Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

Addict Behav. Author manuscript; available in PMC 2019 May 01.

Published in final edited form as:

Addict Behav. 2018 May ; 80: 116–123. doi:10.1016/j.addbeh.2018.01.023.

Drinking to Cope Mediates the Relationship between Depression and Alcohol Risk: Different Pathways for College and Non-College Young Adults

Shannon R. Kenney, Ph.D., M.P.H.[a,b], **Bradley J. Anderson, Ph.D.**[a], and **Michael D. Stein, M.D.**[a,c]

[a]Behavioral Medicine Department, Butler Hospital, Providence, RI, 02906

[b]Warren Alpert Medical School of Brown University, Providence, RI, 02912

[c]Boston University School of Public Health, Boston, MA 02118

Abstract

Background—It is well-established that drinking to cope with negative affective states mediates the relationship between depressed mood and alcohol risk outcomes among college students. Whether non-college emerging adults exhibit a similar pathway remains unknown. In the current study, we compared the mediating role of coping motives in the relationship between depressive symptoms and drinking risk outcomes (heavy episodic drinking and alcohol problems) in college and non-college emerging adult subgroups.

Methods—Participants were three hundred forty-one community-recruited 18–25 year olds reporting past month alcohol use. We used a structural equation modeling (SEM) for our primary mediation analysis and bias-corrected bootstrap resampling for testing the statistical significance of mediation.

Results—Participants averaged 20.8 (± 1.97) years of age, 49% were female, 67.7% were White, 34.6% were college students, and 65.4% were non-college emerging adults. College and non-college emerging adults reported similar levels of drinking, alcohol problems, and drinking to cope with negative affect, and drinking to cope was associated with alcohol-related problems in both samples. However, while drinking to cope mediated the relationship between depressed mood and

*Correspondence concerning this article should be addressed to: Shannon R. Kenney, Ph.D., M.P.H., Department of Psychiatry and Human Behavior at Brown University, Butler Hospital, 345 Blackstone Blvd., Providence, RI 02906; Pn: (617) 633-4321; Fx: (401) 680-4101. Shannon_Kenney@brown.edu.

Contributors

Dr. Stein collected the data used in the current manuscript. Drs. Stein, Kenney, and Anderson generated the design and analyses used in the current study. Dr. Kenney conducted the literature review, wrote the Introduction, Methods, and Discussion, and revised the final draft of the manuscript. Dr. Anderson conducted statistical analyses, wrote the Results section, and reviewed manuscript drafts. Dr. Stein reviewed and provided feedback on drafts of the manuscript, and all authors contributed to and have approved the final manuscript.

Conflict of Interest

There are no conflicts of interest to report.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

alcohol problems among students, it did not mediate the pathway among non-college emerging adults.

Conclusions—These findings caution against extending college-based findings to non-college populations and underscore the need to better understand the role of coping motives and other intervening factors in pathways linking depressed mood and alcohol-related risk in non-college emerging adults.

Keywords

Coping motives; Alcohol consumption; Alcohol consequences; Depression; Emerging adulthood

1.0 INTRODUCTION

Co-occurring depressed mood and risky alcohol use are prevalent during emerging adulthood, a critical development period ranging from approximately 18 to 25 years of age linking adolescence and adulthood and characterized by identity exploration, instability, self-focus, and opportunity (Arnett, 2005). Three-quarters of individuals with lifetime history of mood disorders have their first onset by the age of 24 (Kessler et al., 2005), and emerging adulthood is associated with peak lifetime drinking risk (Patrick & Schulenberg, 2011; Sussman & Arnett, 2014), including alcohol use disorder (AUD; Hasin, Stinson, Ogburn, & Grant, 2007). In a review of 18 studies directly comparing U.S. college and non-college samples, Carter and colleagues (2010) show that college students drink at riskier levels and display greater increases in drinking during emerging adulthood relative to non-college peers. However, studies adjusting for background factors reveal similar rates of psychiatric disorders (Blanco et al., 2008) and AUD (Blanco et al., 2008; Harford, Yi, & Hilton, 2006). Other studies demonstrate that emerging adults who do not attend college report greater levels of daily drinking (O'Malley & Johnston, 2002; Slutske, 2005), experience more alcohol-related problems (Quinn & Fromme, 2011; White, Labouvie, & Papadaratsakis, 2005), and are at heightened risk for developing alcohol dependence over time (Bingham, Shope, & Tang, 2005; Carter et al., 2010; Slutske, 2005).

Motivational models of problematic alcohol use posit that depressed individuals are susceptible to consuming alcohol to avoid or regulate negative internal states (Abrams & Niaura, 1987; Maisto, Carey, & Bradizza, 1999). Moreover, of all drinking motives (e.g., social, enhancement, coping, conformity; Cooper, 1994), drinking to cope is the most robust predictor of negative alcohol-related consequences among college students (Merrill, Wardell, & Read, 2014), among the strongest correlates of binge drinking (5+ drinks in a row in past two weeks) from ages 18–22, and the strongest correlate of bingeing after age 22 (M. L. Cooper, 1994; Kuntsche, Stewart, & Cooper, 2008; Park & Levenson, 2002; Patrick & Schulenberg, 2011). Although drinking to cope fails to effectively resolve problems and may actually induce depressant effects, learned behavioral patterns reinforce maladaptive coping behaviors (Bonin, McCreary, & Sadava, 2000; M. L. Cooper, Frone, Russell, & Mudar, 1995; M. L. Cooper, Russell, Skinner, Frone, & Mudar, 1992; Merrill & Thomas, 2013; Park, Armeli, & Tennen, 2004). In effect, individuals who rely on drinking to cope are less likely to transition out of excessive drinking patterns over time (Baer, 2002; Littlefield, Sher, & Wood, 2010; Merrill & Read, 2010).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Drinking to cope has emerged as a strong mediator in the relationship linking depressive symptoms with subsequent negative alcohol consequences among college students (Bravo, Pearson, Stevens, & Henson, 2016; Clerkin, Werntz, Magee, Lindgren, & Teachman, 2014; Gonzalez, Bradizza, & Collins, 2009; Kenney, Jones, & Barnett, 2015; Tomaka, Morales-Monks, & Shamaley, 2013; Vernig & Orsillo, 2015). Two of these studies also show intervening effects on alcohol consumption outcomes, including drinking frequency (Bravo et al., 2018; Gonzalez et al., 2009) and heavy drinking (Gonzalez et al. 2009). Unfortunately, existing emerging adult research has primarily examined undergraduate student samples at four-year universities (for review see E. Kuntsche, R. Knibbe, G. Gmel, & R. Engels, 2005), and researchers regularly note the lack of generalizability to non-college populations (Armeli, Sullivan, & Tennen, 2015; L. M. Cooper, Kuntsche, Levitt, Barber, & Wolf, 2016; Merrill et al., 2014). Nationally, one in five eighth graders drop out of high school (Heckman & Lafontaine, 2010), and among high school graduates, less than half matriculate into 4-year colleges the following fall (Aud et al., 2011). Therefore, it is surprising that the current literature examining the role of coping motives in predicting alcohol risk among distressed emerging adults largely neglect a substantial proportion of this population. Examining the extent to which pathways may differ by college status is important to attend adequately to the needs of all emerging adults.

