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**DRINKING MOTIVES AS POTENTIAL MEDIATORS OF ASSOCIATIONS
BETWEEN LONELINESS AND ALCOHOL USE AND CONSEQUENCES
AMONG COLLEGE STUDENTS**

by
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A Thesis

Submitted to the
Department of Psychology
College of Science and Mathematics
In partial fulfillment of the requirement
For the degree of
Master of Arts in Clinical Psychology
at
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Abstract

Faith A. Shank

DRINKING MOTIVES AS POTENTIAL MEDIATORS OF ASSOCIATIONS BETWEEN LONELINESS AND ALCOHOL USE AND CONSEQUENCES AMONG COLLEGE STUDENTS

2021-2022

Chelsie M. Young, Ph.D.

Master of Arts in Clinical Psychology

College is a pivotal time when students begin to cultivate social relationships and engage in heavy drinking practices, resulting in alcohol-related consequences. Two potential factors associated with college drinking behaviors are loneliness and drinking motivation. Loneliness has mixed associations with drinking behaviors, meanwhile, drinking motives have clear associations with drinking behaviors. Together, those experiencing loneliness are more likely to drink to cope, yet the existing research examining loneliness, drinking motives, and drinking behaviors is limited. We aim to examine associations between 1) loneliness and drinking behaviors; 2) loneliness and drinking motives; 3) whether drinking motives mediate associations between loneliness and drinking behaviors. A secondary data analysis was conducted, which included 1,107 college students aged 18-25 (55.06% women), with a mean age of 21.57 years. Results showed that, controlling for anxiety and depressive symptoms, loneliness is not associated with alcohol consumption nor consequences. In addition, all four drinking motives were positively associated with loneliness. Lastly, conformity motivation was the sole significant mediator, such that those who were lonely and drank for conformity reasons, had fewer drinks per week; however, had more alcohol-related consequences. These results aid in our understanding of the role of loneliness in drinking and can assist in creating future prevention interventions for heavy drinking in college students.

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Chapter 1

Literature Review

Approximately 67% of college students report consuming alcohol in the past 30 days, and 32% report engaging in binge drinking [consuming at least four/five drinks (females/males) in one sitting]; (SAMHSA, 2019; Schulenberg et al., 2020; U.S. Department of Health and Human Services. (n.d.). Such drinking patterns often result in alcohol-related consequences. Indeed, college students report interpersonal problems, poor academic performance, impaired control, physiological dependence, blackouts, and poor self-care (Hingson, Zha, & Smyth, 2017; White & Hingson, 2013).

Thus, it is important to examine factors that may influence drinking behaviors among college students, one of which is loneliness (Arpin, Mohr & Brannan, 2015; Chen & Feeley, 2016; Sadava & Thompson, 1986). The few studies examining loneliness and drinking behaviors have found mixed results regarding associations between loneliness and alcohol use; however, there is a consistent, positive link between loneliness and alcohol-related consequences (Arpin, Mohr, & Brannan, 2015; Chen & Feeley, 2016; Sadava & Thompson, 1986). In addition to drinking behaviors, associations between loneliness and coping drinking motives have also been examined. However, research has yet to explore how loneliness is associated with other drinking motives (e.g., enhancement, social and conformity motivation; Mohr et al., 2021; Todd et al., 2003; Wardell et al., 2020). This study aims to bridge the gap in the current literature to better understand associations between loneliness and drinking motives and between loneliness and drinking behaviors. Furthermore, this study explores drinking motives as potential

mediators of associations between loneliness and drinking behaviors among college students.

Loneliness

Loneliness is defined as emotional distress due to feelings of being misunderstood and/or rejected by others, a lack of social partners, and not being able to obtain a sense of social integration and/or emotional intimacy through social activities (McWhirter, 1990). When defining loneliness, it is important to note that loneliness, or feeling lonely, is not the same as being alone. In other words, one can be socially isolated and live alone but not experience loneliness. A defining feature of loneliness is the perception of social isolation that causes distress (Newall et al., 2009; Schulz, 1976). Thus, one can experience loneliness when they are surrounded by others yet lack social interactions with strong ties (e.g., close, intimate relationships) and when their social interactions are not enjoyable, comfortable, connected, or meaningful (Lee & Ko, 2018).

Loneliness has been associated with a range of negative outcomes. For example, individuals who are lonely experience greater feelings of hopelessness, emptiness, restlessness, and of being unloved, as well as higher levels of anxiety, lower self-esteem, and less intimacy and connectedness in social relationships (Kim & Cha 2018; Ponzetti, 1990). Individuals who are lonely typically report lower quality relationships, less social support from family and friends, and have difficulty making friends, which results in small social networks (Kim & Cha 2018; Ponzetti, 1990). Additionally, individuals who report feelings of loneliness tend to have poorer physical health and psychological well-being (e.g., more stress and depressive and anxiety symptoms; Bhagchandani, 2017; McIntyre et al., 2018; Nicolaisen & Thorsen, 2014; Richardson et al., 2017). In

particular, those who have high levels of loneliness also have symptoms of social anxiety and vice versa, suggesting a bidirectional association (Lim et al., 2016). Similarly, individuals who have high depressive and/or anxiety symptoms tend to also have higher levels of loneliness, and vice versa (Park et al., 2020; Weeks et al., 1980). Depression and anxiety are highly correlated with each other, it is often hard to determine their unique influences on loneliness (Park et al., 2020). However, loneliness and depression are not causally associated, and these variables may represent distinct underlying constructs with similar origins (Weeks et al., 1980). Unlike the extensive research on loneliness and social anxiety, little is known about anxiety's unique association with loneliness (Week et al., 1980).

The majority of research on loneliness has been done with older adults, as they are one of the most prevalent age groups to report being lonely (Coyle & Dugan, 2012; Nicolaisen & Thorsen, 2014; Pinquart & Sorensen, 2001). However, the second most prevalent age group to report being lonely are those between the ages of 18 and 29 (Nicolaisen & Thorsen, 2014). Furthermore, 22.9% of those between 18 and 29 years old have reported feeling lonely either sometimes or often (Nicolaisen & Thorsen, 2014). College students in particular are likely to report being lonely, with 35.6% of students surveyed reporting moderate to severe feelings of loneliness (Diehl et al., 2018). Furthermore, 30% of college students report a lack of strong social ties (e.g., close and intimate relationships), resulting in lower levels of confidence and assertiveness in social situations (Diehl et al., 2018; Newall et al., 2009; Ponzetti, 1990; Schulz, 1976; Weiss, 1973). Those lacking strong social ties also tend to experience higher levels of depressive symptoms and anxiety (Beutel et al., 2017; Diehl et al., 2018; Lim et al., 2016; Ponzetti,

1990; Richardson et al., 2017). Additionally, 10% of college students report that they have a small network of social relationships (i.e., quantity of social relationships; Diehl et al., 2018). Perceived loneliness and weak social ties can necessitate the use of strategies to cope with loneliness.

There are a number of ways individuals attempt to cope with loneliness, including: acceptance and reflection, self-development and understanding, utilizing social support networks, increased activity (i.e., being productive, engaging in extracurricular activities, and enhancing social contacts), denial and distancing, religion and faith, and drinking to cope with negative affect (Rokach, 2003; Rokach & Brock, 1998). While many people engage in helpful and adaptive coping strategies (i.e., acceptance and reflection or utilizing social support), many also engage in maladaptive and short-term coping patterns, such as denial and distancing (i.e., crime, addictive behaviors, avoidance and self-induced isolation; Rokach, 1990). Alcohol or marijuana use is the second most common maladaptive way individuals cope with loneliness disorder (Rokach, 1990). Specifically, individuals who are experiencing loneliness are more likely to drink alcohol to cope than those who are not experiencing loneliness (Rokach & Brock, 1998; Storch et al., 2015; Todd et al., 2003; Wardell et al., 2020).

