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RUMINATION, WORRY, AND DRINKING BEHAVIORS IN COLLEGE
STUDENTS: A MEDIATION ANALYSIS

By

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B.A., College of William & Mary in Virginia, 2010
M.Ed., University of Louisville, 2013

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Submitted to the Faculty of the
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A Dissertation Approved on

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ABSTRACT
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ANALYSIS

Stephanie Winkeljohn Black

April 17, 2015

Mental health and alcohol-related behaviors are constructs of concern on university campuses, as a significant portion of college students experience alcohol-related consequences. There is an established link between mental health variables, including repetitive thoughts associated with depression and anxiety, and drinking behaviors among college students. However, how preventative behaviors – protective behavioral strategies – impact the associations between repetitive thoughts and drinking behaviors and outcomes is less understood. The current longitudinal study analyzed mediational relationships among these variables in college students at a mid-sized 4-year university ($N = 107$; 78.5% female; average age = 21.06 years, $SD = 4.41$). Analyses indicated that no mediational relationships existed among the variables. Moreover, the alcohol consequences measure did not have a significant relationship with any of the other study variables. Implications and limitations are discussed.

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CHAPTER I

INTRODUCTION

Approximately two thirds of college students reported using alcohol in the past 30 days (American College Health Association, 2014; Johnston, O'Malley, Bachman, & Schulenberg, 2010), and college students drink more than their age-mates who do not attend college (Hingson, 2010). Moreover, 31.5% and 44% of students report drinking heavily (5 or more drinks for males, 4 or more drinks for females) during one sitting during the past two weeks (ACHA, 2014; Wechsler & Nelson, 2008). Further, the percentage of college students who drink heavily increased by 8% from 1999-2005 (Hingson, 2010). Thus, heavy drinking appears to an increasing problem among college students.

It is well established that heavy drinking is associated with various negative consequences. According to the ACHA's 2014 report, 36.5% of students reported doing something they later regretted while drinking. In addition, 32.3% of students forgot where they were or what they did, 20.4% had unprotected sex, and 14.9% experienced a physical injury. The literature corroborates this survey-based report, finding that excessive drinking in college student populations is associated with academic and personal consequences including missing classes and assignments, interpersonal problems, driving under the influence, legal repercussions, and death (Perkins, 2002; Hingson, Zha, & Weitzman, 2009). Moreover, students' heavy drinking can have negative consequences for others around them, including physical and sexual assault,

property damage, and poor relations between the community and campus (Hingson et al., 2009; Perkins, 2002).

Protective Behavioral Strategies

Protective behavioral strategies (PBS) are behaviors students can use to decrease and/or monitor their alcohol consumption and decrease their alcohol-related problems (e.g., alternating water with alcohol beverages, avoiding drinking games; Martens et al., 2004). There is an inverse relationship between the use of PBS and alcohol consumption and alcohol-related problems among college students (e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Haines, Barker, & Rice, 2006; Martens et al., 2004, 2005, Martens, Ferrier, & Cimini, 2007). Moreover, PBS mediated the relationship between the implementation of an alcohol intervention and the amount of alcohol consumed two weeks later among college students (Larimer et al., 2007).

The literature demonstrates that PBS are available to students when they consume alcohol (Martens et al., 2004, 2005, 2007), but many students continue to experience serious alcohol-related problems (Hingson et al., 2009; Perkins, 2002). A well-established finding in the literature to explain heavy drinking and alcohol-related problems is that people use alcohol to regulate their emotions and to reduce tension (e.g., Cooper, Frone, Russel, & Mudar, 1995; Russell & Mehrabian, 1975).

Cognitive patterns associated with anxiety and depression influence drinking behaviors, such as PBS and drinking motives. However, the literature on how these cognitive patterns impact behaviors is less developed compared to the literature on drinking motivations. The current study seeks to add to the current understanding of how

cognitive patterns associated with anxiety and depression influences an individual's use of PBS and subsequent alcohol-related consequences.

Mental Health among College Students

Over half of U.S. college students met the DSM-IV-TR criteria for a psychological disorder within the past year (Blanco et al., 2008). Gollust, Golberstein, and Hefner (2007) found that 15.6% of college students had either an anxiety or depressive disorder, based on DSM-IV-TR criteria. Although the findings are mixed as to whether there is a difference in alcohol consumption between depressed and non-depressed students (Fabiano et al., 2009; Pedrelli et al., 2010), depressed students are considered an at-risk group for problem drinking (Geisner, Neighbors, Lee, & Larimer, 2007). For example, depressed students who drink are more likely to experience negative alcohol consequences compared to non-depressed students who drink (Camatta & Nagoshi, 1995; Gonzalez, Reynolds, & Skewes, 2011).

Two notable constructs relating to depression and anxiety that may influence the effectiveness of PBS are depressive rumination and worry, respectively. Depressive rumination is a predictor of depressive episodes (see Nolen-Hoeksema, Wisco, & Lyumbomirsky, 2008 for a review) and excessive worry is primary symptom of General Anxiety Disorder (GAD; American Psychiatric Association, 2013). Rumination involves a repetitive, passive focus on an individual's feelings of sadness or preoccupation with the cause(s) for his/her depressive symptoms; worry involves repetitive thinking about possible future outcomes or consequences. While rumination often focuses on past-oriented events and is associated with increased depression, worry focuses on future-

oriented events and is associated with increased anxiety (Nolen-Hoeksema et al., 2008; Watkins, 2008).

Rumination and worry share many similarities. Both are negative in valence and situational and/or interpersonal contexts. Both rumination and worry have negative consequences for an individual's mental health; that is, both lead to an increase in negative affect and a decrease in positive affect (Hong, 2007; McLaughlin, Borkovec, & Sibrava, 2007; Segerstrom, Tsao, Alden, & Craske, 2000; Watkins, 2008). Additionally, rumination and worry are each associated with deficits in concentration and attention (Nolen-Hoeksema et al., 2008). Finally, the specific cognitions involved in rumination and worry tend to be abstract (Watkins, 2008)¹.

Nevertheless, several researchers have confirmed that depressive rumination and worry load onto two separate factors (e.g., Ciesla et al., 2011; Hong 2007; Segerstrom et al., 2000). Moreover, Nolen-Hoeksema and associates (2008) reviewed the differences between rumination and worry and noted that individuals use worry as a way to anticipate and control possible future negative events. By contrast, individuals who ruminate frequently attempt to gain insight to their depressed mood by focusing on negative events that have already occurred. Additionally, Nolen-Hoeksema and associates (2008) suggested that individuals use rumination as a means to justify inaction (i.e., "everything is hopeless, so why act?"), whereas worry allows people to prepare for various actions by anticipating a variety of situations.