1.1 Objective and Hypotheses

In the current study, we aim to fill a prominent gap in the existing literature by examining if the pathways (i.e., via drinking to cope) linking depressive symptoms with heavy episodic drinking and adverse alcohol outcomes are similar when comparing college and non-college emerging adults. Although college and non-college emerging adults experience substantially different environmental contexts and exhibit different drinking behaviors, consequences, and trajectories, consistent with the college student literature, we hypothesized that drinking to cope would mediate the relationship between depressive status and alcohol-related problems in both college and non-college emerging adult samples. We also hypothesized that drinking to cope would mediate the relationship between depressive status and heavy episodic drinking (Wechsler & Nelson, 2001) in both college and non-college emerging adult samples. All study models control for age, gender, and racial/ethnic status. These factors are known correlates of alcohol use frequency and quantity (e.g., Grant et al., 2004; Vicary & Karshin, 2002) and could confound associations between depression, motivations for alcohol use, and alcohol use and adverse consequences (Kenney et al., 2015; Perkins, 1999).

2. Method

2.1 Participants and Procedure

Study participants were recruited between January 2012 and March 2015 for a study on “health behaviors of young adults, 18–25 years old” using online, newspaper, commercial radio, and public transportation advertising. Those interested in participating were screened anonymously via phone after providing verbal consent. In addition to being 18–25 years old, eligibility criteria for the parent study included using alcohol or marijuana in the last month, not having suicidal ideation in the past two weeks, and living within 30 minutes of the research site. Of the 2,645 individuals screened by phone, 1,252 were ineligible. The most

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

common reasons for ineligibility included having suicidal ideation (n=234) and being outside the age range (n=148). The remaining 1,393 eligible persons were invited for an interview and 893 were either not interested [n=102 actively refused; n=188 passively refused, i.e. said they would call back to schedule an appointment, but never did; or were already participating in a research study (n=17)], or did not keep a scheduled appointment (n=586).

Five hundred persons provided written informed consent (the study was approved by the Institutional Review Board of a research hospital in Southern New England). Because our interest was in the comparison of college and non-college emerging adults, we excluded 101 who had completed a college degree and 55 currently enrolled in (n = 44) or had completed (n = 11) a two-year college program. We excluded these participants to ensure the college sample used in the current analyses was most consistent with existing studies that have primarily utilized current 4-year college students (for review see E. Kuntsche, R. A. Knibbe, G. Gmel, & R. Engels, 2005; Stone, Becker, Huber, & Catalano, 2012). Further, achieving a college degree represents a marked transition into adulthood roles (Stone et al., 2012) and two-year college contexts differ significantly from those of four-year colleges (Cremeens-Matthews & Chaney, 2016; VanKim, Laska, Ehlinger, Lust, & Story, 2010). Finally, we excluded three participants who did not provide data on the drinking motives measure, leaving 341 persons in the final analytic sample. Of these, 223 were currently enrolled in a 4-year college degree program and 118 were not in college (52 were not currently enrolled and 66 had never enrolled). While those not currently enrolled in college are more likely to be non-Hispanic White than those never enrolled, no other significant differences emerged between the non-college subgroups on any variables assessed in the final models.

2.2 Measures

Demographics commonly assessed in health behavior research, including age, sex, and race, were included as covariates in the current analyses. Moreover, during the emerging adult developmental period, risky drinking is shown to increase, peak, and then decrease (Maggs & Schulenberg, 2005), and men and White emerging adults consistently demonstrate greater drinking levels relative to women and non-Whites, respectively (for review see Borsari, Murphy, & Barnett, 2007; Grigsby, Forster, Unger, & Sussman, 2016; Stone et al., 2012). The following variables were also assessed.

2.2.1 Parental history of alcohol problems—Participants answering that their biological mother *or* father has or had “a problem with alcohol” were coded as having a parental history of alcohol problems. Parental history of alcohol problems predicts alcohol-related problems in both college and non-college populations but may be more prevalent among non-college emerging adults (for reviews see Elliott, Carey, & Bonafide, 2012; Grigsby et al., 2016).

2.2.2 Residential status—Participants reporting that their primary living arrangement (past 30 days) was with a parent in their home were coded as living with parents. Residing with parents is shown to protect students from pro-alcohol peer involvement and increased

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

drinking during college (Harford, Wechsler, & Muthen, 2002; White, Fleming, Kim, Catalano, & McMorris, 2008; White et al., 2006)

2.2.3 Depressive symptoms—Depressive symptoms were assessed using the nine-question Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001) that assesses the frequency of depressed mood or anhedonia over the past two weeks (score range 0–27).

2.2.4 Drinking motives—Motivations for drinking was based on the well-validated Drinking Motives Questionnaire (DMQ; M. L. Cooper, 1994). Respondents were asked to indicate how often participants drank alcohol for various reasons in the past 3–6 months. Responses are measured on a 4-point Likert scale from 1 (*almost never/never*) to 4 (*almost always/always*). Three subscales of five items each were assessed: Coping (α = .843; e.g., "To forget your worries"), Social (α = .763; e.g., "Because it helps you enjoy a party"), and Enhancement (α = .845; e.g., "Because it's exciting"). Accounting for social and enhancement drinking motives enabled us to isolate the independent influence of drinking to cope motives on alcohol outcomes.

2.2.5 Alcohol consumption—The Timeline Follow-Back (TLFB; Sobell & Sobell, 1996) measure is a semi-structured interview that uses a calendar-guided approach (Fals-Stewart, O'Farrell, Freitas, McFarlin, & Rutigliano, 2000) to assess alcohol use in the past 90 days. Days of alcohol use in the past 90 days and number of heavy episodic drinking days (i.e., four or more drinks on a given day for women or five or more drinks on a given day for men) were assessed.

2.2.6 Alcohol-related problems—The Short Inventory of Problems (SIP-2R; Miller, Tonigan, & Longabaugh, 1995) assesses participants' experience of 15 alcohol-related consequences (i.e., physical, social responsibility, intrapersonal, impulse, and interpersonal) in the past 3 months (α = .897).