Thus, alcohol use is a common maladaptive coping mechanism used to combat loneliness. An examination of individuals aged 13 to 79 years old found that those who are lonely are more likely to engage in alcohol use patterns that increase their risk of developing an alcohol use disorder later in life (Rokach & Brock, 1998). Among college students, loneliness has been positively associated with frequency and quantity of alcohol use (Åkerlind & Hörnquist, 1992; Bonin et al., 2020; Miller, 2011; Storch et al., 2015),

solitary drinking (Arpin et al., 2015; Gonzalez & Skewes, 2013), and alcohol-related consequences (Chen & Feeley, 2016; Sadava & Thompson, 1986). In contrast, other evidence shows there is no association between loneliness and frequency or quantity of alcohol use (Sadava & Thompson, 1986; Todd et al., 2003) or suggests that lonely individuals drink less (Barratta, Dantzler & Kayson, 1995; Diehl et al., 2018; Ponzetti, 1990). Taken together, there are mixed findings regarding the association between loneliness and alcohol use in college students. However, there is a consistent, positive association between loneliness and alcohol-related consequences (Barratta, Dantzler & Kayson, 1995; Bonin et al., 2020; Chen & Feeley, 2016; Sadava & Thompson, 1986). Further research is needed to better understand how loneliness and alcohol use are associated among college students due to the high prevalence of both loneliness and alcohol consumption in college students (Diehl et al., 2018; Schulenberg et al., 2020). The literature on this topic currently focuses on a variety of college drinkers, thus it is important to examine this association in other drinking groups, especially hazardous college drinkers, as they are most at risk to developing an AUD. Thus, the current study examined the association between loneliness and alcohol use in a sample of hazardous college drinkers.

Drinking Motives

Drinking motivation may serve as a link between loneliness and drinking behaviors (Mohr et al., 2021; Todd et al., 2003; Wardell et al., 2020). Drinking motives are among the most proximal links to drinking behavior and have been examined extensively in the literature (e.g., Cooper et al., 2016; Merrill & Read, 2010; Read et al., 2003; Shank et al., 2020). Much of this work uses the four-dimensional model of

drinking motivation, which includes enhancement (increase positive affect), coping (alleviate negative affect), social reinforcement (obtain social rewards/interaction), and conformity (to fit in and/or avoid social rejection) motives (Cooper, 1994). In relation to loneliness, individuals who are lonely tend to be less confident and assertive in social situations, and have poorer overall well-being, which may lead to drinking for enhancement reasons, or to promote positive mood states (Bhagchandani, 2017; Diehl et al., 2018; Newall et al., 2009; Ponzetti, 1990; Schulz, 1976; Weiss, 1973). Specifically, consuming alcohol for enhancement reasons can increase their positive affect and potentially increase their confidence in social situations (Cooper et al., 2016). Coping drinking motivation is the tendency to drink alcohol to cope with negative emotions and threats to self-esteem (Cooper et al., 2016). Those who are lonely tend to have lower self-esteem and experience more negative emotions (e.g., hopelessness, emptiness, low connectedness), suggesting coping motivation may be common amongst lonely individuals (Kim & Cha, 2018; Ponzetti, 1990). In addition, those who are lonely often find social interactions to be uncomfortable and feel disconnected from others (Lee & Ko, 2018), thus they may endorse social motivation and drink alcohol to improve social interactions and gatherings (Cooper et al., 2016). Similarly, lonely individuals tend to have smaller social networks (Diehl et al., 2018; Kim & Cha 2018; Newall et al., 2009; Ponzetti, 1990; Schulz, 1976; Weiss, 1973), and may use drinking as a way to make new friends and gain their approval, perhaps by drinking to conform to those around them (Cooper et al., 2016).

Additionally, drinking motives have unique associations with both alcohol use and alcohol-related consequences. For instance, internally focused motives (i.e., coping

and enhancement) have distinct positive associations with alcohol-related problems (Bresin & Mekawi, 2021; Cooper et al., 2016). Specifically, drinking to cope motivation is positively associated with alcohol-related consequences when controlling for alcohol use; whereas enhancement motivation is positively associated with alcohol use, which then leads to increases in alcohol-related consequences (Cooper et al., 2016; Kuntsche & Cooper, 2010; Merrill & Read, 2010; Merrill et al., 2014). Similarly, those who drink to conform typically report higher alcohol-related consequences but engage in lighter drinking (Read et al., 2003). In addition, social motives tend to be associated with more moderate drinking patterns (Kuntsche, Knibbe, Gmel, & Engels, 2005); however, social motives have been linked with risky drinking and alcohol-related problems in college students (Read, Wood, Kahler, Maddock, & Palfai, 2003; Sheehan, Lau-Barraco, & Linden, 2013). Of the four alcohol use motives, drinking to cope is the strongest predictor of alcohol-related consequences (Bresin & Mekawi, 2021; Cooper et al., 2016; Kuntsche & Cooper, 2010; Merrill & Read, 2010; Merrill et al., 2014).

In addition to its strong association with alcohol-related consequences, drinking to cope is the only drinking motive that has been previously examined in the context of loneliness (Mohr et al., 2021; Todd et al., 2003; Wardell et al., 2020). For instance, a previous investigation using a daily diary approach found that adults who are lonely are more likely to endorse drinking to cope (Todd et al., 2003). In addition, when an individual reported lower levels of drinking to cope, relative to others in the sample, and were lonely, they were less likely to engage in heavy drinking, yet those higher in drinking to cope did not predict an association between loneliness and alcohol use (Todd et al., 2003). Similarly, an examination of college students' loneliness, coping

motivation, and alcohol use during the COVID-19 pandemic revealed that individuals who were lonely endorsed drinking to cope more frequently than those who were less lonely (Mohr et al., 2020). Additionally, social connectedness (i.e., feelings of interpersonal closeness and connectedness) is negatively associated with loneliness, suggesting low interpersonal closeness and connectedness is an important aspect of determining one's level of loneliness (Diehl et al., 2018; Lee & Ko, 2018; Wardell et al., 2020). Individuals who report more depressive symptoms and/or more anxiety symptoms are more likely to endorse coping motives for drinking, in turn leading to increased alcohol use and alcohol-related problems (Park & Levenson, 2002; Wardell et al., 2020). While prior research has examined the association between loneliness and coping drinking motives, previous studies have not examined all drinking motives in the context of loneliness and drinking behaviors. As drinking motives are interrelated and rarely occur in isolation from each other, it is important to examine how the other drinking motives may help us better understand the association between loneliness and drinking behaviors (Cooper, 1994). Thus, the current study expanded upon the previous findings by examining associations among loneliness and all four drinking motives.

Current Study

The current literature examining associations between loneliness and alcohol use has revealed mixed findings. Thus, the current study aims to examine the association between loneliness, drinking motives, and drinking behaviors (e.g., alcohol use, alcohol-related consequences) in college students who engage in hazardous drinking in an attempt to add to the existing literature. While past studies have suggested a positive association between loneliness and drinking to cope, research has not yet examined how loneliness is

associated with social, conformity, and enhancement drinking motives. This study aims to extend the literature in this area by examining associations between loneliness and all four drinking motives. Lastly, in order to better understand associations between loneliness and drinking behaviors, our final aim is to examine drinking motives as potential mediators of associations between loneliness and drinking behaviors. Due to the unique overlap of loneliness, anxiety symptoms, depression symptoms and drinking behaviors, anxiety and depression symptoms will be included as covariates to examine the unique contribution of loneliness above and beyond other sources of psychological distress.

