



Published in final edited form as:

J Coll Stud Dev. 2009 ; 50(1): 35–49. doi:10.1353/csd.0.0050.

Mental and Social Health Impacts the Use of Protective Behavioral Strategies in Reducing Risky Drinking and Alcohol Consequences

Joseph W. LaBrie, Shannon R. Kenney, Andrew Lac, Jonathan A. Garcia, and Paul Ferraiolo

Joseph W. LaBrie is Assistant Professor of Psychology and Director of Heads UP at Loyola Marymount University. Shannon R. Kenney is a postdoctoral research fellow; Andrew Lac is a statistical consultant; Jonathan A. Garcia is a research assistant; and Paul Ferraiolo is a research assistant; all at Heads UP at Loyola Marymount University.

Abstract

The present study is the first to examine the moderating effects of mental and social health status in the relationship between protective behavioral strategies utilized to reduce high-risk drinking (e.g., alternating alcoholic and nonalcoholic drinks or avoiding drinking games) and alcohol outcomes (drinking variables and alcohol-related negative consequences) among first-year college females ($N = 128$). Findings revealed that protective behaviors were particularly effective in reducing both alcohol consumption and related risks among participants reporting lower mental health as compared to higher mental health. Further, participants with higher social health who utilized protective behaviors consumed significantly fewer maximum drinks per occasion than did peers who also employed protective behaviors but reported lower social health. Explanation of findings and implications for campus intervention initiatives are discussed.

The use and misuse of alcohol by college students is a significant and growing health concern for campus administrative and student affairs professionals (Johnston, O'Malley, Bachman, & Schulenberg, 2006; O'Malley & Johnston, 2002; Perkins, 2002; Wechsler, Davenport, Dowdall, & Moeykens, 1994; Wechsler & Kuo, 2000; Wechsler, Lee, Kuo, & Lee, 2000). It is estimated that 599,000 college students in the U.S. suffer injuries while under the influence of alcohol, and another 1,700 students unintentionally lose their lives due to alcohol-related incidents each year (Hingson, Heeren, Winter, & Wechsler, 2005). Heavy alcohol consumption often leads to negative consequences such as academic neglect, unsafe driving, and risky or unwanted sexual behavior (Park & Grant, 2005; Wolff & Wolff, 2002). Due to their innate physiology, females are acutely susceptible to alcohol-related harm. Compared to men, women metabolize alcohol more slowly and experience intoxication more quickly and intensely, thereby increasing their vulnerability to adverse health problems, compromised judgment, injury, sexual victimization, and addiction (Jersild, 2002; Perkins; Randall et al., 1999; Stockwell et al., 2002). However, despite increased risks, drinking by college women is prevalent and continues to increase.

Not only are women found to drink most excessively during young adulthood, but rates of heavy alcohol consumption are appreciably higher among women attending college compared to those not in college, even exhibiting greater discrepancy than parallel male comparisons (Dawson, Grant, Stinson, & Chou, 2004; Gomberg, 1994). Rates of heavy episodic drinking (consuming four or more drinks in a row) on 5 or more days in the past month doubled in college women from 1977 to 1992 (Wechsler & Isaac, 1992), and recurrent heavy episodic consumption (more than two times in the past 2 weeks) has continued to increase (Wechsler et al., 2002). Although some researchers have speculated that escalations in rates of college females' drinking stem from pressure to prescribe to male peers' drinking behavior or women's desire for relational intimacy (Gleason, 1994), others have posited that gains in education, work, status, and independence simply provide women with more opportunities to consume alcohol (R. W. Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000; S. C. Wilsnack & Wilsnack, 2002). Regardless of the source, however, excessive alcohol consumption among college women is a pervasive and troubling problem that has become imperative for researchers to address. In particular, the first year on college campuses represents a challenging period for females, who are found to have more difficulty adjusting to newfound independence than are male peers (Hoffman, 1984; Lapsley, Rice, & Shadid, 1989). Unfortunately, college transitions often coincide with heavy alcohol usage, which can lead to not only alcohol-related hazards, but unhealthy and enduring drinking behaviors as well (Berkowitz & Perkins, 1987; Schulenberg & Maggs, 2002; Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, 2002; White et al., 2006).

Given the normative nature of college drinking, students affairs personnel have advocated responsible drinking, rather than abstinence alone or zero tolerance, as a successful way to mitigate alcohol-related harm. The association between intoxication and risky behavior is well documented in prior research and has drawn attention to the potential for protective cognitive-behavioral strategies to curtail negative outcomes among college students who choose to drink (Benton et al., 2004; Martens et al., 2004; Park & Grant, 2005). Personal protective behaviors practiced during the active consumption of alcohol, such as avoiding drinking games or setting consumption limits, have been shown to reduce overall alcohol intake as well as alcohol-related negative consequences (Haines, Barker, & Rice, 2006; Larimer et al., 2007; Martens et al., 2005). Overall, teaching students protective behavioral strategies appears to be a promising approach by which college students can drink more responsibly and reduce related risks. A 2002 nationally representative study of over 28,000 college students found that three quarters of students routinely employed at least one of ten protective behaviors to reduce alcohol-related negative consequences, thus suggesting that the use of such strategies may be intuitively endorsed by students (Haines et al.). Further, ample research demonstrating that women are more likely than men to implement self-protective behaviors substantiates the potential benefit of promoting protective strategies in female-specific prevention and intervention efforts (Benton et al.; Delva et al., 2004; Haines et al.; Walters, Roudsari, Vader & Harris, 2007).

Although protective behaviors have consistently been shown to mitigate risky alcohol consumption and related consequences, little is known of influences that may moderate the association. In the present investigation, we aim to determine the extent to which health status, particularly mental and social health, may impact this relationship. Findings related to

mental health have cited gender-specific effects, in which the relationship between psychological health and drinking is more pronounced for females than males. Women commonly suffer psychological impairment in conjunction with alcohol abuse and are most likely to drink for emotional reasons (Berkowitz & Perkins, 1987; Billingham, Parrillo & Gross, 1993; Robbins, 1989). Both depression (Fillmore, Golding, & Leino, 1997) and self-esteem (Walitzer & Sher, 1996), for instance, have been shown to predict increases in alcohol consumption and alcohol use disorders among women but not among men. Overall, research that has upheld a linkage between low mental health and alcohol abuse has suggested that individuals with negative emotional states tend to use alcohol as a means to cope with distress, alleviate anxiety, or enhance self-worth (Cooper, Agocha, & Sheldon, 2000; Martin, Lynch, Pollock, & Clark, 2000; Muchowski-Conley, 1982; Seeman & Seeman, 1992). Not only is this type of incentivized drinking most likely to lead to excessive consumption, but it has been tied time and again to alcohol-related negative consequences (Cooper et al.; Karwacki & Bradley, 1996; Labouvie & Bates, 2002). As a normative facet of social life on college campuses, alcohol is readily available and particularly risk-enhancing for first-year college women who may exhibit heightened anxiety and interpersonal distress while negotiating the developmental disturbance of college entrance. As such, we expect the use of protective behavioral strategies to be more beneficial in reducing both alcohol consumption and related consequences among individuals with lower mental health as compared to higher mental health.