2.3 Analytical Methods

We present descriptive statistics to summarize the characteristics of the sample and use t-tests for differences in means and χ^2 tests for differences in counts to compare college students with emerging adults not in college. Our primary analysis was conducted in a structural equation modeling (SEM) framework because our objectives were to 1) test the hypothesis that the effects of depression on adverse outcomes (alcohol problem severity as measured by the SIP and frequency of heavy episodic drinking) would be mediated by use of alcohol for coping, and 2) determine if these associations differed by student status. We estimated a 2-group (educational status) three-equation model. SIP and frequency of heavy episodic drinking use are correlated exogenous variables; drinking to cope is the hypothesized mediator. Based on prior research, age, sex, ethnicity, race, living with parent (yes/no), parental alcohol problems, drinking to socialize and drinking for enhancement were included as control variables in all 3 equations. Days of alcohol use was included as a control variable in the use of the drinking to cope and SIP equations but because a heavy episodic drinking day is by definition an alcohol use day, frequency of alcohol use was not

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

included as a control variable in the heavy episodic drinking equation. The variables included in the model were based on prior research and we did not drop coefficients that were not statistically significant. Based on theoretical rationale, we limit testing of mediation to the effects of depression and GAD on SIP and frequency of heavy episodic drinking as mediated by use of alcohol to cope. Bias-corrected bootstrap resampling is often recommended for testing the statistical significance of mediated effects (MacKinnon et al., 2004; Williams and MacKinnon, 2008). We used Mplus 8 to estimate 95% confidence interval estimates using bias-corrected bootstrap resampling with 10,000 replications; this method does not provide estimates of exact p-values. Parameter estimates were considered statistically significant at the .05 and .01 level if 0 was not covered by the 95% and 99% confidence intervals, respectively. Based on simulation research (Fritz & MacKinnon, 2007), a sample size of 148 is required to detect a mediation effect if both coefficients defining the interaction are between small and medium (e.g., $\beta \geq .26$) in the population (Fritz & MacKinnon, 2007). We report the unstandardized coefficient, the 95%CI estimate, and the associated standardized coefficient. For continuous covariates, we report fully standardized coefficients. For categorical covariates, we report y-standardized coefficients. We also used the Wald χ^2-statistic to test for between group invariance in the structural coefficients involved in the mediation hypotheses.

3. Results

Participants averaged 20.8 (± 1.97), 51% were male, 10.9% were Hispanic, 67.7% were White, 12.0% were Black, and 20.2% reported other racial origins (Table 1). In subsequent analyses, we contrasted non-Hispanic Whites to all racial and ethnic minorities. Ninety-nine (29.0%) said they were currently living with 1 or more parents, and 14.4% said their mother and/or father had an alcohol problem. Participants reported a mean of 6.61 (± 5.23) depressive symptoms. Based on the PHQ-9 severity score cut-offs (Kroenke et al., 2001), 139 participants (40.8%) were categorized as having no depressive symptomatology (scores less than 5), 119 (34.9%) as having minimal symptoms (scores of 5–9), 48 (14.1%) as mildly depressed (scores of 10–14), 26 (7.6%) as having moderately severe depression (scores of 15–19), and 9 (2.6%) as severely depressed (scores greater than 19). On average, participants reported use of alcohol on 22.0 (± 16.0) and heavy episodic drinking on 11.9 (± 13.1) of the 90 days assessed by the TLFB. The mean score on the SIP was 6.57 (± 6.71). Means on the reasons for drinking scales were 2.79 (± 0.68), 2.66 (± 0.81), and 2.00 (± 0.76) on the use of alcohol for social, enhancement, and coping reasons, respectively.

Students had significantly ($t_{339} = 5.25$, $p < .001$) lower mean age than non-college participants (Table 1). Students were significantly ($\chi^2 = 8.48$, $p = .004$) less likely to be male, significantly less likely to live with parents ($\chi^2 = 8.67$, $p = .003$), and significantly ($\chi^2 = 23.84$, $p < .001$) less likely to say they had a parent with an alcohol problem. Non-students had significantly ($t_{339} = 3.93$, $p < .001$) higher mean scores on the PHQ-9 depression index. Students had significantly ($t_{339} = -2.27$, $p = .024$) higher mean scores on use of alcohol for enhancement, but students and non-students did not differ significantly with respect to any of the outcome variables, or any of the other background characteristics described in Table 1.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Equation 1 - Use of Alcohol for Coping

As shown in Table 2, among college students, depression was positively and significantly associated with use of alcohol for coping (b = 0.045, 95%CI 0.025; 0.064, $p < .01$); this association was substantively weaker and not statistically significant among non-students. A Wald χ^2-test rejected the null hypothesis that the effect of depression on use of alcohol for coping was equal in these two populations ($\chi^2 = 7.35$, df = 1, $p = .007$). Among both students and non-students, use of alcohol for coping was positively and significantly associated with use of alcohol for enhancement and social reasons.

Equation 2 – Short Inventory of Problems

Among non-students, the SIP was positively and significantly associated with use of alcohol for enhancement (b = 2.472, 95%CI 0.307; 4.683, $p < .05$). This association was not statistically significant among students. The SIP was also positively and significantly associated with use of alcohol for coping among both non-students (b = 3.533, 95%CI 0.615; 6.676, $p < .05$) and students (b = 3.556, 95%CI 2.060; 5.197, $p < .01$). We note that the substantive magnitude of this coefficient is similar across groups and the Wald test fails to reject the null hypothesis that this coefficient is equal in the two populations ($\chi^2 = 0.00$, df = 1, $p = .986$).

Equation 3 – Frequency of Heavy Episodic Drinking

Controlling for other variables in the model, frequency of heavy episodic drinking was not associated significantly with either PHQ depression scores or use of alcohol for coping in either sample (Table 2). Frequency of heavy episodic drinking was associated positively with use of alcohol for enhancement among both non-college students (b = 6.631, 95%CI 1.638; 12.242, $p < .01$) and college students (b = 4.246, 95%CI 1.317; 7.726, $p < .01$). Among college students, males had significantly (b = 6.012, 95%CI 2.662; 9.717, $p < .01$) higher adjusted mean frequency of heavy episodic drinking than females; this association was not significant among non-students.

Total, direct, and mediating (indirect) effects of depression as mediated by use of alcohol for coping on SIP and frequency of heavy episodic drinking are reported in Table 3. Among non-students, depression was not associated significantly, either directly or mediated by coping motives, with the SIP. Among college students both the total effect (b = 0.203, 95%CI 0.063; 0.365, $p < .001$) and mediated effect of depression via coping (b = 0.159, 95%CI 0.076; 0.282, $p < .01$) on the SIP were statistically significant. The direct effect of depression on the SIP was substantively smaller than the mediated effect via coping motives and not statistically significant. The mediated effect of depression on the SIP through coping is significantly different in these two groups ($\chi^2 = 4.925$, df = 1, $p = .027$). Depression was not associated directly with frequency of heavy episodic drinking, nor was it mediated by coping motives in either population. Figure 1 summarizes the results of the analysis for the variables of primary theoretical interest.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

4. Discussion

The current comparison between college and non-college emerging adults demonstrates unexpected differential pathways in how depressive symptoms are linked with negative drinking outcomes through drinking to cope in these two populations. These results are consistent with the hypothesis and prior research (e.g., Kenney et al., 2015; Vernig & Orsillo, 2015) showing that among students, the effects of depression on alcohol problem severity, as measured by the SIP, are mostly or fully mediated by use of alcohol for coping. However, despite exhibiting higher levels of depressive symptoms and similar levels of drinking to cope and alcohol-related problems as same-aged college peers, we did not find a similar pathway among non-college emerging adults. It appears that existing research demonstrating a significant mediating role of coping motives but that has primarily relied on college-based samples may not extend to non-college emerging adults.