Hypotheses

H1. Loneliness will be positively associated with drinking behaviors.

H1a. Loneliness will be positively associated with alcohol use.

H1b. Loneliness will be positively associated with alcohol-related consequences.

H2. Loneliness will be positively associated with coping drinking motives and associations between loneliness and social, enhancement, and conformity drinking motives will be explored.

H2a. Loneliness will be positively associated with coping drinking motives.

H2b. The associations between loneliness and enhancement, social, and conformity drinking motives will be explored.

H3. We will examine all four drinking motives as potential mediators of associations between loneliness and alcohol use and alcohol-related consequences.

Chapter 2

Methods

Participants and Procedures

The proposed study is a secondary data analysis of a randomized controlled trial investigating a brief writing-based alcohol intervention targeting problematic drinking among college students (Neighbors et al., 2020). To qualify for the initial study, individuals had to be between the ages of 18 to 26, meet hazardous drinking criteria per the Alcohol Use Disorder Identification Test (AUDIT; 6/7+ for women/men; Babor et al., 2001), and experience at least one alcohol-related problem in the past month. Participants included 592 college drinkers (M age = 21.57 years; SD = 2.04; 55% female). The participants reported the following racial backgrounds: 47.1% Caucasian, 27.1% Asian, 9.6% African American, 8.4% multi-racial, 4.6% other, 2.9% Native American/American Indian, and .7% Native Hawaiian-Pacific Islander. Similarly, 29.5% identified as Latinx. The current study utilized baseline data from a longitudinal trial, including measures of demographics, alcohol use, alcohol-related consequences, drinking motives, loneliness, anxiety, and depressive symptoms.

Measures

Demographics

Participants were asked to indicate their age, sex, year in school, residence, Greek membership, relationship status, ethnicity, racial background, religious affiliation, and work status.

Alcohol-Related Problems

The Young Adult Alcohol Consequences Questionnaire (YAACQ; Read et al., 2006) was used to assess alcohol-related problems. The YAACQ measures a variety of alcohol-related consequences such as interpersonal, self-control, and academic/occupational consequences. Specifically, respondents were asked if they had experienced each of the 48 consequences within the past month, responding either 'yes' or 'no' to each item. Example items include, "I have become very rude, obnoxious, or insulting after drinking", "I often drank more than I originally had planned", and "I have been less physically active because of drinking" ($\alpha = .83$).

Alcohol Use

Drinking was assessed using the Daily Drinking Questionnaire (DDQ; Collins et al., 1985). The DDQ evaluated participants' drinking behaviors in the past month. Specifically, participants were asked how many standard drinks they consume each day of a typical week (Monday through Sunday) as well as how many hours they spent consuming alcohol each day. Participants were presented a visual depiction of a standard drink for beer, wine, and liquor so that participants were aware of the size of a standard drink for each alcohol type. The number of drinks reported each day of the week were summed together to determine total weekly drinking.

Drinking Motives

The 20-item Drinking Motives Questionnaire asked participants how often they drink for each of the reasons listed (Cooper, 1994). Participants responded to each item using a 5-point Likert scale from 1 (Never/Almost Never) to 5 (Almost Always/Always). This scale has four subscales (coping, enhancement, social, and

conformity), each containing 5 items. Example items include, “To forget your worries” (coping), “To be sociable” (social), “Because you like the feeling” (enhancement), and “So you won’t feel left out” (conformity). The Cronbach’s alphas of the motives subscales ranged from .84 to .86.

Loneliness

The 3-item UCLA Loneliness Scale (Russell, 1996) was used to assess loneliness. Specifically, participants were asked how often they felt or thought a certain way. Responses were scored on a 3-point scale, consisting of 1 (Hardly ever), 2 (Some of the time), 3 (Often). The three items were summed to get a total score for loneliness. The items included the following: “How often do you feel that you lack companionship”, “How often do you feel left out”, and “How often do you feel isolated from others” ($\alpha = .80$).

Depressive Symptoms

The 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Van Dam & Earleywine, 2011) was used to assess depressive symptoms in the past week. Participants responded to the items on a 4-point scale, consisting of 0 (Rarely or none of the time), 1 (Some or a little of the time), 2 (Occasionally or a moderate amount of time), 3 (Most or all of the time). The items were summed to get a total score. Example items included: “I was bothered by things that usually don’t bother me”, “I thought my life had been a failure”, “People were unfriendly”, and “I felt that people dislike me” ($\alpha = .78$).

Anxiety Symptoms

The 7-item General Anxiety Disorder Questionnaire (GAD-7; Spitzer et al., 2006) was used to measure an individual’s anxiety symptoms in the past two weeks.

Responses to the items were on a 4-point scale, consisting of 0 (Not at all), 1 (Several days), 2 (More than half the days), 3 (Nearly everyday). The items were summed to get a total score. Example items included: “Not being able to stop or control worrying”, “Trouble relaxing”, and “Becoming easily annoyed or irritable” ($\alpha = .91$).

Data Analysis

Analyses were conducted in both R Studio and MPlus. First, descriptive statistics and bivariate correlations among all variables of interest were examined. Next, the outcomes of our hypotheses were examined on normality, skewness, and kurtosis, to determine the best fitting model. Due to documented sex differences in alcohol use (Geisner, Larimer & Neighbors, 2004; Park & Levenson, 2002; Pedrelli et al., 2011), sex was controlled for in all analyses. Additionally, as there is considerable overlap between loneliness and anxiety and depression (McIntyre et al., 2018; Richardson et al., 2017), and anxiety and depression have known associations with drinking behaviors (Geisner, Mallett & Kilmer, 2012; Pedrelli et al., 2011), anxiety and depressive symptoms were included as covariates.

Primary analyses included cross-sectional examinations of our three primary hypotheses. The first regression model examined the association between loneliness and alcohol use (H1a); and the second regression model examined the association between loneliness and alcohol-related consequences (H1b). Next, path analysis was used to examine loneliness as a predictor of each of the four drinking motives, while controlling for the other drinking motives (H2). Finally, two cross-sectional mediation models were used to examine H3. The first model included alcohol use as the outcome and the second model had alcohol-related consequences as the outcome (while controlling for alcohol

use). Each model included all four drinking motives as the mediators. Specifically, the direct path is from loneliness to the outcome (drinking or consequences); the a-path is from loneliness to the four drinking motivations; the b-path is from the four drinking motivations to the outcome (drinking or consequences). The indirect effect is from loneliness to the outcome, through each of the four drinking motivations. Figures 1 and 2 illustrating each model are provided below.