Rumination, Alcohol, and PBS

¹ It should be noted that worry characterized by concrete thoughts, rather than abstract, tends to be more constructive compared to abstract worry, which is the focus of this study.

Several researchers have investigated the relationship between rumination and alcohol use. Nolen-Hoeksema and Harrell (2002) found that rumination was associated cross-sectionally with alcohol use for men and women, and predicted alcohol problems up to 12 months later for women. Moreover, rumination predicted alcohol consumption in adults with alcohol abuse (average age = 47.2 years, *SD* = 9.5 years; Caselli et al., 2010) and in a sample of both adults with and without an alcohol problem diagnosis (average age = 47.8 years, *SD* = 8.8 years; Caselli, Bortalai, Leoni, Rovetto, & Spada, 2008). However, only a few studies researched the role of rumination in college students. For example, Ciesla and associates (2011) recently found that depressive rumination did not have a relationship with alcohol use when controlling for depressive symptoms. The difference between Ciesla et al.'s (2011) and Caselli and colleague's (2008, 2010) results suggest that different associations among these variables may exist in college student populations compared to non-college attending, community-based adults. Therefore, more studies are needed with college student populations to determine whether there is a difference in the associations between rumination and depressive symptoms compared to adults in a community sample, and if so, what this pattern looks like.

Many researchers have offered explanations for the associations among depressive rumination, alcohol consumption, and PBS. Martens and colleagues (2008) found that PBS partially mediated the relationship between depressive symptoms and alcohol-related problems. While Martens and colleagues did not look into depressive rumination specifically, they posited that cognitions associated with depression might contribute to the lack of motivation or ability to employ PBS when consuming alcohol.

Another explanation, from Nolen-Hoeksema and associates (2008), describes rumination as a cognitive style that takes away an individual's motivation and initiative. Two studies have found that college students induced to ruminate were less likely to generate solutions to various problems compared to students not induced to ruminate (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999). Moreover, Lyubomirsky and colleagues (1999) found that the ruminating participants reported that they were less likely to implement proposed solutions compared to non-ruminating participants. Given the current literature on these constructs and the fact that PBS requires the implementation of solutions (e.g., counting drinks, etc.) to avoid a problem (alcohol-related problems), it is likely that individuals who ruminate would be less likely to use PBS when drinking compared to individuals who do not ruminate. Additionally, one could expect that ruminating individuals would experience more alcohol-related problems compared to non-ruminating individuals, and that PBS would mediate this association.

Worry, Alcohol, and PBS

Researchers have demonstrated a positive relationship between GAD (characterized by worry) and alcohol consumption in epidemiological studies with adult samples (Alonso et al., 2004; Grant et al., 2004) and in an adolescent community sample (Kaplow, Curran, Angold, & Costello, 2001). However, there appears to be a lack of research on GAD and alcohol consumption among college students specifically. This absence of information is problematic, as there is an established difference in patterns of alcohol use between emerging adults in college and their peers who do not attend college (e.g., Blanco et al., 2008; Hingson, 2010), suggesting that both groups may differ in how

or why they consume alcohol, especially when psychiatric conditions such as GAD are present.

Despite the positive relationship between GAD and alcohol use, there appears to be a negative association between worry and alcohol use. Ciesla and colleagues (2011) found a negative association between worry and weekly alcohol consumption in college students, when controlling for gender and anxiety. Ciesla and associates (2011) asserted that worry-prone individuals would see alcohol consumption as a bad idea; these individuals are more likely to worry about the consequences of consuming alcohol compared to individuals who are not prone to worry. Similarly, Shoal, Castaneda, and Giancola (2005) found that worry and alcohol consumption are orthogonal emotion regulation strategies, wherein an individual will choose one strategy over the other to regulate negative emotions.

To date, no research has been conducted on the association between worry and PBS, and we are aware of only one study regarding generalized anxiety and PBS. Litt, Lewis, Blayner, and Kaysen (2013) found that women with higher generalized anxiety scores were less likely to use PBS. Moreover, PBS mediated the relationship between generalized anxiety levels and alcohol consumption and alcohol-related problems.

Summarized, there appears to be a positive association between GAD and alcohol consumption and problems (Alonso et al., 2004; Grant et al., 2004; Kaplow et al., 2001; Litt et al., 2013), and PBS mediates the association between these constructs (Litt et al., 2013). However, there is a negative association between worry and alcohol consumption (Ciesla et al., 2011; Shoal et al., 2005) and no research to date on the associations between worry and PBS. Given that worry is often used to anticipate future negative

outcomes (Nolen-Hoeksema et al., 2008) and the above findings (Ciesla et al., 2011; Shoal et al., 2005), it can be expected that individuals who worry often would be more likely to use PBS and therefore experience fewer alcohol-related problems compared to individuals who do not worry often. Thus, it can be expected that PBS will mediate the relationship between worry and alcohol-related problems.

Current Study

Literature on college student wellness demonstrates that many students experience mental health problems such as depression and anxiety (Blanco et al., 2008; Eisenberg et al., 2007), consume excessive amounts of alcohol (Wechsler & Nelson, 2008), and experience alcohol related problems (e.g., assault, legal problems; ACHA, 2014; Hingson et al., 2009). Moreover, despite the availability of PBS to mitigate the negative effects of drinking alcohol, alcohol consequences are still prevalent on college campuses. Some have identified college students experiencing depression as an at-risk group for alcohol problems (e.g., Geisner et al., 2007). However, although researchers have considered the relationship between depression, anxiety, and alcohol behaviors (e.g., Martens et al., 2008; Shoal et al., 2005), there has been a lack of research on the specific cognitions associated with depression (i.e., rumination) and anxiety (i.e., worry). There is evidence that rumination makes it difficult for individuals to implement strategies (Lyobomirsky et al., 1999), and one study found an inverse relationship between depression and PBS in college students (Martens et al., 2004). Even less work has been done on the associations among worry and various alcohol behaviors. There is evidence to indicate individuals who worry drink less than individuals who do not worry (Ciesla et al., 2011; Shoal et al., 2005). Moreover, Nolen-Hoeksema and colleagues

(2008) describe individuals who worry as constantly anticipating negative outcomes, which suggests that worrying individuals consuming alcohol would be more primed to protect themselves from negative consequences.

