



Short communication

Protective behavioral strategies predict alcohol-related problems among injured patients following a brief intervention

Dylan K. Richards^{a,b,*}, Matthew R. Pearson^c, Osvaldo F. Morera^b, Craig A. Field^{a,b}^a Latino Alcohol and Health Disparities Research and Training Center, University of Texas at El Paso, 500 West University Avenue, El Paso, TX 79968, USA^b Department of Psychology, University of Texas at El Paso, 500 West University Avenue, El Paso, TX 79968, USA^c Center on Alcoholism, Substance Abuse, and Addictions, University of New Mexico, 2650 Yale Boulevard Southeast MSC11-6280, Albuquerque, NM 87106, USA

ARTICLE INFO

Keywords:

Alcohol
Alcohol-related problems
Multiple mediation
Protective behavioral strategies
Trauma care setting

ABSTRACT

Background: Alcohol protective behavioral strategies (PBS) have been proposed as mechanisms of change underlying interventions for reducing alcohol use and alcohol-related problems. Few studies have examined PBS use among non-college student populations and no study has examined PBS use among adult injured patients. The current study tested types of PBS as mediators of the effects of a brief motivational intervention (BMI) delivered in the trauma care setting on alcohol-related problems.

Method: Secondary data analyses were conducted using data from a multisite randomized controlled trial of brief intervention in the trauma care setting. The current study used data from a subset of participants who reported having consumed alcohol at least once at 3-month follow-up ($N = 324$). Following a baseline assessment, participants were assigned to either brief advice (BA; $n = 107$), BMI ($n = 119$), or BMI with a telephone booster (BMI + B; $n = 98$). Participants completed measures of PBS at 3-month follow-up and of alcohol-related problems at baseline and 6-month follow-up. A multiple mediation model was conducted to simultaneously test the mediation effects of types of PBS.

Results: BMI and BMI + B relative to BA did not increase PBS use. However, more frequent use of certain types of PBS at 3-month follow-up were predictors of greater reductions in alcohol-related problems from baseline to 6-month follow-up. There were no statistically significant mediation effects.

Conclusions: The present study suggests that PBS use reduces alcohol-related problems among trauma patients and implications for future studies are discussed.

1. Introduction

The effectiveness of brief motivational intervention (BMI) delivered in medical settings, and trauma centers in particular, for reducing alcohol use and alcohol-related problems is strongly supported (e.g., Field et al., 2010, 2014; Schermer et al., 2006). However, the underlying mechanisms of change following BMI are not well understood (e.g., Heather, 2014). One reason that BMI delivered in the trauma care setting may be effective is that BMI increases use of alcohol protective behavioral strategies which, in turn, reduces alcohol-related problems.

Alcohol protective behavioral strategies (PBS) include behaviors that are used before, during, and/or after drinking to reduce alcohol use and/or alcohol-related problems (e.g., “Use a designated driver”, “Alternate alcoholic and nonalcoholic drinks”, “Avoid drinking games”; Martens et al., 2005). There is strong evidence that more frequent use of

PBS is associated with less alcohol use and fewer alcohol-related problems among college students (for a review, see Pearson, 2013). Although a few psychometric studies have examined PBS among non-college student samples (Cadigan et al., 2015; Richards et al., 2018), no study has examined PBS use among adult injured patients. The extension of PBS research to injured patients is important because alcohol use is a risk factor for injury (Cherpitel et al., 2015) and thus many people with unhealthy alcohol use access medical settings (Saitz et al., 2006). Level 1 trauma centers are mandated to conduct brief alcohol interventions and injured patients may benefit from harm reduction behaviors that could be taught as a component of brief intervention. Indeed, PBS are generally proposed to be mechanisms of change underlying alcohol interventions (Pearson, 2013).

Randomized controlled trials have generally found multi-component (i.e., multiple content areas) BMIs to effectively increase PBS use

* Corresponding author at: Latino Alcohol and Health Disparities Research and Training Center, Department of Psychology, University of Texas at El Paso, 500 West University Avenue, El Paso, TX 79968, USA.