In examining the pathways and mechanisms by which college students engage in drinking, social-related stimuli become pertinent. Upon transitions to college, young adults are surrounded by same-aged peers who, like them, are experiencing unprecedented independence and responsibility. In this context, in which reference groups tend to hold positive views toward drinking and where alcohol is a prominent element of social life, it is not surprising that social motives for drinking are most commonly endorsed among college students who, incidentally, tend to drink more during college than at any other time in their lives (Borsari & Carey, 2001; Gomberg, 1994; Jackson, Sher, & Park, 2005; Reifman & Watson, 2003). Increased consumption rates during the college years are partially explained by young adults' proclivity to model and adopt the same drinking behaviors as peers (Andrews, Tildesley, Hops, & Li, 2002; Clapper, Martin, & Clifford, 1994; Hartzler & Fromme, 2003; Korcuska & Thombs, 2003; Lewis, 2007; Vogeltanz, Wilsnack, Gallant, Keita, & Royak-Schaler, 1997). Specifically, the more agreeable, extraverted, and open an individual, the more likely he or she is to drink excessively (Martsh & Miller, 1997) or espouse referent others' drinking behavior (Peterson, Morey, & Higgins, 2005). The salience of social relationships and peer approval to female identities further reinforces why examining the relationship between college women's social health and drinking is a meaningful undertaking.

Although the bulk of research has tied college students' socially motivated drinking to moderate levels of alcohol consumption, findings regarding the role that social motives may play in alcohol-related negative consequences have been inconsistent (Cooper et al., 2000; Labouvie & Bates, 2002; LaBrie, Hummer, & Pedersen, 2007). Still, LaBrie and colleagues (2008) found that women's relational health to peers and community was positively associated with alcohol consumption but inversely related to negative consequences. The

authors postulated that although relational ties provided participants with more opportunities to drink, they simultaneously protected them from alcohol-related harm, possibly due to strong support networks and personal disincentive to engage in risky behavior. These findings corroborate our hypothesis that protective behaviors should moderate the relationship between social health and drinking, such that female students who score high on the measure for social health and utilize a significant number of protective behavioral strategies should consume less alcohol and experience fewer adverse consequences.

The current study is the first to investigate the potential moderating effects of mental and social health status on the relationship between protective behaviors and alcohol use as well as alcohol-related negative consequences. A better understanding of the impact that health status has on the relationship between protective behaviors and drinking outcomes may aid student affairs and mental health professionals in curtailing risky alcohol use on college campuses. Using a sample of first-year college women, we predict that, consistent with previous research, the use of protective behaviors will be inversely related to alcohol use. However, we further hypothesize that mental health will moderate the relationship between protective strategies and drinking outcomes such that first-year college women with lower mental health will benefit most from implementing protective behaviors (i.e., experience greatest reductions in drinking and alcohol consequences). Finally, we predict that women with higher social health, who may drink because of social pressure and due to the social nature of drinking in the college setting, will benefit most from the implementation of protective behaviors.

METHOD

Participants

Participants were part of a larger intervention study of 287 first-year female undergraduate students at a mid-sized private university. As the purpose of the present investigation was to examine protective strategies employed during the consumption of alcohol, only respondents answering *yes* to the question, “Did you drink during the past 30 days?” were administered the Protective Behaviors Strategies Survey per survey instructions and, therefore, included in all subsequent analyses ($N = 128$). The average age of this final sample was 17.96 ($SD = .23$), with the vast majority (98.4%) living on campus. Racial composition was as follows: 68.0% White/Caucasian, 10.9% Hispanic/Latino, 6.3% Asian/Pacific Islander, 3.9% Black/African American, 0.8% Native American, 8.6% indicating “more than one race,” and 1.6% reporting “other.” According to official registrar statistics, the current sample significantly over-represented Whites/Caucasians, and significantly under-represented Hispanic/Latinos and Asians ($p < .05$).

Design and Procedure

During the summer of 2006, incoming first-year women ($N = 660$) received letters inviting them to take part in “a study on women’s values and attitudes toward drinking and health issues.” Two weeks into their first semester, each of these females was sent an e-mail requesting her participation. If the student agreed to take part in the study, she clicked on a link and electronically “signed” a local IRB-approved informed consent form before

completing a baseline online questionnaire. Recruitment was on a first-come first-served basis. In 3 days, 287 women completed the baseline survey (response rate of 43.5%). At that time, all available spaces in the intervention and control groups for the larger study were filled and recruitment was shut down. Thus, the 287 participants represent those who completed the baseline survey in the first 3 days. Data from the baseline online survey were used in the current study. All participants received nominal compensation for completing the questionnaire.

Measures

Questionnaires gathered demographic information, such as age and ethnicity, as well as participants' drinking behaviors and consequences, use of protective behaviors, and various components of health. Measures used in the present study are described as follows.

Alcohol Use Behavior—Respondents self-reported days over the past 30 days in which alcohol was consumed, amount consumed per drinking occasion, maximum number of drinks consumed at one time, and binge (heavy episodic) use within the past 2 weeks. A binge episode was defined to the female participants as consuming four or more alcoholic beverages in a 2-hour period. The total monthly drinks variable was calculated by multiplying average drinks per occasion by drinking days per month. Similar quantity \times frequency measures of alcohol consumption have demonstrated validity in prior studies (Earleywine & Martin, 1993).

Alcohol-Related Negative Consequences—A modified version of the Young Adult Alcohol Problems Screening Test (YAAPST; Hurlbut & Sher, 1992) was used to determine alcohol-induced negative consequences among young adults. The YAAPST has exhibited good reliability and construct validity (Gonzalez, Riveros, Uribe, & Luna, 2006). The modified version of the YAAPST contained fourteen items that were deemed by the researchers to be particularly salient to college women. Six were related to sexual behavior (e.g., sexual regret, failure to use protection, and rape), and the remaining eight questions evaluated occurrences (e.g., hangovers, academic impairment, belligerence, and driving while intoxicated). Participants responded to each item with a *yes* or *no*. The *yes* responses were totaled to create a measure of number of alcohol-related negative consequences experienced. This modified YAAPST measure exhibited good reliability ($\alpha = .81$).

