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Association of Solitary Binge Drinking and Suicidal Behavior Among Emerging Adult College Students

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Abstract

Emerging adult college students who binge drink in solitary contexts (i.e., while alone) experience greater depression and suicidal ideation than students who only binge drink in social contexts, suggesting that they may be at greater risk for suicidal behavior. This study examined the association of a previous suicide attempt, one of the best predictors of future suicide attempts and suicide, and severity of recent suicidal ideation with drinking in solitary and social contexts. Participants were binge drinking emerging adult (18- to 25-year-old) college students ($N = 182$) drawn from two studies of college drinkers. A logistic regression analysis revealed that both suicide attempt history and severity of suicidal ideation were significantly associated with a greater likelihood of being a solitary binge drinker as opposed to only a social binge drinker. Students with a previous suicide attempt were nearly 4 times more likely to be solitary binge drinkers. Multiple regression analyses revealed that suicide attempt history was significantly associated with greater frequency and quantity of drinking in solitary, but not social contexts. Suicidal ideation was significantly associated with drinks per solitary drinking day, but not frequency of solitary drinking once suicide attempt history was accounted for. Given the associations found between solitary binge drinking and a history of suicide attempts, as well as greater severity of recent suicidal ideation, it would appear that these students are in need of suicide prevention efforts, including treatment efforts aimed at reducing binge drinking.

Keywords

binge drinking; heavy episodic drinking; suicide attempt; suicidal ideation; drinking alone

College students have high rates of “binge” drinking, defined as 4 or more drinks for women or 5 or more drinks for men in one sitting or on one occasions (Wechsler, Davenport, Dowdall, & Moeckens, 1994), and alcohol problems (Knight et al., 2002; Slutske, 2005; Timberlake et al., 2007). American college students also engage in high rates of suicidal ideation and behavior (Brener, Hassan, & Barrios, 1999; Furr, Westefeld, McConnell, & Jenkins, 2001), with 1.7% reporting a suicide attempt and 11.4% reporting seriously having considered attempting suicide during the preceding year (Barrios, Everett, Simon, & Brener, 2000).

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There is a well-established link between alcohol use and disorders and suicide attempts and completions (Borges, Walters, & Kessler, 2000; Cherpitel, Borges, & Wilcox, 2004; Hufford, 2001; Wilcox, Conner, & Caine, 2004). Among college students, individuals with suicidal ideation are more likely to binge drink, and alcohol problems in this population are associated with increased rates of suicidal ideation and attempts (Brener et al., 1999; Gonzalez, Bradizza, & Collins, 2009; Levy & Deykin, 1989; Stephenson, Pena-Shaff, & Quirk, 2006).

Research suggests that drinking context plays an important role in the association between alcohol use and negative affect, including suicidality. In college student, drinking tends to occur for social reasons (Kuntsche, Knibbe, Gmel, & Engels, 2005; LaBrie, Hummer, & Pedersen, 2007; Stewart, Zeitlin, & Samoluk, 1996) and in social contexts (Christiansen, Vik, & Jarchow, 2002; Mohr et al., 2001). However, drinking in response to negative experiences and affect is associated with drinking in solitary as opposed to social contexts (Mohr et al., 2001). Students who engage in solitary binge drinking (i.e., while alone or no one else is drinking) are higher in depression (Christiansen et al., 2002) and suicidal ideation (Gonzalez, Collins, & Bradizza, 2009) than students who only binge drink in social contexts.

Depression and suicidal ideation are associated with suicide and suicide attempts (Brown, Beck, Steer, & Grisham, 2000; Kuo, Gallo, & Tien, 2001; Wen-Hung et al., 2004). Given the association of solitary binge drinking with these variables, solitary binge drinkers may be at higher risk for suicidal behavior than are students who binge drink only in social contexts. However, no study to date has examined the association between solitary drinking and previous suicide attempts, one of the best predictors of risk for suicide and suicide attempts (Borges, Angst, Nock, Ruscio, & Kessler, 2008; Harris & Barraclough, 1997; Oquendo et al., 2004).

This study examined whether individuals with a suicide attempt history were more likely to be solitary as opposed to social binge drinkers. The associations of suicide attempt history and suicidal ideation with frequency and quantity of drinking in social and solitary contexts also were explored to further examine the association of drinking context and suicidality.