Figure 1

Mediation Model 1

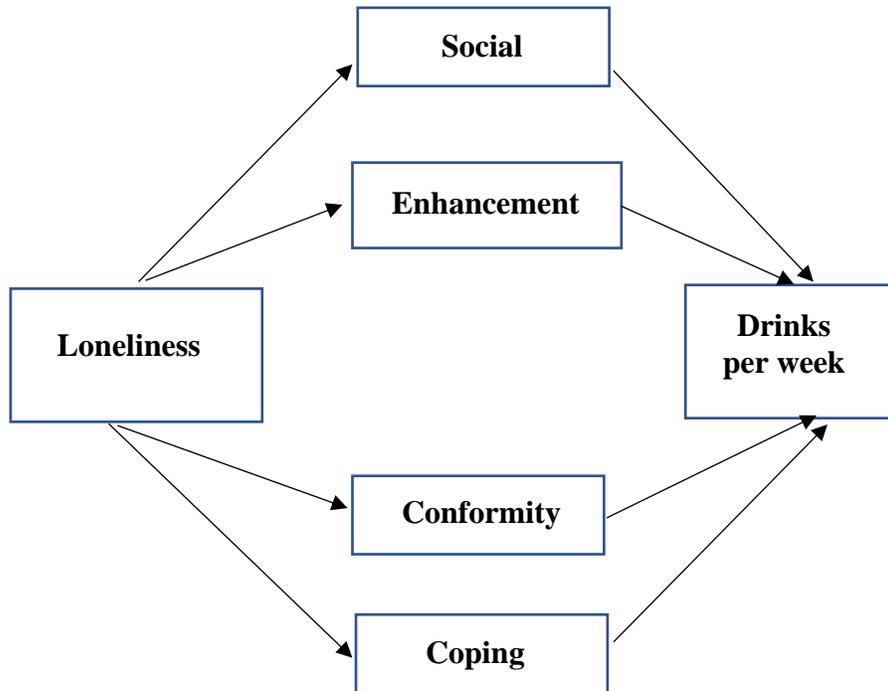
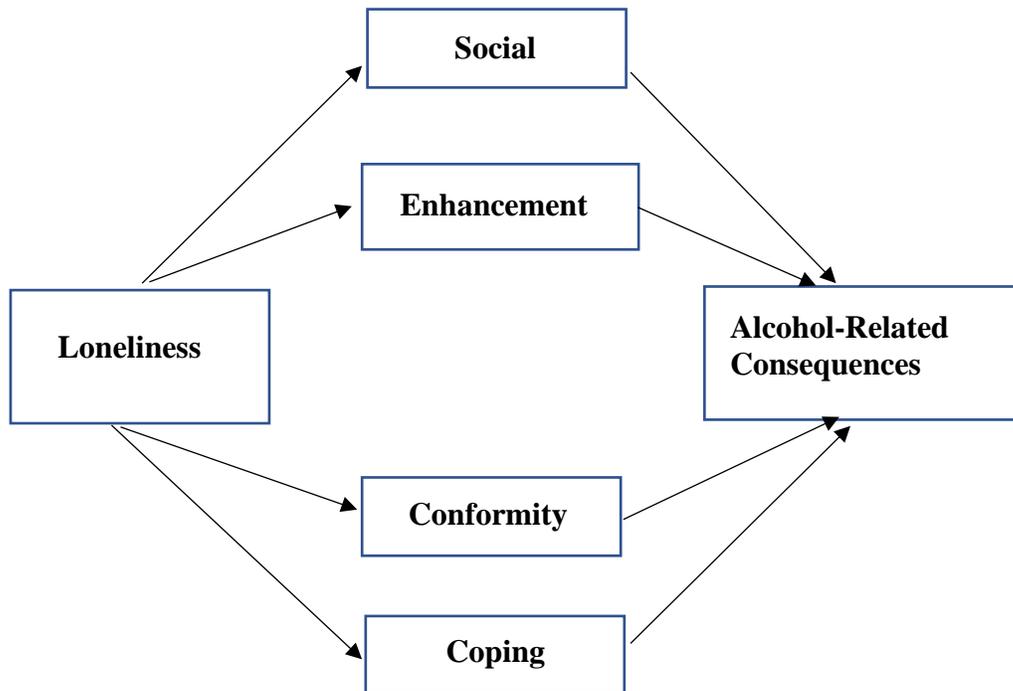


Figure 2

Mediation Model 2



Chapter 3

Results

Descriptive Information and Correlations

Descriptive statistics and bivariate correlations among all the variables of interest were computed in R Studio and are presented in Table 1. On average, participants reported consuming 8.66 drinks per week and experienced approximately 15 alcohol-related consequences in the past month. The number of drinks consumed per week was positively and significantly correlated with all other variables except conformity motivation, anxiety, and loneliness. Alcohol-related consequences were positively correlated with all variables. Loneliness was positively correlated with all variables except drinks per week and was negatively associated with sex such that females reported higher levels of loneliness. All drinking motives were positively correlated with drinks per week, alcohol-related consequences, and loneliness; however, conformity motivation was not significantly associated with drinks per week.

Table 1*Means, Standard Deviations and Correlations for All Variables of Interest*

Variable	1	2	3	4	5	6	7	8	9
1. Drinks									
2. Consequences	.421**								
3. Social	.176**	.295**							
4. Enhancement	.292**	.303**	.551**						
5. Cope	.148**	.401**	.362**	.393**					
6. Conform	-.002	.256**	.379**	.154**	.407**				
7. Loneliness	.002	.227**	.140**	.123**	.432**	.244**			
8. Anxiety	.062	.320**	.145**	.149**	.523**	.178**	.506**		
9. Depression	.043	.359**	.122**	.123**	.564**	.228**	.682**	.741**	
10. Sex	.223**	.005	.036	.086*	-.058	.031	-.099*	-.186**	-.125**
<i>Mean</i>	12.22	15.15	3.82	3.41	2.69	1.94	1.96	9.79	20.92
<i>Sd</i>	8.612	8.93	0.87	0.96	1.04	.93	.64	6.14	12.15

Loneliness as a Predictor of Drinking Behaviors

Next, we examined the associations between loneliness and drinking behaviors. Three models were conducted in R Studio and the results are presented in Table 2. To determine what type of model would be most appropriate to test H1, the dependent variables were examined visually, and the skewness and kurtosis for each outcome was computed. Figure 3 shows the distribution of drinks per week, showing a strong positive skewness. Similarly, the skewness for drinks per week is 2.599 and the kurtosis is 18.547. Due to the visual findings, values of skewness and kurtosis and because drinks per week is a count variable, a negative binomial regression was used to test H1a.

Figure 3

Histogram for Drinks Per Week

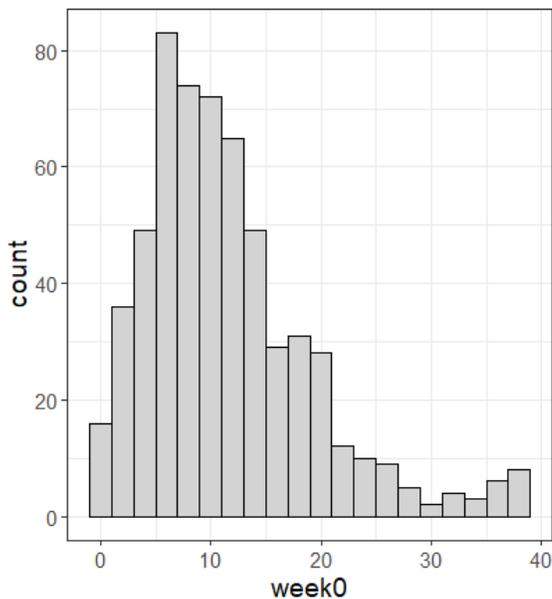
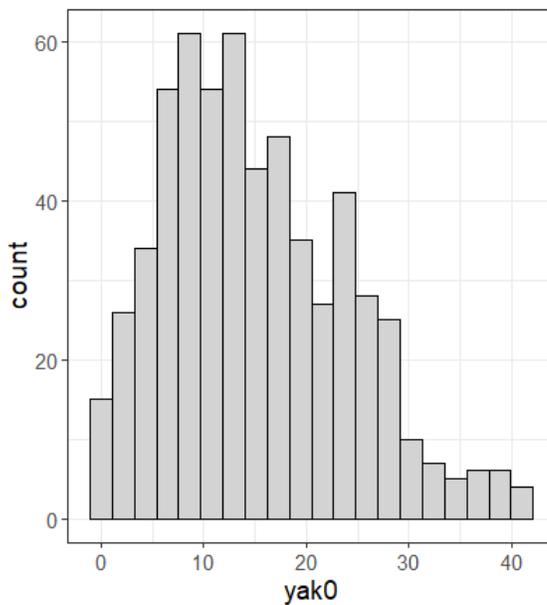


Figure 4 shows the distribution of alcohol related consequences, showing a slight positive skew. The skewness for this variable is 0.596 and the kurtosis is 2.896. Although the

skewness and kurtosis values were in normal ranges, as the variable is a count variable and slightly positively skewed and alcohol-related consequences is a count variable, a negative binomial regression was also used to test H1b.