E-mail address: dkrichards2@utep.edu (D.K. Richards).

<https://doi.org/10.1016/j.drugalcdep.2019.06.037>

Received 23 April 2019; Received in revised form 26 June 2019; Accepted 27 June 2019

Available online 22 October 2019

0376-8716/© 2019 Elsevier B.V. All rights reserved.

(i.e., *a* path), which in turn reduces alcohol use/problems (i.e., *b* path; Barnett et al., 2007; Larimer et al., 2007; Murphy et al., 2012), although exceptions to this pattern can be found (e.g., Neighbors et al., 2009). Further, single component PBS-based interventions have generally failed to effectively increase PBS use (Martens et al., 2013), or have increased PBS use without resulting in a concomitant reduction in alcohol use/problems (Dvorak et al., 2018; LaBrie et al., 2015; Sugarman and Carey, 2009). This mixed support for PBS use as a mechanism of behavior change warrants further investigation.

1.1. The current study

For the present study, secondary data analyses were conducted using data from a multisite randomized controlled trial of brief intervention delivered in the trauma care setting (Field et al., 2014). In brief, Field et al. (2014) found that BMI with a telephone booster was more effective in reducing alcohol use than brief advice. In the present study, we characterize PBS use in this sample of adult injured patients and examine whether the multi-component BMI with and without a telephone booster effectively increases PBS use (*a* path), and whether PBS use in turn predicts lower alcohol-related problems (*b* path). Alcohol-related problems was chosen as the primary outcome as our interest was in direct harm reduction. Further, we examine the three subtypes of PBS in a multiple mediation model.

2. Material and method

For further information about the method, primary aims, and findings of the parent trial, readers are referred to Field et al. (2014). IRB approval for this study was obtained from each participating institution.

Table 1
Socio-demographic Characteristics of the Study Sample (N = 324) by Intervention Condition.

Categorical Variables	BA (n = 107)		BMI (n = 119)		BMI + B (n = 98)		
	n	%	n	%	n	%	
Gender							$X^2(2) = 3.63, p = .163$
Male	82	76.6	84	70.6	80	81.6	
Female	25	23.4	35	29.4	18	18.4	
Race/ethnicity							$X^2(6) = 7.07, p = .315$
Black	27	25.2	30	25.2	20	20.4	
Hispanic	20	18.7	24	20.2	30	30.6	
White	53	49.5	60	50.4	40	40.8	
Other	7	6.5	5	4.2	8	8.2	
Education							$X^2(2) = 0.17, p = .919$
< high school	6	5.7	8	7.1	6	6.5	
≥ high school	99	94.3	105	92.9	86	93.5	
Injury intent							$X^2(2) = 3.84, p = .147$
Unintentional	84	78.5	87	73.1	65	66.3	
Intentional	23	21.5	32	26.9	33	33.7	
Site							$X^2(4) = 5.90, p = .207$
Baylor	55	51.4	62	52.1	46	46.9	
Brackenridge	49	45.8	48	40.3	41	41.8	
Methodist	3	2.8	9	7.6	11	11.2	
Continuous Variables	BA		BMI		BMI + B		
	M (SD)	Range	M (SD)	Range	M (SD)	Range	
Age	35.79 (13.73)	18–76	36.46 (12.09)	19–63	35.21 (13.76)	18–81	$F(2, 321) = 0.24, p = .783$
SIP + 6 (baseline)	12.31 (13.27)	0–58	13.10 (14.26)	0–58	12.39 (13.20)	0–49	$F(2, 320) = 0.12, p = .891$
SIP + 6 (6-month)	6.43 (10.13)	0–42	7.79 (13.12)	0–41	8.08 (12.29)	0–47	$F(2, 295) = 0.53, p = .591$
S/LD (3-month)	3.11 (1.26)	1–6	3.14 (1.17)	1–6	3.21 (1.17)	1–6	$F(2, 320) = 0.18, p = .834$
MOD (3-month)	4.74 (1.10)	1–6	4.52 (1.23)	1–6	4.79 (1.13)	2–6	$F(2, 320) = 1.66, p = .192$
SHR (3-month)	4.48 (1.32)	1–6	4.52 (1.24)	1–6	4.48 (1.21)	1.33–6	$F(2, 320) = 0.05, p = .954$