The current study will investigate longitudinally how rumination and worry are related to alcohol behaviors, specifically PBS and alcohol related problems, in college students. It is expected that college students who ruminate will be less likely to use PBS. Moreover, it is expected that ruminating individuals will experience more alcohol-related problems, and that PBS will mediate this relationship. It is expected also that college students who worry will be more likely to use PBS and less likely to experience alcohol-related problems compared to their non-worrying peers. Finally, it is expected that PBS will mediate the relationship between worry and alcohol-related problems among college students. PBS was hypothesized to be a mediator, rather than moderator, because it is a malleable behavior rather than a stable trait; Wu and Zumbo (2008) recommend mediation models when the variable of interest is more state-like than trait-like. Moreover, there is already evidence that PBS mediates associations between psychological states (e.g., depressive symptoms, GAD) and alcohol-related variables (e.g., Litt et al., 2013; Martens et al., 2008).

CHAPTER II

METHODS

Participants

A total of 533 students completed self-report items for at least one time point. Of these participants, 51 cases were determined to be invalid due to incorrect responses on the random responding check items and another 28 cases were removed due to outliers. Of the remaining 454 cases, 70% reported consuming alcohol within the past 30 days of at least one of the time points. Only participants who reported drinking alcohol in the past 30 days at any time point were included in the current study. Of these 315 participants, 208 completed surveys at one or two of the three time points and 107 completed surveys at all three time points. There were no significant differences between the 208 incomplete participants and the 107 complete participants on age ($t = -.49, p = .628$), ethnicity ($\chi^2(5) = 3.859, p = .570$), gender ($\chi^2(1) = .280, p = .597$), or Greek affiliation ($\chi^2(1) = 2.227, p = .136$), nor on GPA ($t = -.848, p = .398$; $t = -.153, p = .879$; $t = -.039, p = .969$) or depressive symptoms ($t = .773, p = .441$; $t = 1.137, p = .203$; $t = 1.155, p = .188$) at times 1-3. However, the groups did differ on their year in school, with more completers identifying as upperclassmen compared to incompleters ($\chi^2(5) = 13.687, p < .05$; 35.9% of incompleters were freshmen, compared to 24.3% of completers). However this is unsurprising, given that withdrawal from college is most common in the freshman year compared to other years (Tinto, 2012). Thus, it is possible that students who completed the survey at time 1 prior to the university's course

withdrawal deadline, later withdrew from the course and therefore were not recruited for the last two time points. Additionally, student absences due to illness, weather issues, and transportation likely kept some from participating on their designated class's survey day(s), which meant these students' did not have surveys completed at all three time points and thus could not be included in the final analyses.

Of the remaining 107 participants (mean age = 21.06 years, $SD = 4.41$ years), 78.5% identified as women and 88.8% identified as European American. The majority of participants worked at least part-time (70%) and lived off campus with family (55.1%). A quarter of the participants were first generation college students (25.5%); 23.6% were affiliated with Greek organizations and 6.5% were student athletes. More detailed information about participant demographics is presented in Table 1.

Measures

Demographics. Participants reported basic demographic information, such as gender, age, year in school, and ethnicity. Participants also reported whether they are affiliated with a sorority, fraternity, or athletic team whether they live on campus or off and with whom, whether they are a first-generation student, and their grade point average (GPA).

Rumination. The Ruminative Responses Scale (RRS; Nolen-Hoeksema, Parker, & Larson, 1994) from the Response Styles Questionnaire (RSQ) measured participants' ruminative styles. The scale contains 10 items asking participants how often they engage in certain behaviors or thoughts when depressed (e.g., "think, 'what did I do to deserve this?"). All items are measured on a 4-point Likert scale (1 = *almost never*, 4 = *almost always*; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The RRS had adequate internal consistency in the current sample (Cronbach's α at time 1 = .82).

Worry. Participants completed the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), a self-report, trait measure of excessive worry. Individuals with GAD score high on the measure (Molina & Borkovec, 1994), though the PSWQ has been found to measure a “separate construct” from anxiety and/or depression (Hazlett-Stevens, Ullman, & Craske, 2004). The PSWQ contains a total of 16 items on a 5-point Likert scale (e.g., “I am always worrying about something” or “I find it easy to dismiss worrisome thoughts;” 1 = *not at all typical of me*; 5 = *very typical of me*). The PSWQ has demonstrated good validity and reliability in college samples (Ciesla et al., 2011; Hazlett-Stevens et al., 2004) and had good internal consistency in the current sample (Cronbach’s α at time 1 = .94).

Protective Behavioral Strategies. The Protective Behavioral Strategies Scale (PBSS; Martens et al., 2004) measured how often participants use PBS while drinking. The PBSS contains a total of 15 items on a 6-point Likert scale (e.g., “avoid drinking games;” “use a designated driver;” 1 = *never*; 6 = *always*). The PBSS has been shown to be a reliable and valid measure of drinking behaviors and protective strategies among college students (Martens et al., 2007). The PBSS had good internal consistency in the current sample (Cronbach’s α at time 2 = .90).

Alcohol-Related Problems. The Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) measured how often participants experienced various negative consequences due to drinking behaviors within the past year (e.g., “caused shame or embarrassment to someone;” “suddenly found yourself in a place you could not remember getting to”). The RAPI contains 23 items, all on a 4-point Likert scale (0 = *none*, 3 = *more than 5 times*). The RAPI has been used extensively in college populations

(e.g., Ham & Hope, 2005; Larimer et al., 2001; Lewis & Neighbors, 2004; and Murphy et al., 2004) and had adequate internal consistency in the current sample (Cronbach's α at time 3 = .85).

Alcohol Consumption. Frequency and quantity of alcohol consumption will be measured with three items from the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). Participants were shown standard drink equivalencies (12 ounces of beer, 5 ounces of wine, and 1.5 ounces of 80-proof liquor) and asked to report on how occasions in the past month they consumed over the past month. Next, participants were asked to report how many alcoholic beverages they consumed per sitting, on average, over the past month. To assess heavy episodic drinking (binge drinking), participants were asked how many times they had consumed five or more standard drinks (females will be asked for occasions involving four or more standard drinks; Wechsler et al., 2002) in one sitting over the past 30 days.