Protective Behavioral Strategy Survey ($\alpha = .86$)—Participants completed Protective Behavioral Strategy Surveys (PBSS; Martens et al. 2005) to assess cognitive-behavioral strategies utilized to reduce high-risk drinking and associated negative consequences. The PBSS is the most rigorously tested and psychometrically validated measurement of protective behavior (Benton et al., 2004; Martens et al., 2005; Martens, Ferrier, & Cimini, 2007; Martens, Pedersen, LaBrie, Ferrier & Cimini, 2007; Walters et al. 2007). Using a scale ranging from 1 (*never*) to 6 (*always*), participants indicated the degree to which they had engaged in certain behaviors while consuming alcohol or “partying” in the past week. The 15-item measure comprised statements including, “leave the bar/party at a predetermined time,” “put extra ice in your drink,” “drink slowly rather than gulp/chug,” “avoid drinking games,” and “use a designated driver.”

Duke Health Profile—Fifteen items from the Duke Health Profile (DUKE; Parkerson, Broadhead & Tse, 1990), a self-administered scale that has demonstrated good construct validity (Guillemin, Paul-Dauphin, Virion, Bouchet, & Briancon, 1997), were used to evaluate participants' mental, social, and physical health. To date, the DUKE scale has been utilized primarily in epidemiological studies. Mental health items included statements such as, "I like who I am" and "feeling depressed or sad"; social health items included "I am comfortable being around people" and "I am happy with my family relationships"; and physical health assessed the difficulty with which respondents performed conventional tasks like "walking up a flight of stairs" or "sleeping." Each of these health indices (mental, social, and physical) comprised five items to which participants indicated whether the statements described them *not at all* (0), *somewhat* (1), or *exactly* (2); or if they had experienced *a lot* (0), *some* (1), or *none* (2) of the given symptoms in the past week. Responses were scored in the direction such that higher values reflect better health in that health domain. Per survey instructions, for each domain, the raw score was totaled and then multiplied by 10. Accordingly, this resulted in mental, social, and physical health indices that could each range from a possible score of 0 to 100.

RESULTS

Analytic Strategy

Correlations among all the variables were initially examined. Our central hypotheses were tested via estimation of hierarchical multiple regression models with interaction terms. Sample size requirements for regression analyses were satisfied (Tabachnick & Fidell, 2007). Prior to creating interaction terms, all predictors were standardized to minimize problems associated with multicollinearity. Models were estimated in two steps. In Step 1, main effects (protective strategies, physical health, mental health, and social health) were entered. Step 2 followed, involving entry of interaction terms between protective strategies and each of the three health subscales. Total drinks, maximum drinks, binge episodes, and alcohol-related negative consequences served as the outcome measures.

All results were interpreted at the final step with all predictors entered. Statistically significant interactions were estimated, graphed, and interpreted according to procedures put forth by Aiken and West (1991). As such, the predictor and moderator variables were plotted at one standard deviation below (low) and above (high) the mean. To assess whether these slopes were statistically different from a slope of zero, we then conducted simple slope analyses.

Descriptives and Correlations

The sample of females consumed an average of 30.06 ($SD = 29.18$) total drinks in the past month, drank 7.20 ($SD = 3.60$) maximum drinks on any occasion, and experienced 1.93 ($SD = 2.32$) binge episodes in the past 2 weeks. The correlation matrix (Table 1) shows that these three drinking behaviors were highly intercorrelated. Furthermore, alcohol protective strategies negatively correlated with all drinking behaviors as well as with alcohol-related negative consequences. In marked contrast, none of the health domains (physical, mental, social) significantly correlated with drinking behaviors or with alcohol-related negative

consequences—suggesting that the health domains may instead have an indirect, moderating influence on these outcomes. Specifically, we propose that the effectiveness of implementing alcohol protective strategies varies as a function of one's health status. This possibility is further investigated in the next set of analyses.

Moderation Models

Predicting Drinking Behaviors—Results show that each of the overall regression models predicting the various drinking behaviors to be statistically significant (Table 2). Upon closer inspection, mental health status statistically moderated the effect of protective strategies usage on all three drinking behaviors. As illustrated in Figure 1, among females who reported poorer mental health, protective behavioral strategies were considerably more effective in reducing total drinks, maximum drinks, and binge episodes. Among those having high mental health, however, such strategies were relatively less effective in mitigating alcohol consumption. To determine whether each slope was statistically different from a horizontal slope, simple slope analyses were computed for low ($\beta = -.59, p < .001$) and high ($\beta = -.15, ns$) mental health on total drinks; for low ($\beta = -.49, p < .001$) and high ($\beta = -.05, ns$) mental health on maximum drinks; and for low ($\beta = -.42, p < .01$) and high ($\beta = -.08, ns$) mental health on binge episodes.

Furthermore, the effectiveness of protective strategies was statistically moderated by social health (Table 2). As depicted in Figure 2, females with high social health who also utilized protective strategies tended to be most successful in reducing the maximum number of drinks. However, protective strategies were relatively less successful in reducing maximum drinks among females reporting low social health. Simple slopes were calculated for low ($\beta = -.09, ns$) and high ($\beta = -.31, p < .05$) social health on maximum drinks. There was no statistically significant interaction between social health and protective strategies for either total drinks or binge episodes.

Although there were no specific hypotheses related to physical health, it was added to the model for completion's sake. Physical health did not interact with protective strategies to predict any of the three drinking behaviors.

Predicting Negative Consequences—Finally, the overall regression model predicting alcohol-related negative consequences was statistically significant (Table 3). The significant interaction effect, presented in Figure 3, reveals that the utilization of protective strategies on lowering alcohol-related negative consequences was more effective among females classified as having low rather than high mental health. We calculated simple slopes for low ($\beta = -.59, p < .001$) and high ($\beta = -.10, ns$) mental health on negative consequences. Neither social health nor physical health statistically moderated the effect of protective strategies on negative consequences.