Figure 4

Histogram of Alcohol-Related Consequences



To test our first hypothesis (H1a), loneliness, sex, anxiety, and depression were entered into the model as predictors of the dependent variable, drinks per week. Loneliness, anxiety, and depression were not significantly associated with drinks per week; however, sex was positively associated with drinks per week such that, on average, men reported consuming more drinks per week than women. The second model examined the association between loneliness and alcohol-related problems (H1b), with loneliness, drinks per week, sex, and depression as predictors and alcohol-related consequences as the outcome. Drinks per week, anxiety, and depression were all positively associated with

alcohol-related consequences. Specifically, those who report consuming more drinks per week report more alcohol-related consequences than individuals who consume fewer drinks per week. Individuals who reported more anxiety symptoms also reported more alcohol-related consequences than those with fewer anxiety symptoms. Individuals reporting more depressive symptoms reported more alcohol-related consequences than those reporting fewer depressive symptoms. Sex and loneliness were not associated with alcohol-related consequences. Thus, hypothesis 1 was not supported.

Loneliness as a Predictor of Drinking Motives

To examine if loneliness is a predictor of the four drinking motives (H2), it is important to determine the unique association between loneliness and each of the drinking motives while accounting for the remaining drinking motives. Thus, it was determined that a path analysis would be most appropriate to test this hypothesis. Loneliness was entered into the model as the independent variable, with the four drinking motives serving as dependent variables (see Figure 5). Results showed that loneliness positively predicted all four drinking motives, supporting H2 (see Table 3).

Figure 5

Path Model for H2

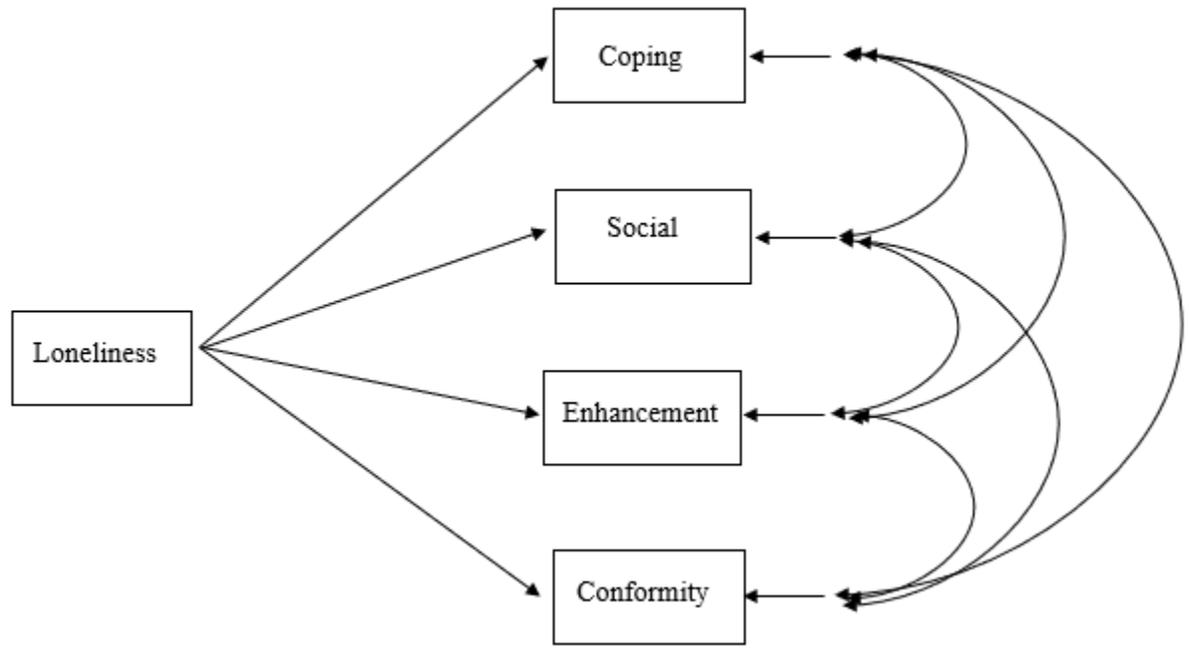


Table 2*Results Examining Associations Among Loneliness, and Drinking Behaviors*

Criterion	Predictor	IRR	SE	t	p
<i>Drinks per week</i>	Loneliness	.956	.059	-.756	.450
	Sex	1.390	.057	5.798	<.001
	Anxiety	1.008	.007	1.260	.208
	Depression	1.003	.004	.789	.431
<i>Alcohol-related consequences</i>	Loneliness	.982	.045	-.399	.690
	Drinks per week	1.020	.002	10.067	<.001
	Sex	.995	.044	-.112	.911
	Anxiety	1.011	.005	2.189	.029
	Depression	.012	.003	4.219	<.001

Note. IRR = incident rate ratio.

Table 3*Results Examining Associations Among Loneliness and Drinking Motives*

Criterion	Predictor	Est.	SE	p
Coping	Loneliness	.696	.060	<.001
	Social	.190	.055	.001
	Enhancement	.184	.061	.003
	Conformity	.350	.057	<.001

Drinking Motives as Mediator of Loneliness and Drinking Behaviors

Next, we examined drinking motives as mediators of associations among loneliness and drinking behaviors. Two models were used to test our third hypothesis (H3). Both outcome variables (i.e., drinks per week and alcohol-related consequences) were count variables that were positively skewed, which were best fit with negative binomial distributions. Analyses were conducted in MPlus. For both models, bootstrapped asymmetric confidence intervals with 100 bootstrapped samples were used to examine the indirect effects of drinking motives as mediators between loneliness and drinking behaviors. Loneliness was entered as the predictor in both models, the four drinking motives were entered as mediators, and sex, depression, and anxiety were included as covariates. For the first model, drinks per week was the outcome, and for the second model alcohol-related consequences was the outcome.

In the first model, the a-path showed loneliness was positively associated with coping, social, and conformity motivation, and enhancement motives. The b-path showed that enhancement motives are positively associated with drinks per week and conformity motives are negatively associated with drinks per week. The indirect effect of conformity motives was significant such that those higher in loneliness were more likely to drink to conform, yet they reported consuming fewer drinks per week. The second model found that loneliness was positively associated with conformity, social, and coping motivation, and conformity and social motivation positively predicted alcohol-related consequences. The indirect effect of conformity motives was significant such that those higher in loneliness tend to drink for conformity reasons which results in more alcohol-related consequences. Results are presented in Table 3 and Figures 6 and 7.