Depression. Symptoms of depression were measured with the Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977). The CES-D asks participants how frequently they have experienced various symptoms of depression within the past week (e.g., “I felt that everything I did was an effort”). The 20 items are answered using a 4-point Likert scale ($0 = none\ of\ the\ time$, $3 = all\ of\ the\ time$). Shafer (2005) reviewed and conducted a meta-analysis of the CES-D, noting that it has a single higher-order factor structure and primarily assesses affective and somatic symptoms of depression. This is ideal, because a measure of cognitive symptoms may have too much shared variance with the RRS. The CES-D had adequate internal consistency in the current sample (Cronbach's α at time 1 = .83).

Anxiety. Symptoms of general anxiety were measured with the Beck Anxiety Inventory (BAI; Beck & Steer, 1993). On the BAI participants are asked to rate how much each of the 21 items bothered the client in the past month on a Likert scale (e.g., “terrified or afraid;” “nervous;” $0 = \textit{not at all}$; $3 = \textit{severely}$). Items on the BAI are largely somatic; therefore, there should not be a significant overlap between the BAI and PSWQ in variance. However, some have proposed a two-factor structure for the BAI, where 6 items are cognitive and 15 are somatic (Creamer, Foran, & Bell, 1995). However, in the current sample the correlation between the BAI and PSWQ was moderate; therefore the cognitive items on the BAI were retained for analyses. The BAI had good internal consistency in the current sample (Cronbach’s α at time 1 = .90).

Random Responding Checks. To track participant random responding, two validity items were added between the above measures throughout the survey. The validity items state, “We’re sure you’re trying your hardest, select ‘almost always’ if you’re paying attention to this survey.” Participants who fail to endorse the indicated option either or both time points were removed from the analyses.

Procedure

Students were invited to participate in the study through their education classes in the College of Education and Human Development at the University of Louisville. Over the fall 2013 and spring 2014 semesters, the self-report measures were administered and collected three times at four-week intervals during class time in 18 Teacher Education and Certification classes (11 in the fall; 7 in the spring). Given the high proportion of women in Teacher Education classes, a Health and Sport Sciences class was recruited in the spring specifically to boost male participation. In approximately 50% of the classes

course credit were offered by the class instructor to students for their participation in the study to retain participation across all time points. Some of the classes completed the survey online in a computer lab, while others completed a pen-and-paper version; both surveys were identical in instruction and the order of measures.

Data Analysis

First, outliers were identified and removed from remaining analyses. For the CES-D, BAI, RRS, PSWQ, PBSS, and RAPI an outlier was defined as a value that was three or more standard deviations above or below the mean (Osborne, 2012). Given that the current study focused on drinking behaviors, it was important to retain as much variability as possible in drinking amount and frequency. Thus, instead of removing cases that were more than three standard deviations away from the mean on the three items assessing amount of alcohol consumption, scores on these items were instead truncated. For the items, “In the past month, on how many occasions did you drink alcohol?” and “In the past month, on how many occasions did you have 5 or more alcohol beverages?” any participant self-reported scores above 30 were changed to 30, based on the assumption that individuals would engage in a drinking event no more than once per day. For the item, “In the past month, how many alcohol drinks did you consume in a typical setting?” the highest possible self-report was set to 13 standard drinks, based on findings from Paschall et al.’s (2011) multi-campus study on alcohol consumption among college students, which found that across 30 universities ($N = 2,400$ students), the average participant consumed 2.67 standard drinks ($SD = 3.4$ drinks). Thus, three standard deviations above this mean was just under 13 standard drinks, which became the maximum value for this item in the current study.

In order to test the study hypotheses, three linear regressions were calculated in SPSS 21. In the first regression, amount of alcohol consumption, the CES-D, and BAI at time 1 were entered as control variables; RRS and PSWQ at time 1 were then entered as predictor variables and PBSS at time 2 was entered as the outcome variable. Thus, the first regression analyzed whether rumination (RRS) or worry (PSWQ) at time 1 was associated with the hypothesized mediator, PBSS (protective strategies) at time 2, while controlling for depressive symptoms (CES-D), anxiety (BAI), and alcohol consumption at time 1. The second regression was identical to the first in terms of the control and predictor variables entered, but this time the RAPI at time 3 was entered as the outcome variable, in order to test for the relationship between predictor and outcome variables. In the third regression, PBSS at time 2 was entered as the predictor variable and RAPI at time 3 was entered as the outcome variable, with the same control variables as in the first regression. This third regression analyzed whether PBSS at time 2 predicted alcohol-related consequences (RAPI) at time 3. To adjust for the inflated error rate associated with running multiple regressions (three total), the *p*-value cutoff for significance was adjusted from .05 to .017.

Mediation occurs when there is a significant, indirect relationship between the predictor and outcome variables through a mediating variable (Preacher & Hayes, 2011). This was analyzed by calculating 95% confidence intervals using PRODCLIN (Tofighi & MacKinnon, 2011), first using the regression weights and standard errors for RRS to PBSS and for PBSS to RAPI, and then using the weights and errors for PSWQ to PBSS and for PBSS to RAPI. According to Hayes and Preacher (2011), mediation exists when the confidence intervals do not contain zero.

CHAPTER III

RESULTS

Correlations and descriptive statistics are reported for the analyzed variables in Table 2. There were moderately high correlations between the CES-D and BAI at time 1 and the CES-D and RRS-B at time 1, though these correlations were not higher than their associations in other studies with college students (e.g., Ciesla et al., 2011). Additionally, the BAI, RRS, and PSWQ at time 1 correlated moderately with each other. Alcohol consumption variables at time 1 correlated negatively with the RAPI at time 3; PBSS at time 2 also correlated negatively with the RAPI at time 3. The only significant correlation between the mental health variables (CES-D, BAI, RRS, and PSWQ) and drinking-related variables (consumption, PBSS, RAPI) was a negative correlation between the BAI and alcohol consumption at time 1.

Regarding the relationships between the predictor variable (RRS at time 1) and the mediator (PBSS at time 2) and outcome (RAPI at time 3) variables, analyses revealed that the relationship between the RRS at time 1 and PBSS at time 2 was significant, where higher levels of RRS at time 1 predicted lower PBSS score at time 2 when controlling for alcohol consumption, CES-D, and BAI scores at (see Table 3 for regression statistics). However, RRS at time 1 did not predict higher RAPI scores at time 3. Regarding the relationships between the predictor variable PSWQ at time 1 and PBSS at time 2 and RAPI at time 3, analyses indicated no relationship between PSWQ at time 1

and PBSS at time 2 when controlling for alcohol consumption, CES-D, and BAI scores at time 1. Additionally, the PSWQ at time 1 did not predict RAPI scores at time 3.