Note. BA = Brief advice; BMI = Brief motivational intervention; BMI + B = Brief motivational intervention plus a telephone booster; SIP + 6 = Short Inventory of Problems + 6; S/LD = Stopping/Limiting Drinking subscale of the Protective Behavioral Strategies Scale; MOD = Manner of Drinking subscale of the Protective Behavioral Strategies Scale; SHR = Serious Harm Reduction subscale of the Protective Behavioral Strategies Scale.

2.1. Participants and procedure

Participants were 596 injured patients recruited from three urban Level 1 trauma centers in Texas between October 2007 and December 2010. Patients treated for unintentional (e.g., motor vehicle collision) or intentional (e.g., stab wounds) injuries and who met the following criteria were eligible for inclusion (for exclusion criteria, see Field et al., 2014): 1) blood alcohol concentration > .01 at time of admission, 2) self-reported drinking 6 h prior to injury, or 3) met or exceeded cutoff score for alcohol misuse on the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C; Bradley et al., 2007). Given that PBS can only be used when drinking according to our operationalization of this construct, only participants who reported having consumed alcohol at least once at 3-month follow-up (N = 324) were included in the analyses. Those who reported drinking at 3-month follow-up were more likely to be non-Hispanic White, better educated, and had experienced greater alcohol-related problems at baseline than those who reported abstaining (all *ps* < .05).

Following a baseline assessment, participants were randomly assigned to one of three intervention conditions: 1) brief advice (BA; n = 107) (a minimal intervention condition), BMI (n = 119) (e.g., Field et al., 2005), or BMI with a telephone booster using personalized drinking feedback one month later (BMI + B; n = 98). None of the three intervention conditions addressed PBS directly, although patients were given a handout that included “strategies to limit drinking”.

Table 1 presents the socio-demographic characteristics of the study sample by intervention condition. Participants completed baseline and follow-up assessments 3, 6, and 12 months after receiving the intervention.

2.2. Measures

2.2.1. Alcohol-related problems

Alcohol-related problems were assessed at baseline and 6-month follow-up using the Short Inventory of Problems + 6 (SIP + 6; Soderstrom et al., 2007). The SIP + 6 is the 15-item Short Inventory of Problems (SIP; Miller et al., 1995), which is a short version of the Drinker Inventory of Consequences (DrInC; Miller et al., 1995), that retains 6 additional items from the DrInC that assess injury-related behaviors. The SIP + 6 demonstrated high estimates of internal consistency at both baseline ($\alpha = .94$) and 6-month follow-up ($\alpha = .93$).

2.2.2. PBS

PBS use was assessed at 3-month follow-up using the 15-item Protective Behavioral Strategies Scale (PBSS; Martens et al., 2004). The PBSS includes three subscales: stopping/limiting drinking (S/LD; 7 items), manner of drinking (MOD; 5 items), and serious harm reduction (SHR; 3 items). Research supports the reliability and validity of the PBSS among non-college student samples (Cadigan et al., 2015; Richards et al., 2018). Studies have generally found adequate estimates of internal consistency for the S/LD and MOD subscales, but not for the SHR subscale among college students (e.g., Martens et al., 2007). Similar estimates were found in the current study (S/LD: $\alpha = .70$; MOD: $\alpha = .67$; SHR: $\alpha = .39$). Despite low internal consistency estimates of the SHR subscale, it has demonstrated adequate external validity (e.g., Martens et al., 2007).