DISCUSSION

The current study extends existing research that examines the efficacy of protective behaviors in reducing alcohol consumption and related consequences by highlighting first-year college females' health status as a significant intervening variable. Although health

status did not predict drinking directly, both mental and social health were found to moderate the relationship between the use of protective behavioral strategies and risky drinking. Overall, participants who utilized self-protective strategies drank less and experienced fewer consequences. However, this finding is further illuminated by our moderation analyses. Consistent with our prediction, mental health moderated the impact of protective strategies on drinking as well as consequences such that protective behaviors were particularly effective in reducing alcohol consumption and related risks among participants who reported lower mental health. Among these participants, those who employed protective behaviors were found to consume significantly less alcohol and experienced substantially fewer alcohol-related negative consequences compared to those who failed to use protective behaviors. Our hypothesis that social health would moderate the relationship between protective behaviors and drinking outcomes was partially supported. Results illustrate that female students who reported higher social health and who utilized a significant number of protective behavioral strategies consumed significantly fewer maximum drinks per occasion than did women who also employed protective behaviors, but reported lower social health. In sum, findings are important in that they suggest that the value of implementing protective behavioral strategies varies as a function of one's health status and may point to the need for targeted interventions as well as limitations in use of protective strategies.

This study demonstrates that by implementing protective behavioral strategies, participants who reported mental health below the mean reduced total alcohol consumption, maximum drinks per occasion, binge episodes, and alcohol-related negative consequences to levels similar to, and even lower than peers who reported mental health above the mean. Simple slope analyses confirmed significant reductions in all measures of drinking behavior and associated outcomes among those participants with lower levels of mental health but not among those with higher mental health. Considering that participants designated as having low mental health were, overall, more likely to report feeling “depressed or sad,” “nervous,” or lacking concentration, self-worth, or determination (e.g., “I give up too easily”) as compared to peers with higher mental health suggests that protective behavioral strategies may be particularly beneficial to individuals who may lack the intuitive emotional regulation, resolve, or volitional control over drinking to consume alcohol responsibly.

The present findings emphasize the need for campus outreach programs to target alcohol use in students who may be experiencing compromised mental health upon their transitions to college. Low self-esteem, anxiety disorders, and depression all contribute to escalating rates of psychological impairment observed in college populations and underscore the need for proactive mental health interventions (Caulfield, 2001; Kitzrow, 2003). College transitions, in particular, may engender considerable anxiety for female students who may suffer deteriorated mental well-being and, consequently, increased risks for hazardous drinking. Drinking may be a form of coping with negative mental states. Interventions that take place soon after matriculation can teach and stress the value of using protective strategies in reducing risks associated with drinking to students who might most benefit from them. In particular, nonpunitive and noncoercive group motivational enhancement interventions conducted in the spirit of motivational interviewing (MI; Miller & Rollnick, 2002) and designed to increase students' motivation to alter their own behavior have been effective in

reducing alcohol consumption within this population (Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, 2002). Thus, teaching protective behaviors within such a setting may be advantageous. In addition, equipping faculty and college personnel who work directly with students and may be best situated to identify lower mental health with information on protective strategies may be helpful. Further, campus health and psychological centers might consider sponsoring protective behavioral based initiatives by providing therapists and counselors with the tools needed to teach such self-protective strategies. Guidelines encouraging mental health professionals to discuss protective strategies with students who come in seeking counseling might be effective as these students are generally experiencing poor mental health and teaching them protective behaviors might help mitigate risky drinking and related consequences. Finally, although our analyses exhibited no direct correlational significance between mental health and drinking or negative outcomes, mental well-being does appear to offer some intrinsic protection against risky drinking behavior. Considering that first-year college women tend to experience heightened levels of emotional distress, other proactive approaches should focus on alleviating sources of stress and boosting mental health among this population. Training students to better manage academic pressures or providing supportive big sister sponsors may relieve anxiety associated with transitions to unfamiliar environments and reduce risky drinking.

Social health also moderated the impact of protective behaviors in this sample, such that protective behavioral employment decreased maximum consumption per occasion in women who reported higher social health. Among those women who tended to describe themselves as socially active, “easy to get along with,” “comfortable being around people,” and “happy with family relationships,” protective strategies appeared to reduce excessive social drinking to less risky, more moderate levels. Results indicate that the more satisfied a female student is with her social surroundings and the closer her ties are to those around her, the more efficacious protective behaviors become in mitigating excessive drinking. Conversely, the usage of protective behaviors was not found to be effective in reducing maximum drinks among female participants with lower perceived social health. It is plausible that socially anxious or disconnected first-year college women may lack the social confidence or assertiveness to successfully employ self-protective behaviors. Perhaps women with higher social health are better able to apply protective behaviors than their lower social health peers because they are more likely to drink in intimate and familiar settings and may feel more secure with drinking associates, who may even encourage their use of such strategies. These findings related to maximum drinks are consistent with previous research asserting the protective benefit of support networks and community integration (LaBrie et al., 2008; Vaux, 1988). However, by failing to establish a direct link between social health and drinking, these results also conflict with LaBrie and colleagues (2008) who correlated college females’ stronger connection to peers and community with increased alcohol consumption. Supplemental research using varied methods and diverse samples is needed to ascertain the role of social health in drinking behavior. Nevertheless, the current results emphasize the impact of social health status to protective behavioral efficacy and offer important implications for campus intervention policies. For example, prevention efforts that stress protective behaviors and are targeted toward socially active campus groups, such as sororities or athletic teams, may be particularly efficacious given that women with high

social health were shown to benefit most from implementing protective strategies. In addition to protective behavioral education, student affairs personnel should strive to foster socially integrated campus environments and provide those students lacking social confidence or a sense of communal cohesiveness with opportunities to enhance social ties within the community and to develop positive social health.

Results of the current study must be interpreted with several methodological limitations in mind. First, as the data are cross-sectional, no causation can be inferred. Future studies would benefit from longitudinal analyses that capture the causal effect of collegiate women's health status on the usefulness of protective behavioral strategies. Second, our self-report measures, which must rely on participants' accurate reporting, risk inherent response bias. However, we made great efforts to ensure respondents that surveys were anonymous and confidential, thereby conforming to methods deemed valid and reliable in evaluating alcohol use and behavior (Maisto, Connors, & Allen, 1995). Further, our sample overrepresented White/Caucasian students and underrepresented Hispanic/Latino and Asian students in comparison to campus student demographics. Future research might examine if the observed relationships are similar in minority samples, particularly among Hispanic/Latinos and Asians. Finally, the generalizability of the findings is also hindered by the fact that the sample comprised female students from one mid-sized private university. Research is needed to determine if the findings hold true for college males and upper-class college females.

This investigation facilitates the advancement of prevention strategies and encourages targeted protective behavioral based campus initiatives. Findings are promising for college personnel concerned with female students' alcohol consumption and risks for adverse consequences. Specifically, individuals with lower mental health and higher social health who seem to reap unique and significant benefits from the use of protective behaviors should be equipped with such valuable preemptive strategies.