Subsequent analysis demonstrated that PBSS scores at time 2 did not predict RAPI scores at time 3. Thus, given the lack of relationship between the proposed mediator and outcome variables, mediation was not found and the calculation of confidence intervals therefore was not conducted.

Post Hoc Analyses

Given the extensive empirical support for the inverse relationship between protective strategies and alcohol-related consequences among college students (Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Haines, Barker, & Rice, 2006; Martens et al., 2004, 2005, Martens, Ferrier, & Cimini, 2007), the current study's finding that protective behavioral strategies at time 2 did not predict alcohol-related consequences at time 3 was highly unexpected. However, further inquiry into the literature yielded additional literature on the conceptual and psychometric nature of the alcohol-related consequences instrument – the RAPI - in college samples. Martens and colleagues (2007) noted that many researchers and clinicians score the RAPI dichotomously, rather than continuously and found in a confirmatory factor analysis that dichotomously scoring the measure yielded valid and reliable scores. Martens et al. (2007) pointed out that while a continuous score on the RAPI attempts to convey the severity of a participant's consequences (e.g., a score of 5 could indicate experiencing several physical fights and missing one class, or could indicate one physical fight, missing two classes, and driving drunk), a dichotomous score would allow researchers and interventionists to understand the range of alcohol-related consequences an

individual experienced (e.g., a score of 5 indicates a participant experienced five *different* alcohol-related consequences). The researchers conclude that researchers may benefit more from using a dichotomously scored RAPI than a continuously scored one.

Moreover, there is evidence to suggest that students may perceive some alcohol-related consequences as problematic, and may experience some consequences as more distressing than others (Mallett, Varvil-Weld, Borsari, Read, Neighbors, & White, 2013). For example, Mallett et al. (2008) found that many students reported hangovers or blackouts as positive consequences of their drinking. There is some research indicating that students' social consequences are most salient to their consumption and post-consumption beliefs about alcohol and their alcohol behaviors (Lee et al., 2010). While some have begun analyzing how various types of alcohol-related consequences might be related to psychological constructs, such as life satisfaction (Diulio et al., 2014) or social anxiety (Norberg, Olivier, Alperstein, Zvolensky, & Norton, 2011), there is no research on how specific types of consequences might relate to repetitive thoughts such as ruminative brooding or worry. Martens et al. (2007) conducted a confirmatory factor analysis of the RAPI and found support for three subscales: personal consequences (e.g., "neglected your responsibilities," "had a bad time"), social consequences (e.g., "caused shame or embarrassment to someone," "got into fights with other people"), and dependence (e.g., "felt that you needed more alcohol than you used to in order to get the same effect," "tried to control your drinking"). Thus, the RAPI can be used to distinguish among students' types of alcohol-related consequences and determine whether some types of consequences are related more strongly to certain psychological variables, such as worry or rumination.

The relationships among repetitive thought and protective strategies with alcohol-related consequences was thus analyzed in three additional ways to determine whether a conceptual or psychometric re-structuring of the RAPI might indicate more complex relationships to protective strategies and repetitive thought such as rumination and worry. First, new analyses explored whether rumination and worry at time 1 or protective strategies at time 2 predicted alcohol-related consequences measured with a dichotomously-scored RAPI at time 3 and whether protective strategies would mediate this relationship between repetitive thought at time 1 and dichotomously-scored alcohol-related consequences at time 3. This analysis allowed for an examination of whether repetitive thought and protective strategies predicted a range of alcohol-related consequences, rather than the previously measured combination of range and severity of consequences. Second, additional analyses were conducted to determine whether repetitive thought at time 1 or protective strategies at time 2 predicted only specific alcohol-related consequences, or have stronger predictive relationships with certain alcohol-related consequences compared to others, using Martens et al.'s (2007) three validated RAPI subscales. This examination was conducted with both continuously scored RAPI subscales and dichotomously scored RAPI subscales.

Post-hoc Measures

All measures were the same as used in the original hypotheses. For one of the post-hoc analyses the RAPI was calculated dichotomously rather than continuously; this version of the measure had adequate internal consistency (Cronbach's $\alpha = .85$). Additionally, the RAPI subscales – Personal Consequences (RAPI-P), Social Consequences (RAPI-S), and Dependence (RAPI-D) were calculated and demonstrated

adequate internal consistency in the current sample when scored continuously (Cronbach's $\alpha = .72; .72; .70$, respectively) and dichotomously (Cronbach's $\alpha = .70; .76; .76$, respectively), though it should be noted the subscales had lower internal consistency than the full scale RAPI, regardless of how it was scored.

Post-hoc Data Analysis

The data analyses were similar to the approach used above, analyzing linear regressions in order to then test for mediation. The first regression analyzed the relationship between the predictor variables RRS and PSWQ and various forms of the RAPI at time 3 (full scale, dichotomously scored; subscales, continuously scored; subscales, dichotomously scored), while controlling for alcohol consumption, CES-D, and BAI at time 1, and the second regression analyzed the relationship between PBSS at time 2 and various forms of the RAPI at time 3 while controlling for alcohol consumption, CES-D, and BAI at time 1. As the first regression in the original analyses (RRS and PSWQ at time 1 to PBSS at time 2) was not being reexamined, those regressions were not re-calculated. To adjust for the inflated error rate associated with running multiple regressions (two total), the p -value cutoff for significance was adjusted from .05 to .025.

Post-hoc Results

Correlations and descriptive statistics are reported for the post hoc analyses in Table 4. The RAPI subscales, both continuously and dichotomously scored, correlated with each other, and most of the RAPI subscales correlated with the drinking consumption variables. As with the original analyses, the RAPI subscales did not

correlate with the mental health variables, with the exception of the dichotomously-scored RAPI-S subscale and the BAI at time 1.

The first set of post-hoc hypotheses tested whether the predictor (RRS at time 1 and PSWQ at time 1) or proposed mediator (PBSS at time 2) variables predicted a dichotomously-scored RAPI at time 3. Analyses revealed that there were no significant relationships between the RRS or PSWQ at time 1 and a dichotomously-scored RAPI at time 3, nor was there a relationship between PBSS at time 2 and a dichotomously-scored RAPI at time 3 (Table 5).

The second set of post-hoc hypotheses tested whether RRS and PSWQ scores at time 1 or PBSS scores at time 2 had significant relationships with any of the three RAPI subscales, when continuously scored, at time 3. Analyses revealed no significant relationships between the RRS or PSWQ at time 1 and any of the RAPI subscales at time 3; nor were there relationships among PBSS at time 2 and any of the RAPI subscales at time 3 (Tables 6 – 8).