2.3. Analysis plan

To test the effects of BMI and BMI + B on alcohol-related problems through PBS use, a multiple mediation path model was examined using full-information maximum likelihood estimation in Mplus 8 (Muthén and Muthén, 1998-2017; Muthén and Muthén, -, 2017; Muthén and

Muthén, 1998-2017). Intervention assignment was represented by two dummy-coded variables representing the effects of BMI and BMI + B (as compared to BA). The mediator variables were the three PBSS subscales (S/LD, MOD, and SHR) assessed at 3-month follow-up. Covariances among the mediators were estimated (Preacher and Hayes, 2008). The outcome variable was SIP + 6 assessed at 6-month follow-up. SIP + 6 assessed at baseline and additional control variables (selected from Field et al., 2014) were allowed to covary and were modeled as predictors of mediators and outcome variables (see Table 2). We used 95% bias-corrected confidence intervals from 10,000 bootstrapped resamples (e.g., MacKinnon et al., 2004) to determine statistical significance of indirect (i.e., mediated) effects. Statistical significance is determined by confidence intervals that do not contain zero (at $\alpha = .05$).

3. Results

Participants (across intervention conditions) reported using MOD behaviors ($M = 4.68, SD = 1.16$) most frequently, SHR behaviors ($M = 4.49, SD = 1.25$) in the middle, and S/LD behaviors ($M = 3.15, SD = 1.20$) least frequently. Compared to a large, diverse sample of college students (Project PSST; Looby et al., 2019), this sample reported substantially higher use of MOD behaviors ($d = 1.05$), moderately less use of S/LD behaviors ($d = .30$), and substantially lower use of SHR behaviors ($d = .72$).

As shown in Table 2, BMI and BMI + B (as compared to BA) did not significantly predict S/LD, MOD, nor SHR scores at 3-month follow-up. However, both S/LD and SHR scores at 3-month follow-up predicted lower SIP + 6 scores at 6-month follow-up. In contrast, MOD scores at 3-month follow-up was not a significant predictor of SIP + 6 scores at 6-month follow-up, although the effect was the in the expected direction. In addition, none of the six potential mediation effects were significant.

Table 2
Summary of the Standardized Regression Coefficients for the Multiple Mediation Model.

Predictor	Mediators									Outcome		
	S/LD			MOD			SHR			SIP + 6 (6-month)		
	β	95% CI		β	95% CI		β	95% CI		β	95% CI	
		Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound
Covariates												
Male	-0.117	-0.228	0.001	-0.042	-0.138	0.058	-0.107	-0.216	0.004	-0.021	-0.112	0.069
Age	-0.060	-0.189	0.065	0.281	0.176	0.378	-0.211	-0.327	-0.094	0.033	-0.061	0.119
Black	0.125	-0.017	0.265	-0.019	-0.174	0.128	0.080	-0.063	0.214	0.169	0.035	0.301
Hispanic	0.043	-0.089	0.166	0.000	-0.121	0.112	-0.085	-0.203	0.035	-0.019	-0.107	0.065
Other ethnicity	0.067	-0.076	0.201	-0.028	-0.142	0.073	0.014	-0.105	0.125	-0.002	-0.107	0.084
Education	-0.153	-0.260	-0.045	-0.092	-0.241	0.054	0.020	-0.113	0.141	0.022	-0.077	0.123
Injury intent	-0.065	-0.195	0.069	-0.011	-0.152	0.128	-0.089	-0.224	0.049	-0.056	-0.187	0.075
Methodist	0.019	-0.094	0.131	-0.077	-0.205	0.036	-0.119	-0.242	-0.004	-0.026	-0.115	0.066
Brackenridge	0.105	-0.028	0.228	0.065	-0.050	0.183	0.040	-0.080	0.161	0.002	-0.107	0.112
SIP + 6 (baseline)	-0.089	-0.198	0.020	-0.202	-0.318	-0.087	-0.193	-0.303	-0.087	0.563	0.444	0.670
Focal predictors												
BMI	0.007	-0.116	0.135	-0.096	-0.222	0.034	0.029	-0.092	0.154	0.045	-0.050	0.138
BMI + B	0.046	-0.085	0.181	0.064	-0.053	0.176	0.003	-0.118	0.128	0.084	-0.018	0.185
Mediators												
S/LD										-0.137	-0.231	-0.044
MOD										-0.070	-0.186	0.053
SHR										-0.132	-0.243	-0.024