Method

Participants

Participants for the current study were drawn from two studies of emerging adult college drinkers (Gonzalez & Skewes, 2011; Gonzalez, Reynolds, & Skewes, 2011). For both studies, eligibility criteria included (a) being a full- or part-time university student and (b) being between the ages of 18 and 25 years old. Each study had additional selection criteria. In study one, participants had to have at least one solitary or social binge drinking episode per month during a typical month in the past year. In study two, participants had to have consumed at least four standard drinks in the past month and report either current sadness or loss of pleasure. The sadness and loss of pleasure items were adapted from the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996), with items needing to be endorsed as at least a '1' (i.e., not enjoying things as much or feeling sad much of the time) to meet the inclusionary criterion. Although study two included the sadness or loss of pleasure criterion, combining these samples was advantageous for the current study, as depression has been found to be associated with the key variables of interests in this study: solitary binge drinking and suicidality. Data in these studies were collected from March 2009 to September 2010. For the current study, individuals were not included if they did not binge drink during a typical month in the past year ($n = 31$), gave out of range and/or highly inconsistent and illogical responses across alcohol use items ($n = 25$), or were missing drinking data ($n = 2$).

Participants were 182 binge drinking emerging adult (18- to 25-year-old) female (72.5%, $n = 132$) and male (27.5%, $n = 50$) college students attending a large, open enrollment university in the Northwest. The average age was 21.1 years old ($SD = 1.9$). The sample was 74.7% White, 10.4% Alaska Native or American Indian (including mixed heritage), 4.4% Latino, 4.4% multiethnic, 2.2% Asian American, 1.6% Pacific Islander, and 1.1% African American. The majority of participants were full-time students (88.5%) and single (95.6%). With regard to living arrangements, 23.8% lived in their parents' home, 53.5% lived off-campus (not in a parent's home), and 22.7% lived on-campus. The sample was 19.8% freshman, 24.2% sophomore, 24.2% junior, 23.6% senior, 6.0% graduate students, and 2.2% non-degree seeking.

Procedures

In both studies one and two, participants were recruited via flyers posted on campus and e-mails directed at 18- to 25-year-old students via their student e-mail accounts. Flyer and e-mail solicitations directed potential participants to a webpage that described the respective study in general terms (e.g., "a study of college student lifestyle and mood") and included a questionnaire with items that screened for study eligibility embedded among distractor items. Those who met eligibility criteria for each respective study were scheduled for an in-person data collection session where study materials were presented in random order using MediaLab version 2006 software (Jarvis, 2006) on laptop computers. Participants were compensated for their time with a gift card (\$20 – study one and \$30 – study two, given the longer protocol) to a supermarket/gas station or coffee shop chain. After data collection, all participants were individually debriefed and given referral information for counseling services, as well as suicide/crisis hotline phone numbers. The study protocols were approved by the Institutional Review Board of the university.

Measures

Alcohol consumption—Solitary and social alcohol consumption were measured using items modified from the National Institute of Alcohol Abuse and Alcoholism's (NIAAA) alcohol consumption question set (NIAAA, 2003). Three separate items for social (defined as "with other people who were drinking") and solitary (defined as "while alone or no one else was drinking") contexts asked the following for a typical month in the past year: drinking days per month, number of standard drinks consumed on a typical drinking day, and the number of days on which binge drinking (i.e., 4 or more—women, or 5 or more—men, standard drinks on one occasion or sitting) occurred. Participants were provided with a handout that defined a standard drink (e.g., 12 oz. beer, 5 oz. of wine, 8 to 9 oz. of malt liquor, or 1.5 oz. of 80-proof liquor).

Suicide attempt history—The Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001) is a 4-item self-report measure of suicidal behavior and ideation. The first item assesses lifetime suicidal ideation and behavior ("*Have you ever thought about or attempted to kill yourself?*"), with mutually exclusive response options ranging from no history of suicidal ideation or behavior (*never*) to history of a suicide attempt (*I have attempted to kill myself*). This item was used in the current study to categorize participants as having or not having a suicide attempt history. In young adult samples the SBQ-R demonstrates high two-week test-retest reliability ($r = .95$) and good convergent validity (Cotton, Peters, & Range, 1995).

Suicidal ideation—The Adult Suicidal Ideation Questionnaire (ASIQ; Reynolds, 1991a) is a 25-item self-report measure of suicidal thoughts and behavior experienced during the past month. Items range from general wishes that one were dead to thoughts of planning a suicide attempt and are rated on a 7-point scale (0 = *never had the thought*, 6 = *almost every*

day). The ASIQ demonstrates high one-week test-retest reliability ($r = .86$) and good convergent validity (Gutierrez, Osman, Kopper, Barrios, & Bagge, 2000; Reynolds, 1991b). It also evidences predictive validity, with total score predicting suicide attempts over a 3-month follow-up period (Osman et al., 1999). In the current sample, coefficient alpha for the ASIQ was .97.