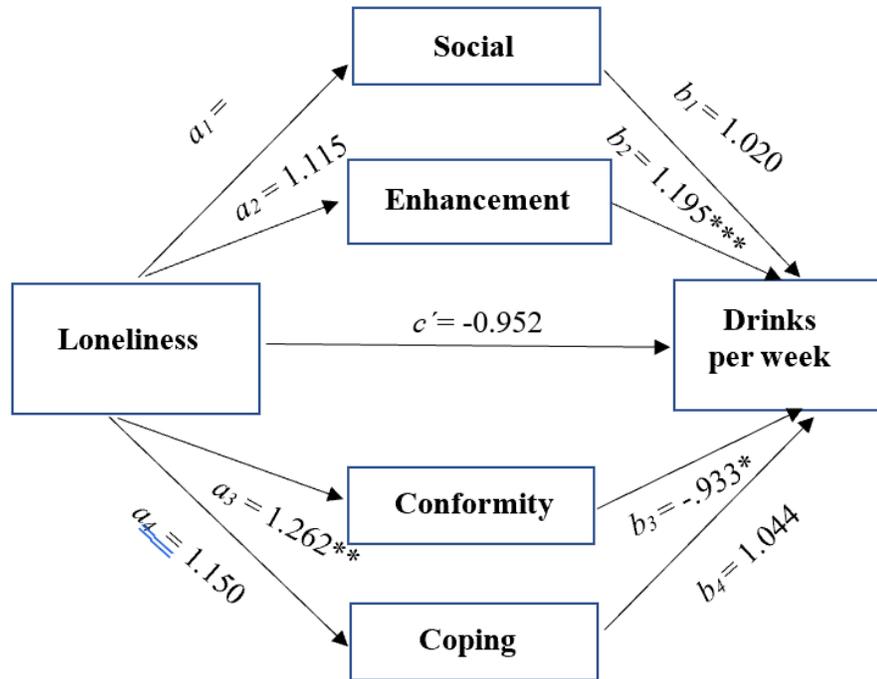
Table 4

Results Examining Drinking Motives as A Mediator Between Loneliness And Drinking Behaviors

Criterion	Predictor	IRR	SE	IRR 95% CI		
				Low	High	<i>p</i>
	<i>A path</i>					
Coping	Loneliness	1.150	.072	-.973	1.297	.054
Social		1.153	.069	-.961	1.260	.040
Enhancement		1.115	.075	-.968	1.283	.147
Conformity		1.262	.083	1.107	1.420	.005
Drinks Per Week	<i>B path</i>					
	Coping	1.044	.039	-.939	1.099	.260
	Social	1.020	.048	-.935	1.116	.671
	Enhancement	1.195	.042	1.105	1.294	<.001
	Conformity	-.933	.029	-.881	-.979	.018
Drinks Per Week	<i>Indirect effect</i>					
	Coping	1.006	.007	-.997	1.022	
	Social	1.003	.008	-.992	1.024	
	Enhancement	1.019	.014	-.999	1.053	
	Conformity	-.984	.008	-.962	-.995	
	<i>Direct Effect</i>	-.952	.049	-.856	1.040	.324
	<i>A path</i>					
Coping	Loneliness	1.157	.072	-.979	1.290	.043
Social		1.162	.069	-.982	1.293	.029
Enhancement		1.131	.074	-.997	1.096	.097
Conformity		1.262	.083	1.097	1.120	.005
Alcohol-related consequences	<i>B path</i>					
	Coping	1.050	.028	1.001	1.123	.084
	Social	1.090	.036	1.019	1.162	.016
	Enhancement	1.041	.027	-.988	1.096	.142
	Conformity	1.080	.021	1.038	1.120	<.001
Alcohol-related consequences	<i>Indirect effect</i>					
	Coping	1.007	.006	-.999	1.031	
	Social	1.013	.010	1.000	1.074	
	Enhancement	1.005	.006	-.999	1.022	
	Conformity	1.018	.009	1.005	1.036	
	<i>Direct Effect</i>	-.966	.042	-.886	1.051	.401

Figure 6

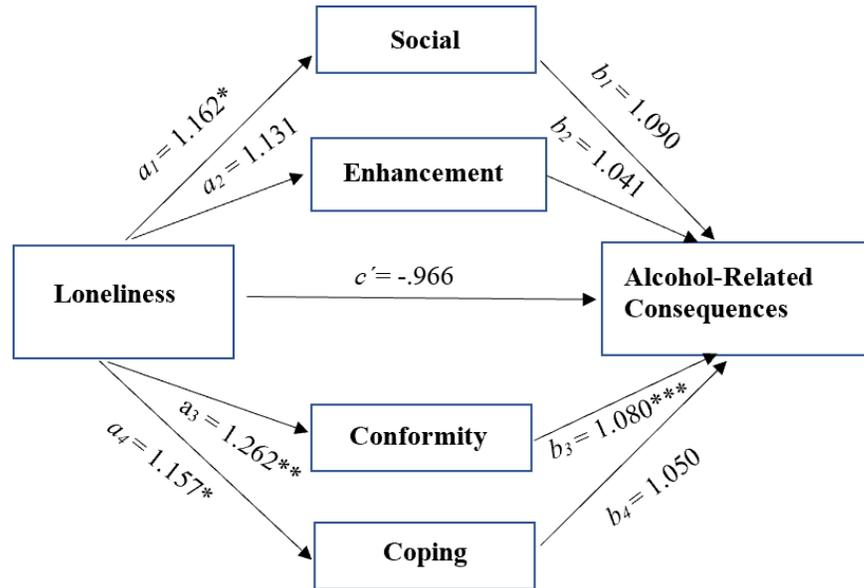
Mediation Model 1 Results



Note: * <0.05, ** <0.01, *** <0.001

Figure 7

Mediation Model 2 Results



Note: * <0.05, ** <0.01, *** <0.001

Chapter 4

Discussion

The literature has demonstrated that loneliness and drinking to cope motivation have unique associations with drinking patterns; however, there has been a lack of research examining how loneliness and drinking motivations together are associated with drinking patterns. The present study expanded on the current literature by conducting a secondary data analysis examining cross-sectional associations between a) loneliness and drinking behaviors, b) loneliness and drinking motives, and c) drinking motives as mediators of associations between loneliness and drinking behaviors.

Our results suggest that, after controlling for anxiety and depression, loneliness is not significantly associated with alcohol consumption or alcohol-related consequences. Thus, the first hypothesis was not supported. While the literature on loneliness and drinking is mixed and currently has evidence to support a negative association between loneliness and drinking (e.g., Barratta, Dantzler & Kayson, 1995; Diehl et al., 2018; Ponzetti, 1990) and a positive association between loneliness and drinking (e.g., Åkerlind & Hörnquist, 1992; Bonin et al., 2020; Miller, 2011; Storch et al., 2015), our findings are consistent with other past studies which have found no association between loneliness and alcohol consumption (Sadava & Thompson, 1986; Todd et al., 2003). On the other hand, while our findings revealed a non-significant association between loneliness and alcohol-related consequences, past research has consistently found that individuals higher in loneliness report more alcohol-related consequences (Barratta, Dantzler & Kayson, 1995; Bonin et al., 2020; Chen & Feeley, 2016; Sadava & Thompson, 1986). However, the present study deviates from past studies by controlling for anxiety and depressive

symptoms in our analyses. Controlling for both anxiety and depressive symptoms is important due to their known associations with loneliness, alcohol consumption, and alcohol-related consequences (Park & Levenson, 2002; Wardell et al., 2020). Thus, our findings extend the current literature by identifying potential constructs that may have influenced past results. Specifically, when we controlled for anxiety and depression symptoms, which are both strongly associated with loneliness and alcohol consumption, the association between loneliness and alcohol-related consequences was no longer significant. Our bivariate correlations revealed that loneliness, anxiety, and depression were highly correlated ($r_s > .505$), potentially explaining why loneliness was not significantly associated with drinking behavior when controlling for these psychological constructs. These findings suggest that loneliness has considerable overlap with anxiety and depression. However, it should be noted that this does not equate to loneliness, anxiety, and depression being equal constructs in terms of symptoms, rather they influence each other and could potentially have similar origins (Week et al., 1980).