Note. Statistically significant coefficients at $\alpha = .05$ are in boldface. 95% CI = 95% confidence interval constructed using bias-corrected bootstrapping with 10,000 resamples; S/LD = Stopping/Limiting Drinking subscale of the Protective Behavioral Strategies Scale; MOD = Manner of Drinking subscale of the Protective Behavioral Strategies Scale; SHR = Serious Harm Reduction subscale of the Protective Behavioral Strategies Scale; SIP + 6 = Short Inventory of Problems + 6.

Given the lack of differences in PBS use across intervention conditions, we conducted an exploratory moderation analysis to determine if the protective effects of specific PBS subtypes on alcohol-related problems differed across conditions using the same covariates described above. None of these interactions were significant.

4. Discussion

The current study is the first to characterize PBS use and test types of PBS as mediators of the effects of multi-component BMIs delivered in the trauma care setting on alcohol-related problems. Although the BMI conditions did not specifically target PBS, it is plausible that patients would naturally use PBS to reduce alcohol-related harms once motivated to reduce their drinking. Neither the BMI nor BMI + B increased the frequency of PBS use relative to the BA condition. Although these interventions were shown to effectively reduce alcohol use in this sample, especially BMI + B (Field et al., 2014), it does not appear that these interventions increased PBS use.

As the first study examining PBS use among injured patients, it is important to highlight that more frequent use of S/LD and SHR strategies prospectively predicted greater reductions in alcohol-related problems from baseline to 6-month follow-up. This finding is consistent with findings in the college student literature (Pearson, 2013). We ruled out the potential that the BMIs differentially affected the impact of different types of PBS on alcohol-related problems. Thus, these protective effects of PBS use were consistent across intervention conditions. Unlike what has been reported in multiple college samples (Pearson, 2013), MOD strategies did not emerge as a significant predictor of alcohol-related problems. It may be that MOD behaviors (e.g., "Avoid drinking games") are less effective among non-college student populations, despite the sample in the present study reporting using MOD behaviors more frequently than college students.

Important limitations of the current study were that PBS was only assessed at one time point. Because PBS was assessed at only one time point, change in the frequency of use of PBS could not be modeled. Future studies should address this by including assessments of PBS at multiple time points. In addition, two of the PBSS subscales demonstrated low internal consistency estimates and these estimates were lower in the present study compared to studies among college students (e.g., Martens et al., 2007). The low internal consistency of the SHR has been found among college samples (Martens et al., 2007), which motivated the development of a revised version of the PBSS with more SHR items, the Protective Behavioral Strategies Scale-20 (PBSS-20; Treloar et al., 2015). As PBS use is increasingly examined in non-college populations, it is important that researchers continue to examine the psychometric properties of these measures given that poor reliability will decrease statistical power to detect relationships between PBS use and alcohol-related outcomes. Finally, the means of the PBSS subscales were compared to those found in Project PSST which used convenience sampling and the PBSS-20 as opposed to the PBSS. Although PBSS and PBSS-20 use the same response options and the S/LD subscales are identical, comparisons are limited by potential differences in the psychometric properties of the measures across populations and differences in the methods across the studies.

4.1. Conclusions

Despite these limitations, the current study makes a valuable contribution by examining PBS use as a prospective predictor of alcohol-related problems in a sample of injured patients. Given that certain types of PBS strategies predicted reductions in alcohol-related problems, future studies should examine whether brief intervention delivered in the trauma care setting that directly addresses PBS effectively increases PBS use. It may be that future brief interventions that effectively increase PBS use are more effective in reducing alcohol-related problems among injured patients than brief interventions that do not.