Analyses

A hierarchical logistic regression was used to examine the influence of a previous suicide attempt and severity of suicidal ideation on binge drinking group (social – only [0], solitary [1]). For these analyses, if a participant reported (a) no episodes of solitary binge drinking during a typical month in the past year and (b) had at least one episode of social binge drinking, then they were classified as a social binge drinker ($n = 129$). If a participant reported a binge drinking episode while alone or no one else was drinking at least once during a typical month in the past year, then they were classified as a solitary binge drinker ($n = 53$). Solitary binge drinkers also could have episodes of social binge drinking, and previous research has found that nearly all do engage in social binge drinking (Gonzalez, Collins et al., 2009).

Four separate hierarchical multiple regression analyses for frequency of drinking and drinks per drinking day in social and solitary contexts were conducted to examine the association of a previous suicide attempt and suicidal ideation with each drinking variable. The same independent variables were entered in the multiple regression analyses and logistic regression analysis described above. In the first step of the analyses, age, gender, and ethnicity were entered to control for their possible effects on drinking and suicidality variables. In the second step, suicide attempt history (none [0], previous attempt [1]) was entered. In the final step, severity of suicidal ideation was entered to examine whether suicidal ideation was significantly associated with the given drinking dependent variable after accounting for suicide attempt history.

Given that the data for the current study came from two studies, analyses were repeated including data source (study one vs. two) in the models in step 1 and mean-centered interaction terms of Data Source \times Suicide Attempt History and Data Source \times Suicidal Ideation included in a final step. The interaction terms allowed an examination of whether the degree of relationship between suicide attempt history and severity of suicidal ideation and the dependent variables differed between the samples in the two studies.

In order to improve normality and reduce the influence of outliers, suicidal ideation, frequency of social drinking, and drinks per social drinking day were square-root transformed. Frequency of solitary drinking and drinks per solitary drinking day, which were more substantially skewed, were log transformed.

Results

In the study sample, 22.6% ($n = 12$) of solitary binge drinkers and 8.5% ($n = 11$) of social binge drinkers reported a previous suicide attempt. Means, standard deviations, and correlations among the study variables are presented in Table 1. The majority of solitary binge drinkers also engaged in social binge drinking at least one day per month (94.3%). An analysis of covariance, controlling for age, gender, and ethnicity revealed that solitary binge drinkers engage in social binge drinking more days per month ($M = 5.03$, $SD = 3.98$) than individuals who only binge drink socially ($M = 3.38$, $SD = 2.81$; $F(1,177) = 10.01$, $p = .002$, $\eta^2 = .05$). Solitary binge drinkers reported a mean of 3.04 ($SD = 3.97$) solitary binge days per month. Among social binge drinkers, 50.4% engaged in solitary drinking at least one day a month.

The sequential logistic regression analysis revealed that having a previous suicide attempt was significantly associated with a greater likelihood of being a solitary binge drinker as opposed to only a social binge drinker ($OR = 3.76, p = .006$; see Table 2). Severity of suicidal ideation also was significantly associated with being a solitary binge drinker. In the third step of the analysis, suicide attempt history remained significantly associated with a greater likelihood of being a solitary binge drinker even when suicidal ideation was controlled for ($OR = 2.76, p = .046$), suggesting that both suicidality (suicidal ideation and attempts) variables were independently associated with a greater likelihood of being a solitary binge drinker.

Separate hierarchical multiple regression analyses were conducted to examine the association of suicidality with frequency of social drinking and with drinks per social drinking day. Frequency of drinking in social contexts was not significantly associated with a previous suicide attempt ($\Delta R^2 < .001, p = .85$) or with severity of suicidal ideation ($\Delta R^2 = .005, p = .33$). Similarly, drinks per social drinking day was not significantly associated with a previous suicide attempt ($\Delta R^2 = .001, p = .61$) or with severity of suicidal ideation ($\Delta R^2 = .003, p = .47$).

Given the higher suicidality among solitary binge drinkers, it was possible that social and solitary binge drinkers differed in the strength of association between social drinking context and suicidality. Therefore, a hierarchical regression analysis was conducted to examine potential differences between binge drinking groups in these associations. In the first step, age, gender, ethnicity, binge drinking group, previous suicide attempt, and suicidal ideation (mean centered) were entered into the model. In the second step, two cross-product interaction terms were entered: Binge Drinking Group \times Suicide Attempt and Binge Drinking Group \times Suicidal Ideation. The addition of these interaction terms did not add significantly to the regression models for frequency of social drinking ($\Delta R^2 = .014, p = .28$) or drinks per social drinking day ($\Delta R^2 = .012, p = .30$), indicating there was not a significant difference between social and solitary binge drinkers. These analyses suggest that for both binge drinking groups, neither frequency nor amount of drinking in social contexts was significantly associated with suicidality.