Acknowledgments

Support for this research was provided by National Institute of Alcohol Abuse and Alcoholism grant U18 AA15451-01 to Joseph W. LaBrie, principal investigator.

REFERENCES

- Aiken, LS.; West, SG. Multiple regression: Testing and interpreting interactions. Thousand Oaks, CA: Sage; 1991.
- Andrews JA, Tildesley E, Hops H, Li F. The influence of peers on young adult substance use. *Health Psychology*. 2002; 21(4):349–357. [PubMed: 12090677]
- Benton SL, Schmidt JL, Newton FB, Shin K, Benton SA, Newton DW. College student protective strategies and drinking consequences. *Journal of Studies on Alcohol*. 2004; 65(1):115–121. [PubMed: 15000510]
- Berkowitz AD, Perkins HW. Recent research on gender differences in collegiate alcohol use. *Journal of American College Health*. 1987; 36(2):123–129. [PubMed: 3312362]
- Billingham RE, Parrillo AV, Gross WC. Reasons given by college students for drinking: A discriminant analysis investigation. *International Journal of the Addictions*. 1993; 28(8):793–802. [PubMed: 8349392]

- Borsari B, Carey KB. Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13(4):391–424. [PubMed: 11775073]
- Caulfield S. Depression on college campuses: A new challenge for student health services and counseling centers. *Student Health Spectrum*. 2001 Fall;1:8–11.
- Clapper RL, Martin CS, Clifford PR. Personality, social environment, and past behavior as predictors of late adolescent alcohol use. *Journal of Substance Abuse*. 1994; 6(3):305–313. [PubMed: 7703707]
- Cooper ML, Agocha VB, Sheldon MS. A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality*. 2000; 68(6):1059–1088. [PubMed: 11130732]
- Dawson DA, Grant BF, Stinson FS, Chou PS. Another look at heavy episodic drinking and alcohol use disorders among college and noncollege youth. *Journal of Studies on Alcohol*. 2004; 65(4):477–488. [PubMed: 15378804]
- Delva J, Smith MP, Howell RL, Harrison DF, Wilke D, Jackson L. A study of the relationship between protective behaviors and drinking consequences among undergraduate college students. *Journal of American College Health*. 2004; 53(1):19–26. [PubMed: 15266726]
- Earleywine M, Martin C. Anticipated stimulant and sedative effects of ethanol vary with limb of the blood alcohol curve and dosage. *Alcoholism: Clinical and Experimental Research*. 1993; 51:135–139.
- Fillmore, KM.; Golding, JM.; Leino, EV. Patterns and trends in women's and men's drinking. In: Wilsnack, RW.; Wilsnack, SC., editors. *Gender and alcohol: Individual and social perspectives*. New Brunswick, NJ: Rutgers Center of Alcohol Studies; 1997. p. 21-48.
- Gleason NA. College women and alcohol: A relational perspective. *Journal of American College Health*. 1994; 42(6):279–289. [PubMed: 8046167]
- Gomberg ESL. Risk factors for drinking over a woman's life span. *Alcohol Health & Research World*. 1994; 18(3):220–227.
- Gonzalez MCT, Riveros MMP, Uribe JI, Luna SM. Validation of the Young Adult Alcohol Screening Test "YAAPST" in a group of undergraduate students of the Pontificia Universidad Javeriana. *Universitas Psychologica*. 2006; 5(1):175–190.
- Guillemin F, Paul-Dauphin A, Virion JM, Bouchet C, Briancon S. Le profil de santé de DUKE: Un instrument de mesure générique de qualité de vie liée à la santé. *Santa Publique*. 1997; 9(1):35–44.
- Haines M, Barker G, Rice R. The personal protective behaviors of college student drinkers: Evidence of indigenous protective norms. *Journal of American College Health*. 2006; 55(2):69–75. [PubMed: 17017302]
- Hartzler B, Fromme K. Heavy episodic drinking and college entrance. *Journal of Drug Education*. 2003; 33(3):259–274. [PubMed: 15022860]
- Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24: Changes from 1998 to 2001. *Annual Review of Public Health*. 2005; 26(1):259–279.
- Hoffman JA. Psychological separation of late adolescents from their parents. *Journal of Counseling Psychology*. 1984; 31:170–178.
- Hurlbut SC, Sher KJ. Assessing alcohol problems in college students. *Journal of American College Health*. 1992; 41:49–58. [PubMed: 1460173]
- Jackson, KM.; Sher, KJ.; Park, A. Drinking among college students: Consumption and consequences. In: Galanter, M., editor. *Recent developments in alcoholism, Vol. 17: Alcohol problems in adolescents and young adults*. New York: Springer; 2005. p. 85-117.
- Jersild, D. *Happy hours: Alcohol in a woman's life*. New York: Harper Collins; 2002.
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. *Monitoring the future: National results on adolescent drug use*. Bethesda, MD: National Institute on Drug Abuse; 2006.
- Karwacki SB, Bradley JR. Coping, drinking motives, goal attainment expectancies and family models in relation to alcohol use among college students. *Journal of Drug Education*. 1996; 26(3):243–255. [PubMed: 8952209]
- Kitzrow M. The mental health needs of today's college students: Challenges and recommendations. *NASPA Journal*. 2003; 41(1):165–179.