Despite similar levels of drinking to cope, the direct effect of depressive symptoms on drinking to cope was significant among college students but not among non-college students. It is possible that different situational contexts may uniquely impact individuals' use of alcohol to alleviate negative mood states specifically. Drinking to cope in order to enhance mood may be particularly appealing for college students with fewer adult roles and ample opportunity to drink in a heavy drinking normative culture. Studies document ease of access to alcohol and heavy drinking parties as predictors of alcohol risk (Jessor, Costa, Krueger, & Turbin, 2006; Paschall & Saltz, 2007). Clapp and colleagues (2006) found that students drink more excessively when many intoxicated peers are present. Accessibility and availability may make decisions to drink easier for depressed students. Still, that drinking to cope was directly associated with alcohol-related problems among non-college participants highlights the risk associated with drinking to cope and the need to examine predictors other than depressed mood in this population. In adult samples, drinking to cope partially mediates the relationship between stressful or traumatic experiences and drinking-related problems (Grayson & Nolen-Hoeksema, 2005; Peirce, Frone, Russell, & Cooper, 1994). Given that emerging adults without college degrees are more likely to have a history of adverse experiences than those with college degrees (Monnat & Chandler, 2015), examining the role of adverse experiences in non-college emerging adults' alcohol-related motivational pathways may be needed.

Neither depressed mood nor coping motives were directly associated with heavy episodic drinking frequency, and no mediation effects emerged. Even though drinking to cope is directly associated with heavy episodic drinking among emerging adults (Cooper, 1994; Kuntsche et al., 2008; Park & Levenson, 2002; Patrick & Schulenberg, 2011), the current findings do not support mediation in this model. Rather, these findings are consistent with research showing that students who drink to alleviate depressive symptoms face heightened risk for associated negative consequences even though they do not drink at greater levels, overall, than non-depressed peers (Kenney et al., 2015). Drinking to cope with depressive states appears to heighten the likelihood for experiencing negative consequences among college students, regardless of drinking level, which points to the exacerbated risk associated with depressed mood itself.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Implications—Despite its lack of prospective analysis, the significant cross-sectional pathways linking depressed mood with alcohol problems through drinking to cope in this study supports the need for early college intervention that teaches students adaptive coping skills that do not involve drinking to better manage depressive states (Amaro et al., 2009; Hansson, Rundberg, Zetterlind, Johnsson, & Berglund, 2007). Further, because depressed students who drank to cope did not necessarily drink heavily, there appears to be a need to investigate other factors influencing risk outcomes beyond intoxification itself. Further, the significant direct link between drinking to cope and alcohol problems in both samples points to the need for skills training for emerging adults who rely on drinking to cope and may lack the emotional regulation or volitional control known to protect them from alcohol-related harm, irrespective of drinking levels (Aurora & Klanecky, 2016). For example, college students who drink to cope are shown to use protective behavioral strategies that are less effective in reducing alcohol-related consequences (Patrick, Lee, & Larimer, 2011) such as those aimed at limiting consumption as opposed to more effective strategies for reducing serious harm (e.g., use designated driver) or avoiding high-risk situations (e.g., avoid drinking games) (Napper, Kenney, Lac, Lewis, & LaBrie, 2014; Pearson, Kite, & Henson, 2012).

4.1 Limitations

The current findings are limited by this study's cross-sectional design. Longitudinal studies are needed to assess temporal relationships and make causal conclusions. Also, a range of socioenvironmental (e.g., pro-alcohol peer influence, dorm living, fraternities/sororities; Timberlake et al., 2007; White et al., 2008; White et al., 2005), dispositional (e.g., self-regulation and sensation seeking; Quinn & Fromme, 2011), and role (e.g., marital, parental, employment or military status; Syden, Sidorchuk, Makela, & Landberg, 2017; Vladimirov et al., 2016) factors that contribute to alcohol risk behaviors were not assessed in this study. Although it was not the focus of the current study, future studies that assess how mediated pathways may differ by gender or race/ethnicity may be informative. Prior studies have shown gender and racial differences in endorsement and effect of coping on alcohol risk (Kenney et al., 2015; Kenney & LaBrie, 2013). We also did not account for contextual factors known to influence drinking rates on college campuses, including college location (e.g., urban/rural), presence and density of alcohol outlets, and presence of a fraternity/sorority system (Dowdall & Wechsler, 2002; Stone et al., 2012). In these analyses, participants who had never attended college and those not currently enrolled were merged to comprise non-college emerging adults, and college graduates and students at 2-year colleges were excluded. Studies using larger samples to disentangle categories of non-college emerging adults are warranted. This study is limited by its low recruitment yield of participants eligible to participate. Furthermore, in this community-based convenience sample, a high proportion (42.6%) of those screened and invited to take part in the study did not attend the in-person interview. Nonetheless, this recruitment rate is similar to what we have found in prior studies (Stein, Hagerty, Herman, Phipps, & Anderson, 2011) and is consistent with evidence citing the challenges associated with recruiting emerging adults for research purposes (Hanna, Scott, & Schmidt, 2014). Nonetheless, as with any recruitment study, selection bias is possible; emerging adults who participated may differ from those

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

who did not participate on measures of interest, including mental health and drinking behaviors.

4.2 Conclusions

Although these findings are consistent with previous work related to depression and drinking in college student samples, researchers should be cautious about extending this behavioral pathway to non-college emerging adult populations. Future research investigating what factors do predict drinking to cope among non-college emerging adults is needed to better understand risk-related pathways in this population.

Acknowledgments

Role of Funding Source

This study was funded by the National Institute on Alcoholism and Alcohol Abuse (R01AA020509). Trial registered at clinicaltrials.gov; Clinical Trial # NCT01751789, https://clinicaltrials.gov/ct2/show/NCT01473719.

References

Abrams, D., Niaura, R. Psychological Theories of Drinking and Alcoholism. New York: The Guilford Press; 1987.