Role of funding source

This study was funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (R01-AA-015439; PI: Craig A. Field). Matthew R. Pearson is supported by a career development award (K01-AA-023233) from the NIAAA. The contents of this manuscript are solely the responsibility of the authors and do not necessarily represent the official views of the NIAAA. The NIAAA had no role in the study design; collection, analysis, and interpretation of data; in the writing of the article; nor in the decision to submit the article for publication.

Contributors

Dylan K. Richards conducted the statistical analyses and wrote the first draft of the manuscript. Matthew R. Pearson and Osvaldo F. Morera consulted on the statistical analyses. Craig A. Field conceived the study and was primarily responsible for the implementation of the study. All authors contributed to revisions and have approved the final manuscript.

Declaration of Competing Interest

All authors declare they have no conflicts of interest.

References

- Barnett, N.P., Murphy, J.G., Colby, S.M., Monti, P.M., 2007. Efficacy of counselor vs. computer-delivered intervention with mandated college students. *Addict. Behav.* 32, 2529–2548.
- Bradley, K.A., DeBenedetti, A.F., Volk, R.J., Williams, E.C., Frank, D., Kivlahan, D.R., 2007. AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcohol. Clin. Exp. Res.* 31, 1208–1217.
- Cadigan, J.M., Weaver, C.C., McAfee, N.W., Herring, T.E., Martens, M.P., 2015. A confirmatory factor analysis of the Protective Behavioral Strategies Scale among OEF/OIF veterans. *Addict. Behav.* 51, 127–130.
- Cherpitel, C.J., Ye, Y., Bond, J., Borges, G., Monteiro, M., 2015. Relative risk of injury from acute alcohol consumption: modeling the dose–response relationship in emergency department data from 18 countries. *Addiction* 110, 279–288.
- Dvorak, R.D., Troop-Gordon, W., Stevenson, B.L., Kramer, M.P., Wilborn, D., Leary, A.V., 2018. A randomized control trial of a deviance regulation theory intervention to increase alcohol protective strategies. *J. Consult. Clin. Psychol.* 86, 1061–1075.
- Field, C.A., Caetano, R., Harris, T.R., Frankowski, R., Roudsari, B., 2010. Ethnic differences in drinking outcomes following a brief alcohol intervention in the trauma care setting. *Addiction* 105, 62–73.
- Field, C.A., Hungerford, D.W., Dunn, C., 2005. Brief motivational interventions: an introduction. *J. Trauma* 59 (Supplement), S21–S26.
- Field, C.A., Walters, S., Marti, C.N., Jun, J., Foreman, M., Brown, C., 2014. A multisite randomized controlled trial of brief intervention to reduce drinking in the trauma care setting: how brief is brief? *Ann. Sur.* 259, 873–880.
- Heather, N., 2014. Toward an understanding of the effective mechanisms of alcohol brief interventions. *Alcohol. Clin. Exp. Res.* 38, 626–628.
- LaBrie, J.W., Napper, L.E., Grimaldi, E.M., Kenney, S.R., Lac, A., 2015. The efficacy of a standalone protective behavioral strategies intervention for students accessing mental health services. *Prev. Sci.* 16, 663–673.
- Larimer, M.E., Lee, C.M., Kilmer, J.R., Fabiano, P.M., Stark, C.B., Geisner, I.M., Mallett, K.A., Lostutter, T.W., Cronce, J.M., Feeney, M., Neighbors, C., 2007. Personalized mailed feedback for college drinking prevention: a randomized clinical trial. *J. Consult. Clin. Psychol.* 75, 285–293.
- Looby, A., Bravo, A.J., Kilwein, T.M., Zimmerman, L., Pearson, M.R., Protective Strategies Study Team, 2019. Alcohol-related protective behavioral strategies as a mediator of the relationship between drinking motives and risky sexual behaviors. *Addict. Behav.* 93, 1–8.
- MacKinnon, D.P., Lockwood, C.M., Williams, J., 2004. Confidence limits for the indirect effect: distribution of the product and resampling methods. *Multivariate Behav. Res.* 39, 99–128.
- Martens, M.P., Ferrier, A.G., Sheehy, M.J., Corbett, K., Anderson, D.A., Simmons, A., 2005. Development of the protective behavioral strategies survey. *J. Stud. Alcohol* 66, 698–705.
- Martens, M.P., Pederson, E.R., LaBrie, J.W., Ferrier, A.G., Cimini, M.D., 2007. Measuring alcohol-related protective behavioral strategies among college students: further examination of the Protective Behavioral Strategies Scale. *Psychol. Addict. Behav.* 21, 307–315.
- Martens, M.P., Smith, A.E., Murphy, J.G., 2013. The efficacy of single-component brief motivational interventions among at-risk college drinkers. *J. Consult. Clin. Psychol.* 81, 691–701.
- Martens, M.P., Taylor, K.K., Damann, K.M., Page, J.C., Mowry, E.S., Cimini, M.D., 2004. Protective behavioral strategies when drinking alcohol and their relationship to negative alcohol-related consequences in college students. *Psychol. Addict. Behav.* 18,