- Korcuska JS, Thombs DL. Gender role conflict and sex-specific drinking norms: Relationships to alcohol use in undergraduate women and men. *Journal of College Student Development*. 2003; 44(2):204–216.
- Labouvie E, Bates ME. Reasons for alcohol use in young adulthood: Validation of a three-dimensional measure. *Journal of Studies on Alcohol*. 2002; 63(2):145–155. [PubMed: 12033691]
- LaBrie JW, Hummer JF, Pedersen ER. Reasons for drinking in the college student context: The differential role and risk of the social motivator. *Journal of Studies on Alcohol and Drugs*. 2007; 68(3):393–398. [PubMed: 17446979]
- LaBrie JW, Thompson AD, Ferraiolo P, Garcia JA, Huchting K, Shelesky K. The differential impact of relational health on alcohol consumption and consequences in first year college women. *Addictive Behaviors*. 2008; 33(2):266–278. [PubMed: 17913379]
- Lapsley DK, Rice KG, Shadid GE. Psychological separation and adjustment to college. *Journal of Counseling Psychology*. 1989; 36(3):286–294.
- Larimer ME, Lee CM, Kilmer JR, Fabiano PM, Stark CB, Geisner IM, et al. Personalized mailed feedback for college drinking prevention: A randomized clinical trial. *Journal of Consulting & Clinical Psychology*. 2007; 75(2):285–293. [PubMed: 17469886]
- Lewis TF. Perceptions of risk and sex-specific social norms in explaining alcohol consumption among college students: Implications for campus interventions. *Journal of College Student Development*. 2007; 48(3):297–310.
- Maisto SA, Connors GJ, Allen JP. Contrasting self-report screens for alcohol problems: A review. *Alcoholism: Clinical and Experimental Research*. 1995; 19(6):1510–1516.
- Martens MP, Ferrier AG, Cimini MD. Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol & Drugs*. 2007; 68(1):106–114. [PubMed: 17149524]
- Martens MP, Ferrier AG, Sheehy MJ, Korbett K, Anderson DA, Simmons A. Development of the Protective Behavioral Strategies Survey. *Journal of Studies on Alcohol*. 2005; 66(5):698–705. [PubMed: 16329461]
- Martens MP, Pedersen ER, LaBrie JW, Ferrier AG, Cimini MD. Measuring alcohol-related protective behavioral strategies among college students: Further examination of the Protective Behavioral Strategies Scale. *Psychology of Addictive Behaviors*. 2007; 21:307–315. [PubMed: 17874881]
- Martens MP, Taylor KK, Damann KM, Page JC, Mowry ES, Cimini MD. Protective behavioral strategies when drinking alcohol and their relationship to negative alcohol-related consequences in college students. *Psychology of Addictive Behaviors*. 2004; 18(4):390–393. [PubMed: 15631613]
- Martin CS, Lynch KG, Pollock NK, Clark DB. Gender differences and similarities in the personality correlates of adolescent alcohol problems. *Psychology of Addictive Behaviors*. 2000; 14(2):121–133. [PubMed: 10860111]
- Martsh CT, Miller WR. Extraversion predicts heavy drinking in college students. *Personality and Individual Differences*. 1997; 23(1):153–155.
- Miller, WR.; Rollnick, S. *Motivational Interviewing: Preparing people for change*. 2nd ed.. New York: Guilford Press; 2002.
- Muchowski-Conley PM. Surveying the need for significant-other involvement in the treatment of female alcoholism. *International Journal of the Addictions*. 1982; 17(7):1253–1258. [PubMed: 7174165]
- O'Malley PM, Johnston LD. Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol Supplement*. 2002; 63:23. [PubMed: 12022728]
- Park CL, Grant C. Determinants of positive and negative consequences of alcohol consumption in college students: Alcohol use, gender, and psychological characteristics. *Addictive Behaviors*. 2005; 30(4):755–765. [PubMed: 15833579]
- Parkerson GR, Broadhead WE, Tse CJ. The Duke Health Profile: A 17-item measure of health and dysfunction. *Medical Care*. 1990; 28(11):1056–1072. [PubMed: 2250492]
- Perkins HW. Surveying the damage: A review of research on consequences of alcohol misuse in college populations. *Journal of Studies on Alcohol*. 2002:91–100. [PubMed: 11925064]
- Peterson JB, Morey J, Higgins DM. You drink, I drink: Alcohol Consumption, social context and personality. *Individual Differences Research*. 2005; 3(1):50–58.

- Randall CL, Roberts JS, Del Boca FK, Carroll KM, Connors GJ, Mattson ME. Telescoping of landmark events associated with drinking: A gender comparison. *Journal of Studies on Alcohol*. 1999; 60(2):252–260. [PubMed: 10091964]
- Reifman A, Watson WK. Binge drinking during the first semester of college: Continuation and desistance from high school patterns. *Journal of American College Health*. 2003; 52(2):73–81. [PubMed: 14765761]
- Robbins C. Sex differences in psychosocial consequences of alcohol and drug abuse. *Journal of Health and Social Behavior*. 1989; 30(1):117–130. [PubMed: 2723378]
- Schulenberg JE, Maggs JL. A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol*. 2002:54–70.
- Seeman M, Seeman AZ. Life strains, alienation, and drinking behavior. *Alcoholism: Clinical and Experimental Research*. 1992; 16(2):199–205.
- Stockwell T, McLeod R, Stevens M, Phillips M, Webb M, Jelinek G. Alcohol consumption, setting, gender and activity as predictors of injury: A population-based case-control study. *Journal of Studies on Alcohol*. 2002; 63(3):372–379. [PubMed: 12086138]
- Tabachnick, BG.; Fidell, LS. Using multivariate statistics. 5th ed.. Boston: Allyn and Bacon; 2007.
- Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism. A call to action: Changing the culture of drinking at U.S. colleges. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism; 2002.
- Vaux, A. Social support: Theory, research and intervention. Westport, CT: Praeger; 1988.
- Vogeltanz, ND.; Wilsnack, SC.; Gallant, SJ.; Keita, GP.; Royak-Schaler, R. Health care for women: Psychological, social, and behavioral influences. Washington, DC: American Psychological Association; 1997. Alcohol problems in women: Risk factors, consequences, and treatment strategies; p. 75-96.
- Walitzer KS, Sher KJ. A prospective study of self-esteem and alcohol use disorders in early adulthood: Evidence for gender differences. *Alcoholism: Clinical and Experimental Research*. 1996; 20(6): 1118–1124.
- Walters ST, Roudsari BS, Vader AM, Harris TR. Correlates of protective behavior utilization among heavy-drinking college students. *Addictive Behaviors*. 2007; 32(11):2633–2644. [PubMed: 17669596]
- Wechsler H, Davenport A, Dowdall G, Moeykens B. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *JAMA: Journal of the American Medical Association*. 1994; 272(21):1672–1677.
- Wechsler H, Isaac N. 'Binge' drinkers at Massachusetts colleges. *JAMA: Journal of the American Medical Association*. 1992; 267(21):2929.
- Wechsler H, Kuo M. College students define binge drinking and estimate its prevalence: Results of a national survey. *Journal of American College Health*. 2000; 49(2):57. [PubMed: 11016129]
- Wechsler H, Lee JE, Kuo M, Lee H. College binge drinking in the 1990s: A continuing problem. *Journal of American College Health*. 2000; 48(5):199. [PubMed: 10778020]
- Wechsler H, Lee JE, Kuo M, Seibring M, Nelson TF, Lee H. Trends in college binge drinking during a period of increased prevention efforts. *Journal of American College Health*. 2002; 50(5):203. [PubMed: 11990979]
- White HR, McMorris BJ, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Increases in Alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol*. 2006; 67(6):810–822. [PubMed: 17060997]
- Wilsnack RW, Vogeltanz ND, Wilsnack SC, Harris TR. Gender differences in alcohol consumption and adverse drinking consequences: Cross-cultural patterns. *Addiction*. 2000; 95(2):251–265. [PubMed: 10723854]
- Wilsnack SC, Wilsnack RW. International gender and alcohol research: Recent findings and future directions. *Alcohol Research & Health*. 2002; 26(4):245–250. [PubMed: 12875033]
- Wolff MW, Wolff KA. Personality characteristics as a function of frequency and type of substance use. *Adolescence*. 2002; 37(148):705–716. [PubMed: 12564824]