The hierarchical multiple regression analyses examining the association of a previous suicide attempt and severity of suicidal ideation with solitary drinking frequency and drinks per solitary drinking day revealed that a previous suicide attempt was associated with more frequent solitary drinking ($\Delta R^2 = .041, p = .004$; see Table 3) and with more drinks per solitary drinking day ($\Delta R^2 = .037, p = .008$). Suicidal ideation was not significantly associated with frequency of solitary drinking once suicide attempt history was accounted for ($\Delta R^2 = .012, p = .12$). However, suicidal ideation was associated with more drinks per solitary drinking day ($\Delta R^2 = .033, p = .01$).

Finally, repeating these analyses while controlling for data source (study one vs. two) revealed the same patterns of significance for the suicidality variables as reported above. The final step in the models containing the interaction terms of data source by suicide attempt history and suicidal ideation were non-significant in all analyses (ΔR^2 between .002 and .015), suggesting that results found do not differ significantly by data source despite differences in the selection criteria between studies.

Discussion

The findings of this study suggest that binge drinking students with a suicide attempt history are significantly more likely to engage in solitary binge drinking. Students with a previous suicide attempt were nearly four times more likely to be solitary as opposed to only social

binge drinkers. Those experiencing greater severity of recent suicidal ideation also were more likely to be solitary binge drinkers. Both a previous suicide attempt and recent suicidal ideation were independently associated with a greater likelihood of solitary binge drinking.

A history of a suicide attempt was associated with more frequent solitary drinking and having more drinks per solitary drinking day. In contrast, suicide attempt history and severity of suicidal ideation were not associated with frequency of social drinking or the amount of alcohol consumed on social drinking days for either social or solitary binge drinkers. The findings are consistent with that of a previous study that found that severity of suicidal ideation was significantly associated with solitary, but not social, binge drinking among underage students with a history of suicidal ideation (Gonzalez, Collins et al., 2009) and extends the findings to emerging adult students who were not selected for their suicidal ideation history.

Future studies are needed to examine how or why suicidal ideation and a history of a suicide attempt are associated with solitary binge drinking. One potential way that a previous suicide attempt and suicidal ideation may be related to solitary binge drinking is through drinking to cope with negative affect. According to motivational models of alcohol use, drinking to cope is motivated by efforts to escape, avoid, or lessen negative affect (Cooper, Frone, Russell, & Mudar, 1995). Drinking to cope appears to motivate binge drinking in the absence of the social influences commonly associated with drinking among emerging adult students (Christiansen et al., 2002). Consistent with this notion, in a previous study frequency of solitary binge drinking was found to be associated with severity of suicidal ideation and motivated by drinking to cope (Gonzalez, Collins et al., 2009).

Motivational models of alcohol use also suggest that coping skills deficits contribute to a reliance on alcohol to cope with negative affect (Cooper et al., 1995; Cooper, Agocha, & Sheldon, 2000; Cox & Klinger, 1988). Similarly, cognitive behavioral models of suicidality note the important role of coping skills deficits in suicidal ideation and behavior (Reinecke, 2006; Rudd, 2006). Consistent with these models, suicidal ideation and behavior and drinking to cope are associated with greater use of avoidant coping strategies (Britton, 2004; Edwards & Holden, 2001; Reinecke, DuBois, & Schultz, 2001; Williams & Kleinfelter, 1989). Individuals with a history of a suicide attempt may be more likely to engage in solitary binge drinking in order to cope with distress, as well as be more likely to suffer from distress compared with social binge drinkers, in part owing to poorer coping skills. Future studies are needed to examine this possibility, as well as other potential links between solitary drinking and suicidality.

An important limitation of this study was the cross-sectional design. Because of this it is not known whether suicidal ideation motivates solitary binge drinking, solitary binge drinking plays a causal role in suicide attempts, or if these relationships are reciprocal or indirect. Another limitation was the over-representation of women in the sample. This study also was limited to emerging adult college binge drinkers and therefore may not generalize to non-college student emerging adults or non-binge drinking students. Studies are needed to examine solitary binge drinking in relation to negative affect and suicidality with a non-college population samples.