Amaro H, Ahl M, Matsumoto A, Prado G, Mule C, Kemmemer A, … Mantella P. Trial of the university assistance program for alcohol use among mandated students. J Stud Alcohol Drugs Suppl. 2009; (16):45–56. [PubMed: 19538912]

Armeli S, Sullivan TP, Tennen H. Drinking to Cope Motivation as a Prospective Predictor of Negative Affect. Journal of Studies on Alcohol and Drugs. 2015; 76(4):578–584. [PubMed: 26098033]

Arnett JJ. The developmental context of substance use in emerging adulthood. The Journal of Drug Issues. 2005

Aud, S., Hussar, W., kena, G., Bianco, K., Frohlich, L., Kemp, J., Tahan, K. The condition of education 2011 (NCES 2011-033). Washington DC: Government Printing Office; 2011.

Aurora P, Klanecky AK. Drinking motives mediate emotion regulation difficulties and problem drinking in college students. The American Journal of Drug and Alcohol Abuse. 2016; 42(3):341–350. DOI: 10.3109/00952990.2015.1133633 [PubMed: 26905517]

Baer JS. Student factors: understanding individual variation in college drinking. J Stud Alcohol Suppl. 2002; (14):40–53. [PubMed: 12022729]

Bingham CR, Shope JT, Tang X. Drinking behavior from high school to young adulthood: differences by college education. Alcoholism: Clinical and Experimental Research. 2005; 29(12):2170–2180.

Blanco C, Okuda M, Wright C, Hasin DS, Grant BF, Liu SM, Olfson M. Mental health of college students and their non-college-attending peers: results from the National Epidemiologic Study on Alcohol and Related Conditions. Archives of General Psychiatry. 2008; 65(12):1429–1437. DOI: 10.1001/archpsyc.65.12.1429 [PubMed: 19047530]

Bonin MF, McCreary DR, Sadava SW. Problem drinking behavior in two community-based samples of adults: influence of gender, coping, loneliness, and depression. Psychol Addict Behav. 2000; 14(2):151–161. [PubMed: 10860114]

Borsari B, Murphy JG, Barnett NP. Predictors of alcohol use during the first year of college: implications for prevention. Addict Behav. 2007; 32(10):2062–2086. DOI: 10.1016/j.addbeh.2007.01.017 [PubMed: 17321059]

Bravo AJ, Pearson MR, Stevens LE, Henson JM. Depressive Symptoms and Alcohol-Related Problems Among College Students: A Moderated-Mediated Model of Mindfulness and Drinking to Cope. J Stud Alcohol Drugs. 2016; 77(4):661–666. [PubMed: 27340972]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Carter AC, Brandon KO, Goldman MS. The college and noncollege experience: a review of the factors that influence drinking behavior in young adulthood. Journal of Studies on Alcohol and Drugs. 2010; 71(5):742–750. [PubMed: 20731981]

Clapp JD, Reed MB, Holmes MR, Lange JE, Voas RB. Drunk in public, drunk in private: the relationship between college students, drinking environments and alcohol consumption. Am J Drug Alcohol Abuse. 2006; 32(2):275–285. DOI: 10.1080/00952990500481205 [PubMed: 16595328]

Clerkin EM, Werntz AJ, Magee JC, Lindgren KP, Teachman BA. Evaluating age differences in coping motives as a mediator of the link between social anxiety symptoms and alcohol problems. Psychol Addict Behav. 2014; 28(3):880–886. DOI: 10.1037/a0036813 [PubMed: 24841182]

Cooper. Motivations for alcohol use among adolescents: Development and validation of a four-factor model. Psychological Assessment. 1994; 6(2):117–128. DOI: 10.1037/1040-3590.6.2.117

Cooper, LM., Kuntsche, E., Levitt, A., Barber, LL., Wolf, S. Motivational models of substance use: A review of theory and research on motives for using alcohol, marijuana, and tobacco. In: Sher, KJ., editor. The Oxford handbook of substance use and substance use disorders. New York, NY: Oxford University Press; 2016. p. 375-421.

Cooper ML. Motivations for alcohol use among adolescents: Development and validation of a four-factor model. Psychological Assessment. 1994; 6:117–128.

Cooper ML, Frone MR, Russell M, Mudar P. Drinking to regulate positive and negative emotions: a motivational model of alcohol use. J Pers Soc Psychol. 1995; 69(5):990–1005. [PubMed: 7473043]

Cooper ML, Russell M, Skinner JB, Frone MR, Mudar P. Stress and alcohol use: moderating effects of gender, coping, and alcohol expectancies. J Abnorm Psychol. 1992; 101(1):139–152. [PubMed: 1537960]

Cremeens-Matthews J, Chaney B. Patterns of Alcohol use: A Two-Year College and Four-Year University Comparison Case Study. Community College Journal of Research and Practice. 2016; 40(1):23–33.

Dowdall GW, Wechsler H. Studying college alcohol use: widening the lens, sharpening the focus. J Stud Alcohol Suppl. 2002; (14):14–22. [PubMed: 12022719]

Elliott JC, Carey KB, Bonafide KE. Does family history of alcohol problems influence college and university drinking or substance use? A meta-analytical review. Addiction. 2012; 107(10):1774–1785. DOI: 10.1111/j.1360-0443.2012.03903.x [PubMed: 22452451]

Fals-Stewart W, O'Farrell TJ, Freitas TT, McFarlin SK, Rutigliano P. The timeline followback reports of psychoactive substance use by drug-abusing patients: psychometric properties. Journal of Consulting and Clinical Psychology. 2000; 68(1):134–144. [PubMed: 10710848]

Fritz MS, MacKinnon DP. Required sample size to detect the mediated effect. Psychological Science. 2007; 18(3):223–239.

Gonzalez VM, Bradizza CM, Collins RL. Drinking to cope as a statistical mediator in the relationship between suicidal ideation and alcohol outcomes among underage college drinkers. Psychol Addict Behav. 2009; 23(3):443–451. DOI: 10.1037/a0015543 [PubMed: 19769428]

Grant BF, Dawson DA, Stinson FS, Chou SP, Dufour MC, Pickering RP. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. Drug And Alcohol Dependence. 2004; 74(3):223–234. [PubMed: 15194200]

Grayson CE, Nolen-Hoeksema S. Motives to drink as mediators between childhood sexual assault and alcohol problems in adult women. J Trauma Stress. 2005; 18(2):137–145. DOI: 10.1002/jts.20021 [PubMed: 16281206]

Grigsby TJ, Forster M, Unger JB, Sussman S. Predictors of alcohol-related negative consequences in adolescents: A systematic review of the literature and implications for future research. J Adolesc. 2016; 48:18–35. DOI: 10.1016/j.adolescence.2016.01.006 [PubMed: 26871952]

Hanna KM, Scott LL, Schmidt KK. Retention strategies in longitudinal studies with emerging adults. Clin Nurse Spec. 2014; 28(1):41–45. DOI: 10.1097/NUR.0000000000000020 [PubMed: 24309576]

Hansson H, Rundberg J, Zetterlind U, Johnsson KO, Berglund M. Two-year outcome of an intervention program for university students who have parents with alcohol problems: a

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

randomized controlled trial. Alcoholism: Clinical and Experimental Research. 2007; 31(11):1927–1933. DOI: 10.1111/j.1530-0277.2007.00516.x