The third and final set of post-hoc hypotheses tested whether RRS and PSWQ scores at time 1 or PBSS scores at time 2 had significant relationships with any of the three RAPI subscales at time 3, when dichotomously scored. Analyses revealed no significant relationships between the RRS or PSWQ at time 1 and any of the RAPI subscales at time 3; nor were there relationships among PBSS at time 3 and any of the dichotomously-scored RAPI subscales at time 3 (Tables 9 – 11).

Finally, while not part of the formal post-hoc hypotheses, notable relationships were found among the control variables at time 1 and RAPI subscales at time 3 (when both continuously and dichotomously scored). Specifically, the number of occasions in

which alcohol at time 1 was consumed in the past month predicted higher continuously and dichotomously-scored RAPI-P scores at time 3. BAI scores at time 1 predicted higher RAPI-S scores at time 3 when calculated continuously or dichotomously. Finally, the number of binge drinking incidences in the past month measured at time 1 reported predicted continuously and dichotomously-scored RAPI-D scores at time 3.

CHAPTER IV DISCUSSION

The current study investigated the relationships among rumination, worry, PBS, and alcohol consequences. Previous studies have established a positive relationship between rumination and alcohol consequences (e.g., Nolen-Hoeksema & Harrell, 2002) and a negative relationship between worry and alcohol consumption (Ciesla et al., 2011; Shoal et al., 2005), with no literature on worry and alcohol consequences. Moreover, few have tested the mechanisms to explain these differing relationships between rumination and alcohol and worry and alcohol. There is a larger body of literature demonstrating an inverse relationship between PBS and alcohol consequences (e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Haines, Barker, & Rice, 2006; Martens et al., 2004, 2005, Martens, Ferrier, & Cimini, 2007). The current 3 wave longitudinal study thus attempted to replicate the findings that rumination predicts more alcohol consequences and to determine whether worry would predict fewer alcohol consequences, as it predicts less alcohol consumption. It was also hypothesized that PBS would mediate the positive relationship between rumination and alcohol consequences.

Rumination at time 1 predicted fewer PBS at time 2 but did not predict alcohol consequences at time 3 when controlling for depressive symptoms and alcohol consumption. This is the first study to examine how rumination impacts PBS and it supports Martens' (2008) suggestion that the inverse association between depressive symptoms and PBS might be explained by the cognitive load high-ruminating individuals

experience, which keeps them from expending cognitive energy elsewhere, such as monitoring their drinking behaviors and employing PBS. The lack of relationship between rumination and alcohol consequences was unexpected, given the relationship between rumination and PBS that was found. Ciesla et al. (2011) found a similar null relationship in a college student sample when examining the association between depressive rumination and alcohol consumption and suggested that the lack of association, found to be significant in other studies (Caselli et al., 2008, 2010; Nolen-Hoeksema & Harrell, 2002), may not be significant in populations with subclinical levels of disordered alcohol use and/or depression. Instead, populations with subclinical levels of alcohol abuse and/or depression may be consuming alcohol not due to their ruminative thoughts but for positive alcohol expectancies. A similar phenomenon may be occurring here, where participants had ruminative thoughts but were drinking primarily for pleasure-seeking. Moreover, Nolen-Hoeksema and Harrell (2002) found that the positive relationship between rumination and alcohol consequences in their study was moderated by gender, where this relationship existed only for women. Thus, further inquiry into these constructs with college student populations should integrate drinking motives and moderator variables, such as gender, into their conceptualizations and analyses.

The lack of relationships between worry and PBS and between worry and alcohol consequences was similarly unexpected, given Litt et al.'s (2013) study indicating that individuals with GAD employ more PBS compared to individuals without GAD. The rationale for the current study's hypothesis regarding worry and PBS was that the primary cognitive component of general anxiety – worry – would explain the use of more PBS. Therefore, one explanation for the null finding is that worry is not the component

which accounts for the relationship between general anxiety symptoms and PBS.

However, general anxiety symptoms were measured and controlled for in the current study and there was no significant association between general anxiety symptoms and PBS or between general anxiety symptoms and alcohol consequences, contradicting Litt and associates' (2013) findings. Given the lack of relationship between general anxiety symptoms and PBS and alcohol consequences, it is not possible to conclude outright that worry does not predict PBS or alcohol consequences. A second explanation for the null findings involves distinguishing among potential sources of worry. There is a well-established literature base suggesting that social anxiety is positively related to drinking behaviors (e.g., Kashdan & Steger, 2006; Ham, Zamboanga, & Bacon, 2011; Norberg et al., 2011). Moreover, Villarosa, Moorer, Madson, Zeigler-Hill and Noble (2014) found that college students with social anxiety used fewer PBS and therefore experienced more alcohol consequences. Thus, it is possible that participants who endorsed high levels of worry in the current study actually represented two groups: individuals with high levels of GAD, which was controlled for, and individuals with high levels of social anxiety, which was not controlled for. If this was the case, then it is likely that the scores of participants with social anxiety and scores of participants with GAD canceled each other out.

Most unexpected in the current study was the lack of relationships between rumination, worry, or PBS with alcohol consequences. Post-hoc analyses were conducted to understand why there was no relationship among these three variables and alcohol consequences. Given the literature, it was anticipated that the calculation of the measure for alcohol consequences, as both a unitary construct and continuously

measured, might have influenced the findings (Martens et al., 2007). Specifically, it was hypothesized that rumination and worry at time 1 and PBS at time 2 could predict particular alcohol consequences at time 3 (Personal, Social, or Dependent) or any alcohol consequences, when they were scored dichotomously rather than continuously. However, follow-up analyses indicated that rumination and worry at time 1 did not predict any types of alcohol consequences at time 3, when measured continuously or dichotomously.

Even with the post-hoc analyses, there was no relationship between PBS and alcohol consequences, when considered as a unitary construct or as separate constructs representing personal, social, and dependency-related consequences. Additionally, there was no relationship when alcohol consequences were measured dichotomously as per Martens et al.'s (2007) recommendation. Given the substantial body of literature indicating an inverse relationship between PBS and alcohol consequences (e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Haines, Parker, & Rice, 2006; Martens et al., 2004, 2005, Martens, Ferrier, & Cimini, 2007), this is highly surprising. However, it is worth noting that some researchers have also found no associations and even positive associations between PBS and alcohol consequences in a college student sample (e.g., Frank, Thake, & Davis, 2012; Sugarman & Carey, 2009). Moreover, all of the above cited studies that found an inverse relationship between PBS and alcohol consequences were cross-sectional, and therefore no causal or even temporal relationship between the constructs can be concluded. In a recent review of the empirical study of PBS among college students, Pearson (2013) concluded the operational definition of PBS need to be revisited to address the complexities and differences among specific protective

behaviors. In other words, different PBS should be studied independently, rather than as a unitary construct, to understand how specific PBS related to alcohol outcomes.