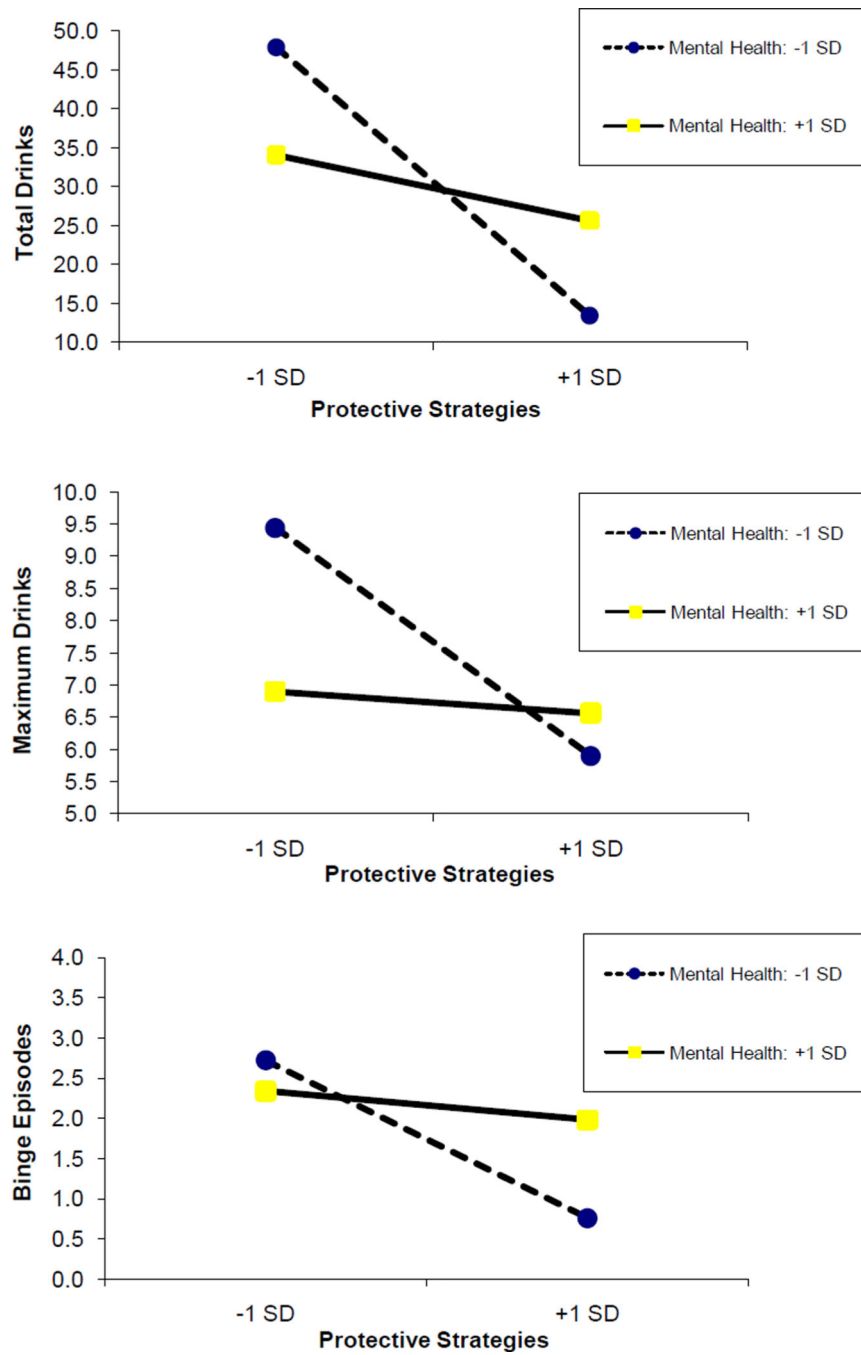


FIGURE 1. Protective Strategies × Mental health on total drinks, Maximum drinks, and Binge episodes