Harford TC, Wechsler H, Muthen BO. The impact of current residence and high school drinking on alcohol problems among college students. Journal of Studies on Alcohol. 2002; 63(3):271–279. [PubMed: 12086127]

Harford TC, Yi HY, Hilton ME. Alcohol abuse and dependence in college and noncollege samples: A ten-year prospective follow-up in a national survey. Journal of Studies on Alcohol. 2006; 67(6): 803–809. [PubMed: 17060996]

Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Archives of General Psychiatry. 2007; 64(7):830–842. DOI: 10.1001/archpsyc.64.7.830 [PubMed: 17606817]

Heckman JJ, Lafontaine PA. The American High School Graduation Rate: Trends and Levels. Rev Econ Stat. 2010; 92(2):244–262. DOI: 10.1162/rest.2010.12366 [PubMed: 20625528]

Jessor R, Costa FM, Krueger PM, Turbin MS. A developmental study of heavy episodic drinking among college students: the role of psychosocial and behavioral protective and risk factors. J Stud Alcohol. 2006; 67(1):86–94. [PubMed: 16536132]

Kenney SR, Jones RN, Barnett NP. Gender Differences in the Effect of Depressive Symptoms on Alcohol Expectancies, Coping Motives, and Alcohol Outcomes in the First Year of College. Journal Of Youth And Adolescence. 2015; 44(10):1884–1897. [PubMed: 26036995]

Kenney SR, LaBrie JW. Use of Protective Behavioral Strategies and Reduced Alcohol Risk: Examining the Moderating Effects of Mental Health, Gender, and Race. Psychology Of Addictive Behaviors: Journal Of The Society Of Psychologists In Addictive Behaviors. 2013; 27(4):997–1009. [PubMed: 24079648]

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Archives of General Psychiatry. 2005; 62(6):593–602. DOI: 10.1001/archpsyc.62.6.593 [PubMed: 15939837]

Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. Journal of General Internal Medicine. 2001; 16(9):606–613. [PubMed: 11556941]

Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. Clin Psychol Rev. 2005; 25(7):841–861. DOI: 10.1016/j.cpr.2005.06.002 [PubMed: 16095785]

Kuntsche E, Knibbe RA, Gmel G, Engels R. Why do young people drink? A review of drinking motives. Clinical Psychology Review. 2005; 25(7):841–861. [PubMed: 16095785]

Kuntsche E, Stewart SH, Cooper ML. How stable is the motive-alcohol use link? A cross-national validation of the Drinking Motives Questionnaire Revised among adolescents from Switzerland, Canada, and the United States. Journal of Studies on Alcohol and Drugs. 2008; 69(3):388–396. [PubMed: 18432381]

Littlefield AK, Sher KJ, Wood PK. Do changes in drinking motives mediate the relation between personality change and “maturing out” of problem drinking? J Abnorm Psychol. 2010; 119(1):93–105. DOI: 10.1037/a0017512 [PubMed: 20141246]

Maggs JL, Schulenberg JE. Initiation and course of alcohol consumption among adolescents and young adults. Recent Dev Alcohol. 2005; 17:29–47. [PubMed: 15789858]

Maisto, SA., Carey, KB., Bradizza, CM. Psychological theories of drinking and alcoholism. In: Leonard, KE., Howard, BT., editors. Social Learning Theory. 2. New York: Guilford Press; 1999. p. 106-163.

Merrill JE, Read JP. Motivational pathways to unique types of alcohol consequences. Psychol Addict Behav. 2010; 24(4):705–711. DOI: 10.1037/a0020135 [PubMed: 20822194]

Merrill JE, Thomas SE. Interactions between adaptive coping and drinking to cope in predicting naturalistic drinking and drinking following a lab-based psychosocial stressor. Addictive Behaviors. 2013; 38(3):1672–1678. DOI: 10.1016/j.addbeh.2012.10.003 [PubMed: 23254217]

Merrill JE, Wardell JD, Read JP. Drinking motives in the prospective prediction of unique alcohol-related consequences in college students. Journal of Studies on Alcohol and Drugs. 2014; 75(1): 93–102. [PubMed: 24411801]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Miller, WR., Tonigan, JS., Longabaugh, R. The drinker inventory of consequences (DRINC): An instrument for assessing adverse consequences of alcohol abuse. Rockville, MD: National Institute on Alcohol Aubuse and Alcoholism (NIAAA); 1995.

Monnat SM, Chandler RF. Long Term Physical Health Consequences of Adverse Childhood Experiences. Sociol Q. 2015; 56(4):723–752. DOI: 10.1111/tsq.12107 [PubMed: 26500379]

Napper LE, Kenney SR, Lac A, Lewis LJ, LaBrie JW. A cross-lagged panel model examining protective behavioral strategies: are types of strategies differentially related to alcohol use and consequences? Addictive Behaviors. 2014; 39(2):480–486. DOI: 10.1016/j.addbeh.2013.10.020 [PubMed: 24229842]

O'Malley PM, Johnston LD. Epidemiology of alcohol and other drug use among American college students. J Stud Alcohol Suppl. 2002; (14):23–39. [PubMed: 12022728]

Park CL, Armeli S, Tennen H. The daily stress and coping process and alcohol use among college students. Journal of Studies on Alcohol. 2004; 65(1):126–135. [PubMed: 15000512]

Park CL, Levenson MR. Drinking to cope among college students: prevalence, problems and coping processes. Journal of Studies on Alcohol. 2002; 63(4):486–497. [PubMed: 12160108]

Paschall MJ, Saltz RF. Relationships between college settings and student alcohol use before, during and after events: a multi-level study. Drug Alcohol Rev. 2007; 26(6):635–644. DOI: 10.1080/09595230701613601 [PubMed: 17943524]

Patrick ME, Lee CM, Larimer ME. Drinking motives, protective behavioral strategies, and experienced consequences: Identifying students at risk. Addictive Behaviors. 2011; 36(3):270–273. DOI: 10.1016/j.addbeh.2010.11.007 [PubMed: 21159445]

Patrick ME, Schulenberg JE. How trajectories of reasons for alcohol use relate to trajectories of binge drinking: National panel data spanning late adolescence to early adulthood. Developmental Psychology. 2011; 47(2):311–317. DOI: 10.1037/a0021939 [PubMed: 21219061]

Pearson MR, Kite BA, Henson JM. The assessment of protective behavioral strategies: comparing prediction and factor structures across measures. Psychol Addict Behav. 2012; 26(3):573–584. DOI: 10.1037/a0028187 [PubMed: 22612255]

Peirce RS, Frone MR, Russell M, Cooper ML. Relationship of financial strain and psychosocial resources to alcohol use and abuse: the mediating role of negative affect and drinking motives. J Health Soc Behav. 1994; 35(4):291–308. [PubMed: 7844327]

Perkins HW. Stress-motivated drinking in collegiate and postcollegiate young adulthood: life course and gender patterns. Journal Of Studies On Alcohol. 1999; 60(2):219–227. [PubMed: 10091960]

Quinn PD, Fromme K. Alcohol use and related problems among college students and their noncollege peers: the competing roles of personality and peer influence. Journal of Studies on Alcohol and Drugs. 2011; 72(4):622–632. [PubMed: 21683044]

Slutske WS. Alcohol use disorders among US college students and their non-college-attending peers. Archives of General Psychiatry. 2005; 62(3):321–327. DOI: 10.1001/archpsyc.62.3.321 [PubMed: 15753245]

Sobell, LC., Sobell, MB. Timeline Followback user's guide: A calendar method for assessing alcohol and drug use. Toronto, Ontario, Canada: Addiction Research Foundation; 1996.