Another difference between our study and past literature is that our study utilized hazardous drinkers, meanwhile, past studies did not restrict drinking as an inclusion criteria for participation (Barratta, Dantzler & Kayson, 1995; Bonin et al., 2020; Chen & Feeley, 2016; Sadava & Thompson, 1986). In testing the associations between loneliness and drinking motives, our second hypothesis was supported such that loneliness was positively associated with all four drinking motives. These findings are consistent with past research which has shown that individuals who are high in loneliness often use drinking as a coping mechanism, (Mohr et al., 2021; Todd et al., 2003; Wardell et al., 2020). As previous literature did not examine the association between loneliness and the

other drinking motives, our results are able to fill this gap by providing evidence that loneliness is also positively associated with conformity, social, and enhancement motivation for drinking. These results suggest that those who are lonely may be more likely to drink to conform in a drinking situation, to try and fit in with those around them. It has been found that individuals who are lonely may have low confidence in social situations and struggle with being assertive (Lee & Ko, 2018), thus drinking to conform to social situations may help lonely individuals increase their confidence and assertiveness in these situations. In addition, as individuals high in loneliness tend to lack strong social interaction and have difficulty making friends, they might engage more in drinking for social reasons, aiming to obtain more social interactions (Cooper et al., 2016; Lee & Ko, 2018; Kim & Cha 2018; Ponzetti, 1990). Likewise, loneliness is typically associated with negative emotions (e.g., feeling unloved, worthless, etc.), thus lonely individuals may be more inclined to drink to enhance positive affect (Cooper et al., 2016; Lee & Ko, 2018).

When exploring drinking motives as mediators of associations between loneliness and drinking behaviors, results suggested that conformity motivation was the only drinking motive to significantly mediate associations between loneliness and drinking behaviors. Specifically, individuals higher in loneliness report drinking more frequently for conformity reasons, resulting in fewer drinks per week, but more alcohol-related consequences. These results add to the existing literature as they elucidate the potential role of all drinking motives in association with loneliness and drinking, whereas past research focused exclusively on coping motivation (Mohr et al., 2020; Todd et al., 2003). It is important to recognize that these indirect effects were significant above and beyond

the influences of depressive symptoms and anxiety, thus highlighting the strength of this association.

Additionally, our results found that coping, enhancement, and social motivation did not significantly mediate associations between loneliness and drinking behaviors. Previous studies found significant associations between loneliness, coping motives and drinking behaviors, such that individuals who highly endorse coping motivation and are lonely engage in heavier drinking (Mohr et al., 2020; Todd et al., 2003). These findings suggested that coping motivation would positively mediate the association between loneliness and drinking behaviors; however, our results found no other significant mediation effects besides conformity motivation. For coping motivation, this non-significant result may be explained in part by the fact that drinking to cope was most strongly associated, at the bivariate level, with loneliness, anxiety and depressive symptoms. This strong bivariate association suggests that these constructs share a large amount of variance, thus limiting our ability to examine loneliness as a unique construct and may explain our null findings.

Limitations and Future Directions

The limitations of this study should be noted. First, this study relied on self-report from the participants, which can lead to bias of over or underestimating drinking behaviors and other psychological constructs. Although self-report measures for alcohol consumptions are deemed reliable (Del Boca & Darkes, 2003), future research may aim to utilize a multimethod model to assess alcohol consumption to eliminate potential bias (e.g., Ecological Momentary Assessment (EMA), Timeline Follow Back; Martin-Willett et al., 2020; Shiffman, 2009). More specifically, utilizing an EMA approach for all

assessments (e.g., drinking motives, drinking behaviors, loneliness, depressive symptoms and anxiety symptoms) could help us better understand dynamic associations between loneliness, drinking behaviors and drinking motives, in specific contexts. Similarly, the CES-D depression scale used in the current study is typically used as a screening survey for depression in adult communities (Santor et al., 1995). Past evidence shows that this measure is overly sensitive for college students (Santor et al., 1995), thus it is recommended that future research should use a different measure of depressive symptomology, such as the Beck Depression Inventory (Beck et al., 1979).

Although our sample was racially and ethnically diverse, our participants were unique in terms of their drinking patterns and depression severity. To qualify for the study, college students had to meet criteria for hazardous drinking, thus our sample might have a restriction of range issue. However, estimates suggest that approximately 8% of college students are heavy drinkers (e.g., binge drinking on 5 or more days in the past month; SAMHSA, 2020). Thus, our results cannot be generalized to all college drinkers nor all lonely individuals, and future research may wish to examine a broader sampling of college students that is more representative of the college student population overall. Similarly, our results found that on average our sample was at risk for clinical depression, per the CES-D, which may be true in view of our inclusion criteria focusing on heavy drinkers (Van Dam & Earleywine, 2011). Focusing on participants who are considered heavy drinkers can potentially explain the reason for our sample having high depression scores, as it is noted in past research that depression and alcohol consumption has a strong positive association (Park & Levenson, 2002; Wardell et al., 2020). Likewise, only 12.3% of our participants endorsed experience loneliness often and 15.1% of our

participants endorsed rarely experiencing loneliness. Thus, to focus on individuals who experience loneliness in future research is important. One way future research can do this is by screening individuals levels of loneliness prior to the completing the study.

Lastly, only baseline assessment data was used to examine our hypotheses. Using cross-sectional data limits our ability to understand temporal relations between loneliness and drinking behaviors. Future research should examine these constructs longitudinally to better understand the potential temporal associations between these variables. Obtaining more knowledge about these associations over time can inform future interventions of potential ways to intervene and mitigate the symptomology that leads to heavy drinking in college populations.

Conclusions

In summary, findings from the present study indicate that there is not a unique association between loneliness and drinking behaviors among a sample of hazardous drinkers, when controlling for participants' anxiety and depression symptoms. Loneliness, anxiety, and depression are highly correlated with each other, and anxiety and depression are highly correlated with drinking behaviors, potentially explaining our null results. Testing drinking motives as a potential mediator, conformity motives were the only drinking motives that significantly mediated the association between loneliness and drinking behaviors, such that those high in loneliness tend to drink to conform, resulting in fewer drinks per week and more alcohol-related consequences. Our findings extend the literature on loneliness and drinking by highlighting relations between loneliness, conformity motivation, and drinking behaviors. Future research should further

examine this association as the present research suggests that conformity drinking motives may be particularly important within the context of loneliness.