There are numerous explanations for the current findings, including the possibility that these mediational relationships do not exist. However, the reason for the lack of findings is the null relationship between any independent and mediation variable and the RAPI, indicating the current findings provide important lessons about sampling and methodology specific to studying these constructs. Many of the operational and measurement-based issues related to alcohol consequences have been discussed above ('Post Hoc Analyses;' Lee et al., 2010; Mallet et al., 2008; Martens et al., 2007); given the lack of findings even after altering the scoring of the RAPI and using subscales in addition to the full scale, it is likely that the issue lies more with how alcohol consequences are conceptualized rather than how they are measured. More work is needed to understand how to parse apart alcohol consequences when defined objectively (e.g., university citations, legal action) instead of subjectively by students (e.g., having a bad time) or subjectively by researchers or university administrators (e.g., experiencing a hangover, missing class).

Another possible explanation for the unexpected findings is the demographic composition of the current sample - differences between this sample and samples in other studies might account for differences among the constructs of interest. For example, Martens' research team, who developed a PBS measure and has studied college students' PBS and alcohol behaviors extensively reported using highly residential samples (e.g., 97.2% of the sample lived on campus; Martens et al., 2004). By contrast, over half of the current sample (55.1%) reported living off campus with their parents whereas only 28%

reported living in campus dormitories or in campus affiliated housing, including Greek organization housing. Students who live on campus are more likely to consume alcohol compared to students who commute to campus (McCabe et al., 2005). Additionally, Cacciola and Nevid (2014) investigated the role of gender, ethnicity, and residence on college students' general patterns of alcohol consumption as well as students' rates of binge drinking. The researchers found that students living with their parents were less likely to consume alcohol in general and were less likely to binge drink; this effect was also moderated by age, where students under 21 years of age living with their parents were less likely than students over 21 years to consume alcohol. Moreover, much of the literature studying the associations among mental health variables (e.g., worry, brooding), protective strategies, and/or alcohol consequences have recruited students who live on campus. Thus, it is likely that the current sample tapped into a different type of student drinker (the final, current sample included only students who reported consuming alcohol in the past month) than what the field typically studies. Given the difference in sample and therefore drinking behaviors, it is unsurprising that this study yielded results inconsistent with the literature.

The current study should be considered within the context of its limitations. In addition to the sampling limitations and issues with the RAPI discussed above, there was a significant loss of participants over the course of data collection. While analyses showed there were very few significant differences among completers and non-completers, completers were still more likely to be upperclassmen compared to non-completers. Given that the primary unexpected finding in the current study was between two alcohol-related variables – PBS and alcohol consequences - this could have obscured

the results, as freshmen tend to drink more than upperclassmen (e.g., Turrissi, Padilla, & Wiersma, 2000). The drop in participants to 107 also likely had consequences for the data analyses; having additional participants could have increased the statistical power and found significant results. However, given the extremely low regression weights for many of the nonsignificant associations (PBSS at time 2 to RAPI at time 3 in particular), additional statistical power probably would not have found different results. Finally, the current study relied on retrospective, self-report data, rendering the data vulnerable to recall bias, decreasing the validity of the current data. For example, Ekholm (2004) has found that people report fewer drinks consumed when the recall period participants are asked to use increased. Pearson (2013) recommends that researchers instead use prospective methods, such as a daily diary design, when studying alcohol-related variables. Nonetheless, the study also has notable strengths. The longitudinal design allowed for actual mediational analyses; moreover, in a recent review Pearson (2013) reported that of the 62 studies on PBS in college students, 80% relied on cross-sectional data. Thus, the current study provides empirical evidence regarding the temporal relationships between constructs and adds to the sparse longitudinal literature in this area. Moreover, while the current study's sample is different from the college students typically assessed in this literature and therefore may not generalize well to residential populations, the unexpected findings also indicated that more research is needed to understand how drinking and mental health variables interact among different types of college student populations. This study is one of the first of hopefully many examining how non-residential students fare regarding alcohol behaviors and mental health.

The current longitudinal study analyzed how mental health constructs (worry, rumination), alcohol behaviors (PBS), and alcohol consequences relate to one another in college students. Specifically, the study explored the question of whether mental health constructs might impact one's use of PBS, and therefore account for more or fewer alcohol consequences. The analyses supported the hypothesis and indicated that rumination does predict less use of PBS, a finding that has significant implications for alcohol prevention and intervention on college campuses. Students who ruminate often are at a higher risk for not engaging in behaviors to mitigate alcohol consequences, meaning they may need a specialized educational program or specialized interventions that raise students' awareness of how their cognitive patterns could impact their drinking behaviors. This finding supports a recent trend toward studying the benefits of mindfulness-based interventions with college students who binge drink. Mindfulness interventions have been shown to successfully reduce rumination in a randomized-control trial with college students (Jain et al., 2007). Thus, one mechanism to explain the success of mindfulness-based interventions for binge drinking is the demonstrated effect mindfulness practice has on reducing rumination (e.g., Mermelstein & Garske, 2014), which in turn increases one's likelihood of using protective strategies and engaging in less risky drinking behaviors.

The data did not support the remaining hypotheses, though there are many explanations to account for these findings beyond the possibility that the relationships simply do not exist. These alternative explanations, particularly around this study's sample composition, are relevant to the literature because they add important questions about how students may differ in their mental health and alcohol behaviors based on their

identities (e.g., traditional or non-traditional, residential or commuter). These questions are critical as they imply that different prevention and intervention methods should be employed depending on the student's identities, and that universities that are primarily residential should use different approaches than universities where students commute or serve large numbers of non-traditional students. It is also worth noting that the current study only examined the negative consequences of drinking, which leaves out the positive experiences that students may find rewarding and affirming, and may function for them adaptively. The possibility of positive experiences, if included in a future study, would account for more variance in what motivates students to continue drinking in ways that are associated with negative consequences. Ultimately, the findings of the current study open several new ideas and issues for college and alcohol researchers to consider.