In conclusion, the current findings suggest that solitary binge drinkers are in particular need of suicide prevention efforts. Binge drinking alone among individuals with a suicide attempt history and/or greater severity of suicidal ideation is alarming in regard to risk for suicidal behavior, as intoxication can impede adaptive coping, increase aggression, and worsen mood (Hufford, 2001). Solitary binge drinkers are in need of treatment efforts aimed at their reducing their alcohol misuse, given their greater frequency of social binge drinking as well

as additional episodes of solitary binge drinking. This may serve to reduce the likelihood for alcohol dependence, as well as suicide risk within this population.

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Table 1

Means, Standard Deviations, and Intercorrelations of Study Variables

Variables	M	SD	1	2	3	4	5	6	7	8	9
1. Previous suicide attempt	–										
2. Suicidal ideation	16.86	19.20	.32 ^{***}	–							
3. Solitary binge drinker			.19 ^{**}	.19 [*]	–						
4. Social drinking days/month ^a	7.74	5.62	-.05	-.10	.08	–					
5. Drinks per social drinking day ^a	4.82	3.07	.05	.05	.15 [*]	.03	–				
6. Solitary drinking days/month ^a	2.98	5.12	.14	.09	.49 ^{***}	.24 ^{**}	.01	–			
7. Drinks per solitary drinking day ^a	1.71	1.89	.17 [*]	.19 [*]	.72 ^{***}	.07	.16 [*]	.58 ^{***}	–		
8. Age	21.13	1.95	-.17 [*]	-.10	.06	.17 [*]	-.19 [*]	.25 ^{***}	.14	–	
9. Gender			.12	.18 [*]	-.12	-.10	-.18 [*]	-.27 ^{***}	-.19 ^{**}	-.14	–
10. Ethnicity			-.16 [*]	-.06	-.10	.00	-.06	-.02	-.13	.10	-.05

Note. *N* = 182. Previous suicide attempt was coded: no attempts = 0, previous attempt = 1. Solitary binge drinker was coded: social binge drinker = 0, solitary binge drinker = 1. Gender was coded: men = 0, women = 1. Ethnicity was coded: racial/ethnic minority students = 0, White students = 1.

^aCorrelations were calculated using the square-root or log transformed variables, while the mean and standard deviation shown represent the untransformed variable.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Logistic Regression Predicting Being a Solitary Binge Drinker

Step and predictor variable	ΔR^2	β	SE	OR [CI]
Step 1	.04			
Age		.13	.09	1.07 [.90, 1.26]
Gender		-.25	.38	.57 [.28, 1.16]
Ethnicity		-.24	.37	.58 [.28, 1.19]
Step 2	.06**			
Previous suicide attempt		.44**	.48	3.76 [1.45, 9.72]
Step 3	.04*			
Suicidal ideation		.40*	.08	1.19 [1.02, 1.39]

Note. $N = 182$. Dependent variable, binge drinking group, was coded: social binge drinker = 0 solitary binge drinker = 1. Gender was coded: male = 0, female = 1. Ethnicity was coded: racial/ethnic minority students = 0, White students = 1. Previous suicide attempt was coded: no attempts = 0, previous attempt = 1. $R^2 = \text{Nagelkerke } R^2$. OR = odds ratio. CI = 95% confidence interval.

* $p < .05$.

** $p < .01$.

Table 3

Multiple Regression Analyses Predicting Solitary Drinking

Step and predictor variable	Frequency of solitary drinking ^a			Drinks per solitary drinking day ^a				
	ΔR^2	B [CI]	SE	β	ΔR^2	B [CI]	SE	β
Step 1	.12***							
Age		.02 [.01, .03]	.01	.22**	.07**	.01 [-.001, .01]	.003	.13
Gender		-.08 [-.13, -.04]	.02	-.25***		-.03 [-.06, -.01]	.01	-.18*
Ethnicity		-.02 [-.07, .03]	.03	-.05		-.03 [-.06, -.002]	.01	-.15*
Step 2	.04**				.04**			
Previous suicide attempt		.10 [.03, .16]	.03	.21**		.05 [.01, .09]	.02	.20**
Step 3	.01				.03*			
Suicidal ideation ^b		.01 [-.002, .02]	.005	.11		.01 [-.002, .01]	.003	.19*

Note. N = 182. Gender was coded: male = 0, female = 1. Ethnicity was coded: racial/ethnic minority students = 0, White students = 1. Previous suicide attempt was coded: no attempts = 0, previous attempt = 1. CI = 95% confidence interval.

^aVariable was log transformed.

^bVariable was square-root transformed.

* $p < .05$.

** $p < .01$.

*** $p < .001$.