–688. doi:10.15288/jsad.2007.68.681. [PubMed: 17690801]
- Hussong AM. Social influences in motivated drinking among college students. *Psychology of Addictive Behaviors*. 2003; 17:142–150. doi:10.1037/0893-164X.17.2.142. [PubMed: 12814278]
- Lee CM, Maggs JL, Rankin LA. Spring break trips as a risk factor for heavy alcohol use among first-year college students. *Journal of Studies on Alcohol*. 2006; 67:911–916. doi:10.15288/jsa.2006.67.911. [PubMed: 17061009]
- Lee CM, Neighbors C, Lewis MA, Kaysen DL, Mittmann A, Geisner IM, Larimer ME. Randomized controlled trial of a spring break intervention to reduce high-risk drinking. *Journal of Consulting and Clinical Psychology*. 2014; 82:189–201. doi:10.1037/a0035743. [PubMed: 24491072]
- Lewis MA, Patrick ME, Lee CM, Kaysen DL, Mittman A, Neighbors C. Use of protective behavioral strategies and their association to 21st birthday alcohol consumption and related negative consequences: A between- and within-person evaluation. *Psychology of Addictive Behaviors*. 2012; 26:179–186. doi: 10.1007/s10964-010-9515-8. [PubMed: 21553945]

- Lee, CM.; Patrick, ME.; Geisner, IM.; Mastroleo, N.; Mittmann, A.; Zimmerman, L. Individual, interpersonal, and contextual factors associated with discrepancies between intended and actual Spring Break drinking. 2014. Manuscript submitted for publication
- Martens MP, Ferrier AG, Sheehy MJ, Corbett K, Anderson DA, Simmons A. Development of the Protective Behavioral Strategies Survey. *Journal of Studies on Alcohol*. 2005; 66:698–705. doi: 10.15288/jsa.2005.66.698. [PubMed: 16329461]
- Neighbors C, Lee CM, Atkins DC, Lewis MA, Kaysen D, Mittmann A, Larimer ME. A randomized controlled trial of event-specific prevention strategies for reducing problematic drinking associated with 21st birthday celebrations. *Journal of Consulting and Clinical Psychology*. 2012; 80(5):850–862. doi:10.1037/a0029480. [PubMed: 22823855]
- O’Leary TA, Brown SA, Colby SM, Cronce JM, D’Amico EJ, Fader JS, Monti PM. Treating adolescents together or individually? Issues in adolescent substance abuse interventions. *Alcoholism, Clinical and Experimental Research*. 2002; 26:890–899. doi:10.1111/j.1530-0277.2002.tb02619.x.
- Patrick ME, Lee CM. Daily variations in spring break alcohol and sexual behaviors based on intentions, perceived norms, and daily trip context. *Journal of Studies on Alcohol and Drugs*. 2012; 73:591–596. doi:10.15288/jsad.2012.73.591 PMID: PMC3364325. [PubMed: 22630797]
- Patrick ME, Morgan N, Maggs JL, Lefkowitz ES. “I got your back”: Friends’ understandings regarding college student spring break behavior. *Journal of Youth and Adolescence*. 2011; 40:108–120. doi:10.1007/s10964-010-9515-8. [PubMed: 20182778]
- Pearson MR. Use of alcohol protective behavioral strategies among college students: A critical review. *Clinical Psychology Review*. 2013; 33:1025–1040. doi:10.1016/j.cpr.2013.08.006. [PubMed: 24036089]
- Pearson MR, D’Lima GM, Kelley ML. Daily use of protective behavioral strategies and alcohol-related outcomes among college students. *Psychology of Addictive Behaviors*. 2013; 27:826–831. doi:10.1037/a0032516. [PubMed: 23647156]
- Read JP, Kahler CW, Strong DR, Colder CR. Development and preliminary validation of the young adult alcohol consequences questionnaire. *Journal of Studies on Alcohol*. 2006; 67:169–177. doi: 10.15288/jsa.2006.67.169. [PubMed: 16536141]
- R Development Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing; Vienna: 2012. [Software]<http://www.R-Project.org>
- Sobell, LC.; Sobell, MB. Alcohol Timeline Followback (TLFB). In: Rush, J., Jr.; First, MB.; Blacker, D., editors. *Handbook of psychiatric measures*. American Psychiatric Association; Washington, DC: 2000. p. 477–479.
- Tevyaw TO, Borsari B, Colby SM, Monti PM. Peer enhancement of a brief motivational intervention with mandated college students. *Psychology of Addictive Behaviors*. 2007; 21:114–119. doi: 10.1037/0893-164X.21.1.114. [PubMed: 17385961]
- Thombs DL, Olds RS, Ray-Tomasek J. Adolescent perceptions of college student drinking. *American Journal of Health Behavior*. 2001; 25:492–501. doi:10.5993/AJHB.25.5.6. [PubMed: 11518343]
- White HR, Labouvie EW. Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol*. 1989; 50:30–37. doi:10.15288/jsa.1989.50.30. [PubMed: 2927120]
- Wood MD, Read JP, Palfai TP, Stevenson JF. Social influence processes and college student drinking: The mediational role of alcohol outcome expectations. *Journal of Studies on Alcohol*. 2001; 62:32–43. doi:10.15288/jsa.2001.62.32. [PubMed: 11271962]

Highlights

1. Results indicated that higher levels of Serious Harm Reduction strategies and Limiting/Stopping strategies were associated with increased consumption, higher likelihood of experiencing any negative consequences, and an increased number of negative consequences.
2. A different pattern emerged for Manner of Drinking strategy use; participants utilizing higher levels of these strategies drank less and had fewer negative consequences.
3. Limiting/Stopping and Manner of Drinking strategies used by the participant's friends appeared to have less of an impact on the participant's drinking outcomes. However, greater friends' use of Serious Harm Reduction strategies was associated with increased alcohol use by the participant, but not with consequences.
4. Greater friends' use of Serious Harm Reduction strategies was associated with greater Serious Harm Reduction strategy use by the participant. Friends' Limiting/Stopping and Manner of Drinking strategies were not associated with participant drinking, consequences, or PBS.