Stein MD, Hagerty CE, Herman DS, Phipps MG, Anderson BJ. A brief marijuana intervention for non-treatment-seeking young adult women. J Subst Abuse Treat. 2011; 40(2):189–198. DOI: 10.1016/j.jsat.2010.11.001 [PubMed: 21185685]

Stone AL, Becker LG, Huber AM, Catalano RF. Review of risk and protective factors of substance use and problem use in emerging adulthood. Addict Behav. 2012; 37(7):747–775. DOI: 10.1016/j.addbeh.2012.02.014 [PubMed: 22445418]

Sussman S, Arnett JJ. Emerging Adulthood: Developmental Period Facilitative of the Addictions. Eval Health Prof. 2014; 37(2):147–155. DOI: 10.1177/0163278714521812 [PubMed: 24492245]

Syden L, Sidorchuk A, Makela P, Landberg J. The contribution of alcohol use and other behavioural, material and social factors to socio-economic differences in alcohol-related disorders in a Swedish cohort. Addiction. 2017; doi: 10.1111/add.13889

Timberlake DS, Hopfer CJ, Rhee SH, Friedman NP, Haberstick BC, Lessem JM, Hewitt JK. College attendance and its effect on drinking behaviors in a longitudinal study of adolescents. Alcoholism:

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Clinical and Experimental Research. 2007; 31(6):1020–1030. DOI: 10.1111/j.1530-0277.2007.00383.x

Tomaka J, Morales-Monks S, Shamaley AG. Stress and coping mediate relationships between contingent and global self-esteem and alcohol-related problems among college drinkers. Stress Health. 2013; 29(3):205–213. DOI: 10.1002/smi.2448 [PubMed: 22930540]

VanKim NA, Laska MN, Ehlinger E, Lust K, Story M. Understanding young adult physical activity, alcohol and tobacco use in community colleges and 4-year post-secondary institutions: A cross-sectional analysis of epidemiological surveillance data. BMC Public Health. 2010; 10:208.doi: 10.1186/1471-2458-10-208 [PubMed: 20420678]

Vernig PM, Orsillo SM. Drinking motives and college alcohol problems: A prospective study. Journal of Substance Use. 2015; 20(5):340–346.

Vicary JR, Karshin CM. College Alcohol Abuse: A Review of the Problems, Issues, and Prevention Approaches. Journal of Primary Prevention. 2002; 22(3):299–331.

Vladimirov D, Niemela S, Auvinen J, Timonen M, Keinanen-Kiukaanniemi S, Ala-Mursula L, … Miettunen J. Changes in alcohol use in relation to sociodemographic factors in early midlife. Scand J Public Health. 2016; 44(3):249–257. DOI: 10.1177/1403494815622088 [PubMed: 26685194]

Wechsler H, Nelson TF. Binge drinking and the American college student: what's five drinks? Psychol Addict Behav. 2001; 15(4):287–291. [PubMed: 11767258]

White HR, Fleming CB, Kim MJ, Catalano RF, McMorris BJ. Identifying two potential mechanisms for changes in alcohol use among college-attending and non-college-attending emerging adults. Developmental Psychology. 2008; 44(6):1625–1639. DOI: 10.1037/a0013855 [PubMed: 18999326]

White HR, Labouvie EW, Papadaratsakis V. Changes in substance use during the transition to adulthood: A comparison of college stduents and their noncollege age peers. Journal of Drug Issues. 2005; 35:281–306.

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]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Highlights

- College and non-college respondents reported similar alcohol use and problems.
- Drinking to cope was associated with alcohol-related problems in both samples.
- Drinking to cope mediated the depressed mood-alcohol problems pathway in students.
- Drinking to cope did not mediate the pathway in non-college emerging adults.
- Among emerging adults, pathways to alcohol risk may differ by college status.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

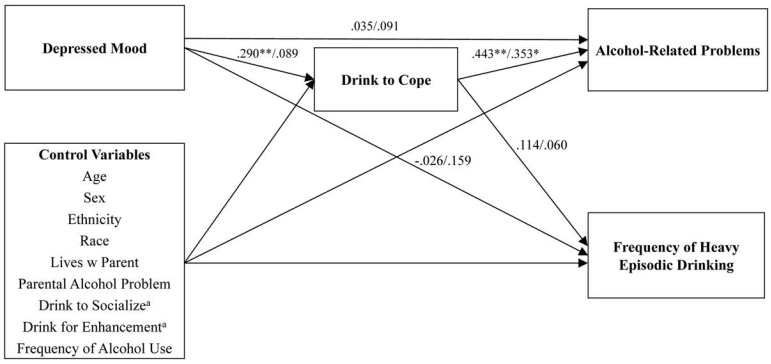

Fig. 1.

Path Model illustrating model mediation.

Note. The reported coefficients are for students/non-students. ***$p < .01$; **$p < .05$

[a]Drinking to socialize was associated with drinking to cope among students ($p < .01$) and non-students ($p < .05$); drinking for enhancement was associated with drinking to cope and frequency of HED among students and non-students ($p < .01$) and alcohol-related problems among non-students ($p < .05$).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Addict Behav. Author manuscript; available in PMC 2019 May 01.