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Appendix A
YAACQ

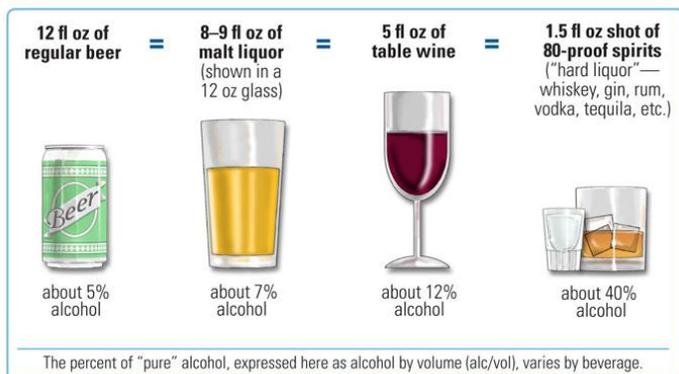
*Below is a list of things that sometimes happen to people either during or after they have been drinking alcohol. Next to each item below, please mark an "X" in either the NO or YES column to indicate whether or not that item describes something that has happened to you **IN THE PAST MONTH**.*

	In the past month...	Yes	No
1.	While drinking, I have said or done embarrassing things.		
2.	The quality of my work or schoolwork has suffered because of my drinking.		
3.	I have felt badly about myself because of my drinking.		
4.	I have driven a car when I knew I had too much to drink to drive safely.		
5.	I have had a hangover (headache, sick stomach) the morning after I had been drinking.		
6.	I have passed out from drinking.		
7.	I have taken foolish risks when I have been drinking.		
8.	I have felt very sick to my stomach or thrown up after drinking.		
9.	I have gotten into trouble at work or school because of drinking.		
10.	I often drank more than I originally had planned.		
11.	My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives.		
12.	I have been unhappy because of my drinking.		
13.	I have gotten into physical fights because of drinking.		
14.	I have spent too much time drinking.		
15.	I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking.		
16.	I have felt like I needed a drink after I'd gotten up (that is, before breakfast).		
17.	I have become very rude, obnoxious or insulting after drinking.		
18.	I have felt guilty about my drinking.		
19.	I have damaged property, or done something disruptive such as setting off a false fire alarm, or other things like that after I had been drinking.		
20.	Because of my drinking, I have not eaten properly.		
21.	I have been less physically active because of drinking.		
22.	I have had "the shakes" after stopping or cutting down on drinking (eg., hands shake so that coffee cup rattles in the saucer or have trouble lighting a cigarette).		
23.	My boyfriend/girlfriend/spouse/parents have complained to me about my drinking.		
24.	I have woken up in an unexpected place after heavy drinking.		
25.	I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk.		

26.	As a result of drinking, I neglected to protect myself or my partner from a sexually transmitted disease (STD) or an unwanted pregnancy.		
27.	I have neglected my obligations to family, work, or school because of drinking.		
28.	I often have ended up drinking on nights when I had planned not to drink.		
29.	When drinking, I have done impulsive things that I regretted later.		
30.	I have often found it difficult to limit how much I drink.		
31.	My drinking has gotten me into sexual situations I later regretted.		
32.	I've not been able to remember large stretches of time while drinking heavily.		
33.	While drinking, I have said harsh or cruel things to someone.		
34.	Because of my drinking I have not slept properly.		
35.	My physical appearance has been harmed by my drinking.		
36.	I have said things while drinking that I later regretted.		
37.	I have awakened the day after drinking and found that I could not remember a part of the evening before.		
38.	I have been overweight because of drinking.		
39.	I haven't been as sharp mentally because of my drinking.		
40.	I have received a lower grade on an exam or paper than I ordinarily could have because of my drinking.		
41.	I have tried to quit drinking because I thought I was drinking too much.		
42.	I have felt anxious, agitated, or restless after stopping or cutting down on drinking.		
43.	I have not had as much time to pursue activities or recreation because of drinking.		
44.	I have injured someone else while drinking or intoxicated.		
45.	I often have thought about needing to cut down or stop drinking.		
46.	I have had less energy or felt tired because of my drinking.		
47.	I have had a blackout after drinking heavily (i.e., could not remember hours at a time).		
48.	Drinking has made me feel depressed or sad.		

Appendix B Daily Drinking Questionnaire (DDQ)

This section asks you to report on your drinking over the last month. For all questions, one drink equals: - 5 oz. wine - 12 oz. wine cooler - 12 oz. beer (10oz. of Microbrew; 8-9 oz. Malt Liquor, Canadian beer or Ice beer) - 1 Cocktail with 1 oz. of 100 proof liquor or 1 ½ oz. (single jigger) of 80 proof liquor.



1) Consider a typical week during the last month. How much alcohol, on average (measured in number of drinks), do you drink on each day of a typical week?

- _____ drinks on **Monday**
- _____ drinks on **Tuesday**
- _____ drinks on **Wednesday**
- _____ drinks on **Thursday**
- _____ drinks on **Friday**
- _____ drinks on **Saturday**
- _____ drinks on **Sunday**

2) Consider a typical week during the last month. Over how many hours do you drink the above number of drinks?

- | | |
|-------------------|-------------------------------------|
| Monday (DDQ8) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Tuesday (DDQ9) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Wednesday (DDQ10) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Thursday (DDQ11) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Friday (DDQ12) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Saturday (DDQ13) | ▼ 0-1 hours (1) ... 10 + hours (11) |
| Sunday (DDQ14) | ▼ 0-1 hours (1) ... 10 + hours (11) |

3) On average, **during the last month**, how often have you consumed alcohol?

<input type="radio"/> Never	<input type="radio"/> Less than once per week	<input type="radio"/> Once a week
<input type="radio"/> Two times a week	<input type="radio"/> Three times a week	<input type="radio"/> Four times a week
<input type="radio"/> Five times a week	<input type="radio"/> Six times a week	<input type="radio"/> Everyday

4) **During the last month**, when you have consumed alcohol, how many drinks on average did you typically consume on a given occasion?

<input type="radio"/> 0 drinks	<input type="radio"/> 1 drink	<input type="radio"/> 2 drinks	<input type="radio"/> 3 drinks
<input type="radio"/> 4 drinks	<input type="radio"/> 5 drinks	<input type="radio"/> 6 drinks	<input type="radio"/> 7 drinks
<input type="radio"/> 8 drinks	<input type="radio"/> 9 drinks	<input type="radio"/> 10 drinks	<input type="radio"/> 11 drinks
<input type="radio"/> 12 drinks	<input type="radio"/> 13 drinks	<input type="radio"/> 14 drinks	<input type="radio"/> 15 drinks
<input type="radio"/> 16 drinks	<input type="radio"/> 17 drinks	<input type="radio"/> 18 drinks	<input type="radio"/> 19 drinks
<input type="radio"/> 20 drinks	<input type="radio"/> 21 drinks	<input type="radio"/> 22 drinks	<input type="radio"/> 23 drinks
<input type="radio"/> 24 drinks	<input type="radio"/> 25 or more drinks		

Appendix C
Drinking Motives Questionnaire

Below is a list of reasons people sometimes give for drinking alcohol. **Thinking of all the times you drink, how often would you say that you drink for each of the following reasons?** Please indicate your response in the blank next to each item according to the following scale:

1	2	3	4	5
Never/almost never	Some of the time	Half of the time	Most of the time	Almost always/always

1. To forget your worries.
2. Because your friends pressure you to drink.
3. Because it helps you enjoy a party.
4. Because it helps you when you feel depressed or nervous.
5. To be sociable.
6. To cheer you up when you are in a bad mood.
7. Because you like the feeling.
8. So that others won't kid you about *not* drinking.
9. Because it's exciting.
10. To get high.
11. Because it makes social gatherings more fun.
12. To fit in with a group you like.
13. Because it gives you a pleasant feeling.
14. Because it improves parties and celebrations.
15. Because you feel more self-confident and sure of yourself.
16. To celebrate a special occasion with friends.
17. To forget about your problems.
18. Because it's fun.
19. To be liked.
20. So you won't feel left out.

Appendix D

UCLA Loneliness Scale

Directions: The questions in this scale ask you about your feelings and thoughts during the last month. For each item, please indicate how often you felt or thought a certain way. Please use the following scale for all items.

- 1 Hardly ever
- 2 Some of the time
- 3 Often

In the LAST MONTH...

- 1. How often do you feel that you lack companionship?
- 2. How often do you feel left out?
- 3. How often do you feel isolated from others?