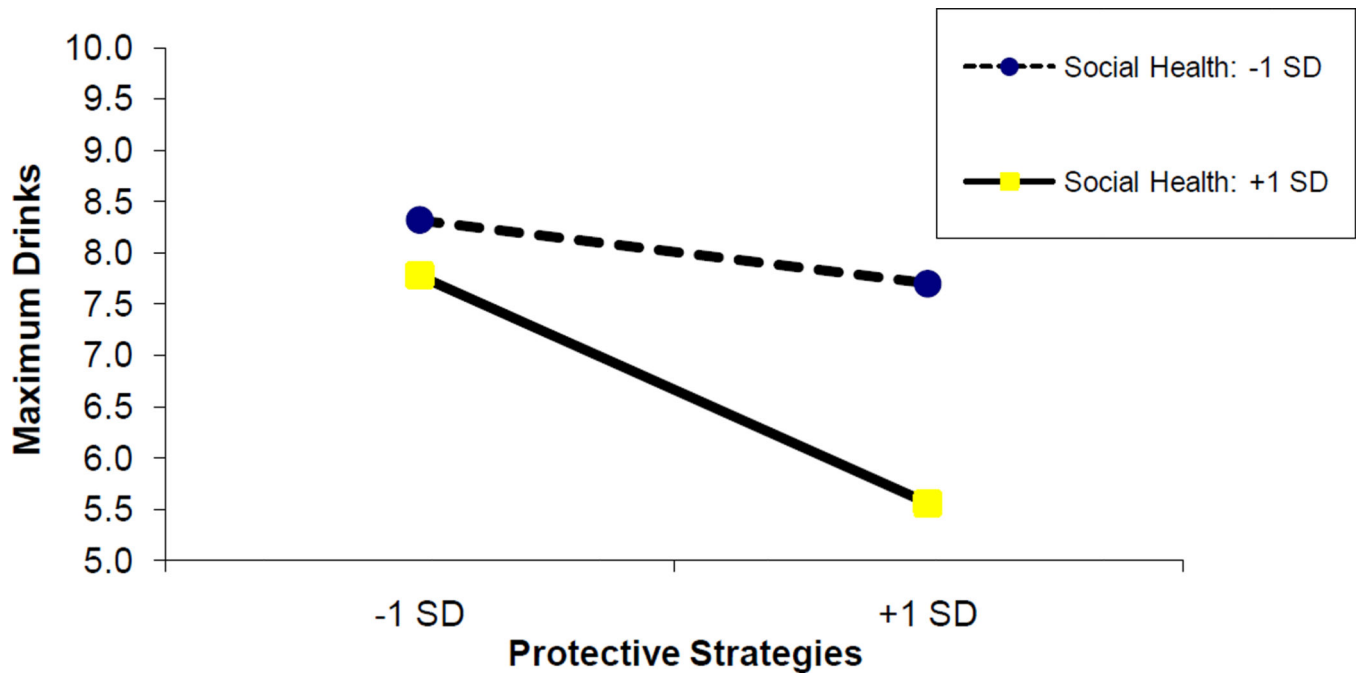


FIGURE 2.
Protective Strategies × Social health on Maximum drinks

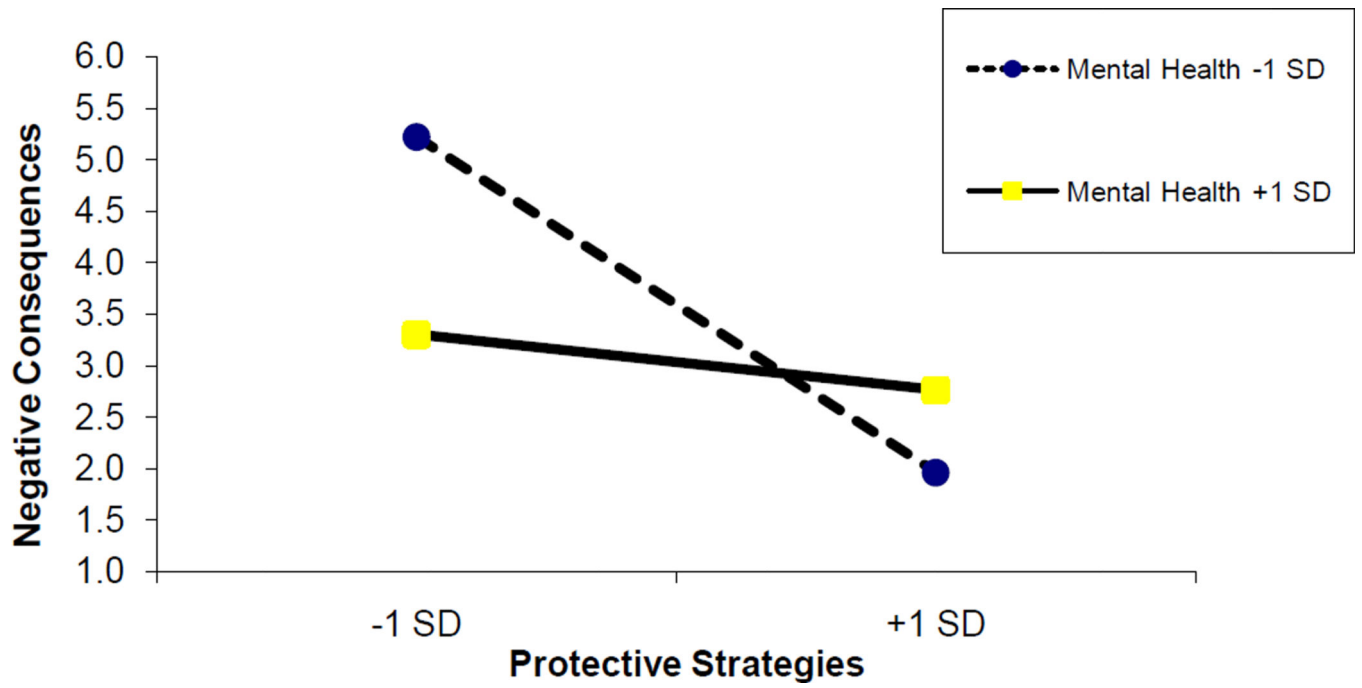


FIGURE 3. Protective Strategies × Mental health on Alcohol-Related Negative Consequences

TABLE 1

Correlation Matrix

Item	1	2	3	4	5	6	7	8
1. Total Drinks	—							
2. Maximum Drinks	.57***	—						
3. Binge Episodes	.76***	.50***	—					
4. Negative Consequences	.42***	.37***	.34***	—				
5. Protective Strategies	-.33***	-.22*	-.23**	-.30***	—			
6. Physical Health	.03	-.06	.10	-.07	.16	—		
7. Mental Health	.01	-.09	.10	-.08	-.04	.46***	—	
8. Social Health	.00	-.14	-.05	-.17	.34***	.38***	.31***	—

* $p < .05$.** $p < .01$.*** $p < .001$.

TABLE 2

Protective Strategies on Drinking Behaviors as Moderated by Health Subscales

Predictor	Total Drinks		Maximum Drinks		Binge Episodes	
	R ²	Final β	R ²	Final β	R ²	Final β
Step 1: Main Effects	.14***		.08**		.07*	
Protective Strategies		-.47***		-.26**		-.29**
Physical Health		.10		.08		.15
Mental Health		-.12		-.15		.02
Social Health		.14		-.13		-.03
Step 2: Interactions	.08**		.08**		.04	
Protective Strategies \times Physical Health		-.01		.12		.01
Protective Strategies \times Mental Health		.30**		.21*		.22*
Protective Strategies \times Social Health		-.11		-.24*		-.12
Multiple R	.47		.40		.33	
F(7, 120)	4.69***		3.27***		2.28*	

* $p < .05$.** $p < .01$.*** $p < .001$.

TABLE 3

Protective Strategies on Alcohol-Related Negative Consequences as Moderated by Health Subscales

Predictor	Negative Consequences	
	R^2	Final β
Step 1: Main Effects	.11**	
Protective Strategies		-.34***
Physical Health	.09	
Mental Health	-.13	
Social Health	-.02	
Step 2: Interactions	.06*	
Protective Strategies \times Physical Health	.08	
Protective Strategies \times Mental Health	.21*	
Protective Strategies \times Social Health	-.02	
Multiple R	.41	
$F(7, 120)$	3.56**	

*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.