Table 1

Background Characteristics and Alcohol Use Behaviors and Problem Severity by Student Status

		Student Status		
	Total (n = 341)	**No (n = 118)**	**Student (n = 223)**	**t or χ^2**
Age	20.8 (± 1.97)	21.6 (± 2.37)	20.4 (± 1.59)	5.25***
Sex (Male)	174 (51.0%)	73 (61.9%)	101 (45.3%)	8.48**
Hispanic Ethnicity (Yes)	37 (10.9%)	17 (14.4%)	20 (9.0%)	2.36
Race				
White	231 (67.7%)	71 (60.2%)	160 (71.8%)	5.79
Black	41 (12.0%)	20 (17.0%)	21 (9.4%)	
Other	69 (20.2%)	27 (22.9%)	42 (18.8%)	
Lives w Parents (Yes)	99 (29.0%)	46 (39.0%)	53 (23.8%)	8.67*
Parental Alcohol Problem (Yes)	49 (14.4%)	32 (27.1%)	17 (7.6%)	23.84***
PHQ9 Depression Index	6.61 (± 5.23)	8.12 (± 5.69)	5.81 (± 4.84)	3.93***
Alcohol Use Days (0 – 90)	22.0 (± 16.0)	20.0 (± 17.7)	23.1 (± 14.9)	−1.73
HED Days (0 – 90)	11.9 (± 13.1)	11.0 (± 14.2)	12.3 (± 12.5)	−0.86
Short Inventory of Problems	6.57 (± 6.71)	6.86 (± 7.85)	6.42 (± 6.04)	0.57
Use Alcohol to Socialize	2.79 (± 0.68)	2.73 (± 0.77)	2.83 (± 0.62)	−1.35
Use Alcohol for Enhancement	2.66 (± 0.81)	2.53 (± 0.87)	2.74 (± 0.76)	−2.27*
Use Alcohol for Coping	2.00 (± 0.76)	2.05 (± 0.78)	1.98 (± 0.75)	0.81

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 2

Unstandardized and Standardized Coefficients for the Estimated Structural Equation Model

	EQUATION 1: USE OF ALCOHOL FOR COPING			
	Non-Students (n = 118)		Students (n = 223)	
	b (95%CI)[a]	β[b]	b (95%CI[a]	β[b]
Age	0.024 (−0.016; 0.064)	.073	−0.015 (−0.070; 0.038)	−.031
Sex (Male)	−0.120 (−0.353; 0.120)	−.153	−0.025 (−0.194; 0.142)	−.034
Non-Hispanic White	−0.114 (−0.326; 0.101)	−.146	0.133 (−0.041; 0.317)	.178
Lives w Parent (Yes)	−0.065 (−0.269; 0.137)	−.083	−0.002 (−0.165; 0.161)	−.003
Par. Alc. Prob. (Yes)	0.131 (−0.103; 0.374)	.168	−0.039 (−0.414; 0.364)	−.051
Days Used Alcohol	0.005 (−0.002; 0.011)	.115	0.003 (−0.002; 0.009)	.067
PHQ-2 Depression	0.012 (−0.007; 0.031)	.089	0.045** (0.025; 0.064)	.290
Enhancement Motives	0.455** (0.288; 0.597)	.492	0.376** (0.244; 0.517)	.383
Social Motives	0.221* (0.050; 0.378)	.217	0.258** (0.095; 0.401)	.215
	EQUATION 2: SHORT INVENTORY OF PROBLEMS			
Age	0.249 (−0.293; 0.836)	.075	0.192 (−0.257; 0.679)	.051
Sex (Male)	−0.934 (−3.602; 1.722)	−.119	0.025 (−1.500; 1.568)	.004
Non-Hispanic White	1.779 (−0.723; 4.586)	.227	−0.581 (−2.281; 0.858)	−.097
Lives w Parent (Yes)	−0.630 (−3.268; 1.494)	−.081	0.328 (−1.322; 2.073)	.055
Par. Alc. Prob. (Yes)	−2.401 (−5.266; 0.277)	−.307	1.771 (−0.420; 4.151)	.295
Days Used Alcohol	−0.005 (−0.106; 0.093)	−.012	0.009 (−0.054; 0.076)	.023
PHQ-2 Depression	0.091 (−0.152; 0.390)	.066	0.043 (−0.115; 0.196)	.035
Enhancement Motives	2.472* (0.307; 4.683)	.273	0.924 (−0.088; 2.152)	.117
Social Motives	−0.352 (−2.503; 1.914)	−.034	0.295 (−1.050; 1.647)	.031
Coping Motives	3.533* (0.615; 6.676)	.353	3.556** (2.060; 5.197)	.443
	EQUATION 3: FREQUENCY OF HED			
Age	0.460 (−0.586; 1.551)	.077	0.994 (−0.058; 2.212)	.126
Sex (Male)	1.598 (−3.239; 6.103)	.113	6.012** (2.662; 9.717)	.480
Non-Hispanic White	2.456 (−1.844; 7.218)	.174	−1.736 (−5.687; 1.973)	−.139
Lives w Parent (Yes)	−1.260 (−6.015; 3.146)	−.089	−2.077 (−5.672; 2.138)	−.137

Author Manuscript
Author Manuscript
Author Manuscript
Author Manuscript

	EQUATION 1: USE OF ALCOHOL FOR COPING			
	Non-Students (n = 118)		Students (n = 223)	
	b (95%CI)[a]	β[b]	b (95%CI[a]	β[b]
Par. Alc. Prob. (Yes)	−0.687 (−6.836; 6.357)	−.049	3.902 (−2.179; 10.978)	.31T
PHQ-2 Depression	0.397 (−0.138; 1.042)	.159	−0.066 (−0.410; 0.291)	−.026
Enhancement Motives	6.631 ** (1.638; 12.242)	.405	4.246 ** (1.317; 7.726)	.259
Social Motives	−2.206 (−8.755; 3.486)	−.120	0.071 (−3.487; 3.319)	.004
Coping Motives	1.076 (−4.731; 7.052)	.060	1.901 (−1.389; 5.075)	.114

[a] 95% Confidence intervals estimated by bias-corrected bootstrap resampling with 10,000 draws.

[b] Fully-standardized coefficients for continuous covariates, y-standardized coefficients for categorical covariates.

* 95% Confidence interval estimate excludes 0.

** 99% Confidence interval estimate (not presented in table or text) excludes 0.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 3

Total, Direct, and Specific Mediated Effect (via Use of Alcohol for Coping) of Depression on SIP and Frequency of HED

	Non-Students (n = 118)		Students (n = 223)	
	b (95%CI)[a]	**β[b]**	**b (95%CI)[a]**	**β[b]**
Effect of Depression on SIP				
Total Effect	0.134 (−0.112; 0.436)	.097	0.203 ** (0.063; 0.365)	.163
Direct Effect	0.091 (−0.152; 0.390)	.066	0.043 (−0.115; 0.196)	.070
Mediation (via Coping)	0.043 (−0.012; 0.157)	.031	0.159 ** (0.076; 0.282)	.128
Effect of Depression on HED				
Total Effect	0.410 (−0.133; 1.084)	.165	0.019 (−0.278; 0.324)	.007
Direct Effect	0.397 (−0.138; 1.042)	.113	−0.066 (−0.410; 0.291)	−.026
Mediation (via Coping)	0.013 (−0.050; 0.15)	.005	0.085 (−0.059; 0.262)	.033

[a] 95% Confidence intervals estimated by bias-corrected bootstrap resampling with 10,000 draws.

[b] Fully-standardized coefficient.

* 95% Confidence interval estimate excludes 0.

** 99% Confidence interval estimate (not presented in table or text) excludes 0.