Table 1

Baseline characteristics of participants

	Mean $\pm$ SD or n (%) (N = 694)	Range
Female gender	398 (57.10)	--
Received any intervention	578 (82.93)	--
Age	20.54 $\pm$ 1.32	18-25
Intended Serious Harm Reduction	9.58 $\pm$ 2.37	1-12
Intended Limiting/Stopping	11.53 $\pm$ 5.04	0-27
Intended Manner of Drinking	4.99 $\pm$ 2.32	0-12
Days with a friend	3.99 $\pm$ 2.47	0-9

Table 2

Daily drinking behaviors and use of protective behavioral strategies for participants and friends during spring break

	Participant full sample N = 694	Friend N = 131
Spring Break Measures	Mean $\pm$ SD	Mean $\pm$ SD
Number of Drinks	5.49 $\pm$ 3.50	4.22 $\pm$ 3.54
Number of Consequences	1.47 $\pm$ 1.75	.97 $\pm$ 1.32
Protective behavioral strategies		
Serious Harm Reduction	1.54 $\pm$ 0.92	1.16 $\pm$ 0.96
Limiting/Stopping	1.40 $\pm$ 1.36	1.26 $\pm$ 1.54
Daily Manner of Drinking	1.01 $\pm$ 0.90	0.76 $\pm$ 0.88

Table 3

Rate ratios from truncated Poisson mixed models^a for the number of drinks consumed according to participant and friend characteristics

Covariate	Participant only model ^b		Friend + Participant model ^c	
	RR (95% CI)	p-value	RR (95% CI)	p-value
Serious Harm Reduction (SHR)	1.18 (1.15,1.21)	<0.001	1.17 (1.10, 1.24)	<.001
Limiting/Stopping (LS)	1.02 (1.01,1.04)	0.006	0.99 (.96, 1.03)	0.658
Manner of Drinking (MD)	0.88 (0.86,0.90)	<0.001	0.92 (.87, .98)	0.007
Friend's Serious Harm Reduction	--	--	1.07 (1.00,1.13)	0.039
Friend's Limiting/Stopping	--	--	0.98 (0.94,1.01)	0.222
Friend's Manner of Drinking	--	--	0.99 (0.94,1.05)	0.796
Friend's Number of Drinks	--	--	1.03 (1.02,1.04)	<0.001

^a Adjusted for gender, intervention, and trip with friend

^b N = 694

^c N = 131

Table 4

Odds ratios and rate ratios from hurdle mixed models^a for consequences experienced according to participant and friend PBS use and drinking

Covariate	Participant only model				Friend + participant model			
	Likelihood of any consequences ^b	OR (95% CI)	p-value	Count of non-zero consequences ^c	Likelihood of any consequences ^d	OR (95% CI)	p-value	Count of non-zero consequences ^e
Serious Harm Reduction	1.90 (1.65,2.18)	<0.001	1.10 (1.04,1.16)	0.001	2.91 (1.85, 4.59)	<0.001	1.06 (0.93, 1.20)	0.392
Limiting/Stopping	1.13 (1.03,1.24)	0.010	1.05 (1.02,1.09)	0.003	0.82 (0.63, 1.08)	0.166	1.09 (1.01, 1.19)	0.031
Manner of Drinking	0.76 (0.66,0.87)	<0.001	0.87 (0.82,0.92)	<0.001	0.91 (0.62, 1.35)	0.642	0.81 (0.71, 0.92)	0.001
Number of Drinks	1.39 (1.33,1.45)	<0.001	1.06 (1.05,1.07)	<0.001	1.36 (1.21, 1.54)	<0.001	1.04 (1.01, 1.06)	0.003
Friend's Serious Harm Reduction	--	--	--	--	--	--	--	--
Friend's Limiting/Stopping	--	--	--	--	1.01 (0.65,1.56)	0.956	1.01 (0.89,1.16)	0.843
Friend's Manner of Drinking	--	--	--	--	1.18 (0.89,1.55)	0.253	1.02 (0.95,1.11)	0.542
Friend's Number of Drinks	--	--	--	--	0.78 (0.50,1.23)	0.287	0.98 (0.87,1.11)	0.765
	--	--	--	--	0.99 (0.90,1.09)	0.829	0.99 (0.97,1.02)	0.628

^a Adjusted for gender, intervention, trip with a friend.

^b N = 694

^c N = 542

^d N = 131

^e N = 94

Table 5

Rate ratios for different protective behavioral strategies used by the participant according to friend use of the corresponding PBS ^{a, b}

PBS outcome	RR (95% CI)	p-value
Serious harm reduction	1.09 (1.01,1.18)	0.027
Limiting/stopping	1.07 (1.03,1.10)	0.107
Manner of drinking	1.27 (1.18,1.37)	0.065

^a Adjusted for gender, trip with friend, and intended use of that PBS at baseline

^b N = 131