- 390–393.
- Miller, W.R., Tonigan, J.S., Longabaugh, R., 1995. The Drinker Inventory of Consequences (DrInC): An Instrument for Assessing Adverse Consequences of Alcohol Abuse (Project MATCH Monograph Series) (NIH Publication No. 95-3911) Vol. 4 US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism, Rockville, MD.
- Murphy, J.G., Dennhardt, A.A., Skidmore, J.R., Borsari, B., Barnett, N.P., Colby, S.M., Martens, M.P., 2012. A randomized controlled trial of a behavioral economic supplement to brief motivational interventions for college drinking. *J. Consult. Clin. Psychol.* 80, 876–886.
- Muthén, L.K., Muthén, B.O., 2017. *Mplus User's Guide*, eighth ed. Los Angeles, California.
- Neighbors, C., Lee, C.M., Lewis, M.A., Fossos, N., Walter, T., 2009. Internet-based personalized feedback to reduce 21st-birthday drinking: a randomized controlled trial of an event-specific prevention intervention. *J. Consult. Clin. Psychol.* 77, 51–63.
- Pearson, M.R., 2013. Use of alcohol protective behavioral strategies among college students: a critical review. *Clin. Psychol. Rev.* 33, 1025–1040.
- Preacher, K.J., Hayes, A.F., 2008. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav. Res. Methods* 40, 879–891.
- Richards, D.K., Puentes, R.P., Gonzales, R., Smith, J.C., Field, C.A., Morera, O.F., 2018. A psychometric evaluation of the Protective Behavioral Strategies Scale-20 among internet samples of adult drinkers. *Addict. Behav. Rep.* 8, 71–78.
- Saitz, R., Freedner, N., Palfai, T.P., Horton, N.J., Samet, J.H., 2006. The severity of unhealthy alcohol use in hospitalized medical patients. *J. Gen. Intern. Med.* 21, 381–385.
- Schermer, C.R., Moyers, T.B., Miller, M.W., Bloomfield, L., 2006. Trauma center brief interventions for alcohol disorders decrease subsequent driving under the influence arrests. *J. Trauma* 60, 29–34.
- Soderstrom, C.A., DiClemente, C.C., Dischinger, P.C., Hebel, J.R., McDuff, D.R., Auman, K.M., Kufera, J.A., 2007. A controlled trial of brief intervention versus brief advice for at-risk drinking trauma center patients. *J. Trauma Acute Care Surg.* 62, 1102–1112.
- Sugarman, D.E., Carey, K.B., 2009. Drink less or drink slower: the effects of instruction on alcohol consumption and drinking control strategy use. *Psychol. Addict. Behav.* 23, 577–585.
- Treloar, H., Martens, M.P., McCarthy, D.M., 2015. The Protective Behavioral Strategies Scale-20: Improved content validity of the Serious Harm Reduction subscale. *Psychol. Assess.* 27, 340–346.