Summary and Implications

A key finding of the current study is that student drinking behaviors and mental health likely differ based on their identities (i.e., demographic information). Thus, university administrators, counselors, and personnel should take into consideration a student or student group's residential and non-traditional status when evaluating the need for (and level of need) alcohol-related prevention and intervention.

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Table 1

Demographic composition of the sample

Demographic	Frequency	Percent
Ethnicity		
African American	5	4.7
Asian American, Pacific Islander	0	0
Biracial/Multiracial	4	3.7
European American	95	88.8
Hispanic/Latino(a)	1	0.9
Other	1	0.9
Prefer not to answer	1	0.9
Gender		
Female	84	78.5
Male	23	21.5
Residence		
Off campus, alone	1	0.9
Off campus, with family	59	55.1
Off campus, with students	16	15.0
On campus, Greek housing	1	0.9
On campus, residence halls	21	19.6
University-affiliated housing	9	8.4

Year in School

Freshman	26	24.3
Sophomore	29	27.1
Junior	25	23.4
Senior	12	11.2
Fifth year or beyond	14	13.1
Non-degree seeking student	1	0.9

Table 2

Regression weights among the variables

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → PBSS	-.304	.2827	-.114	.284
Drink-S → PBSS	-.789	.561	-.144	.163
Drink-B → PBSS	-1.187	.616	-.222	.057
CES-D → PBSS	..105121	.231	-.056	.650
BAI → PBSS	-.121	.168	-.081	.474
RRS → PBSS	-.699	.273	-.267	.012
PSWQ → PBSS	.190	.100	.192	.060
Regression 2				
Drink-O → RAPI	.175	.111	.172	.119
Drink-S → RAPI	.327	.221	.157	.142
Drink-B → RAPI	.402	.242	.199	.100
CES-D → RAPI	.120	.091	.169	.118
BAI → RAPI	.050	.066	.089	.449
RRS → RAPI	.007	.107	.007	.945
PSWQ → RAPI	-.027	.039	-.072	.491
Regression 3				
Drink-O → RAPI	.178	.109	.175	.107
Drink-S → RAPI	.293	.220	.141	.187

Drink-B → RAPI	.367	.245	.182	.138
CES-D → RAPI	.105	.081	.148	.194
BAI → RAPI	.045	.064	.079	.482
PBSS → RAPI	-.030	.039	-.080	.437

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies – Depression scale; BAI = Beck Anxiety Inventory; RRS-B = Ruminative Responses Scale, Brooding subscale; PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies Scale; RAPI = Rutgers Alcohol Problem Index; T1 = time 1; T2 = time 2; T3 = time 3.

Table 3

Regression weights among the variables, using a dichotomously scored RAPI

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI	.144	.073	.217	.052
Drink-S → RAPI	.141	.160	.096	.382
Drink-B → RAPI	.318	.163	.237	.054
CES-D → RAPI	-.023	.063	-.048	.711
BAI → RAPI	.068	.044	.181	.126
RRS → RAPI	.079	.073	.120	.280
PSWQ → RAPI	-.024	.027	-.096	.363
Regression 2				
Drink-O → RAPI	.146	.072	.221	.045
Drink-S → RAPI	.148	.161	.101	.362
Drink-B → RAPI	.322	.164	.240	.053
CES-D → RAPI	-.003	.056	-.007	.950
BAI → RAPI	.057	.042	.153	.180
PBSS → RAPI	-.021	.026	-.084	.416

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies – Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;

PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies

Scale; RAPI = Rutgers Alcohol Problem Index; T1 = time 1; T2 = time 2; T3 = time 3.

Table 4

Regression weights among the variables, with continuously-scored RAPI – personal consequences subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI-P	.116	.106	.273	.019
Drink-S → RAPI-P	.098	.106	.104	.355
Drink-B → RAPI-P	.024	.109	.028	.822
CES-D → RAPI-P	.032	.040	.107	.427
BAI → RAPI-P	.016	.029	.068	.576
RRS → RAPI-P	.002	.047	.005	.966
PSWQ → RAPI-P	-.025	.017	-.155	.159
Regression 2				
Drink-T1 → RAPI-P	.121	.048	.284	.014
Drink-S-T1 → RAPI-P	.075	.105	.080	.474
Drink-B-T1 → RAPI-P	-.009	.111	-.010	.935
CES-D-T1 → RAPI-P	.018	.035	.059	.618
BAI-T1 → RAPI-P	.011	.028	.047	.693
PBSS-T2 → RAPI-P	-.023	.017	-.145	.176

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-P = Rutgers Alcohol Problem Index, Personal Consequences subscale; T1 =
time 1; T2 = time 2; T3 = time 3.

Table 5

Regression weights among the variables, with continuously-scored RAPI – social consequences subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1b				
Drink-O → RAPI-S	.001	.036	.003	.979
Drink-S → RAPI-S	.075	.079	.107	.343
Drink-B → RAPI-S	.156	.079	.250	.050
CES-D → RAPI-S	-.023	.029	-.102	.442
BAI → RAPI-S	.051	.021	.291	.018
RRS → RAPI-S	.033	.035	.107	.349
PSWQ → RAPI-S	-.009	.013	-.078	.477
Regression 2b				
Drink-O → RAPI-S	.004	.035	.012	.917
Drink-S → RAPI-S	.077	.078	.110	.328
Drink-B → RAPI-S	.152	.080	.243	.061
CES-D → RAPI-S	-.013	.026	-.061	.609
BAI → RAPI-S	.047	.021	.265	.026
PBSS → RAPI-S	-.003	.013	-.029	.788

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-S = Rutgers Alcohol Problem Index, Social Consequences subscale; T1 =
time 1; T2 = time 2; T3 = time 3.

Table 6

Regression weights among the variables, with continuously-scored RAPI – dependence subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI-D	.058	.038	.160	.132
Drink-S → RAPI-D	.105	.076	.141	.173
Drink-B → RAPI-D	.233	.084	.321	.007
CES-D → RAPI-D	.030	.033	.113	.363
BAI → RAPI-D	-.001	.023	-.005	.964
RRS-B → RAPI-D	.026	.037	.072	.496
PSWQ → RAPI-D	.001	.014	.006	.954
Regression 2				
Drink-O → RAPI-D	.054	.038	.148	.158
Drink-S → RAPI-D	.103	.076	.138	.182
Drink-B → RAPI-D	.223	.085	.309	.010
CES-D → RAPI-D	.039	.029	.145	.188
BAI → RAPI-D	.000	.022	.000	.997
PBSS → RAPI-D	-.008	.013	-.060	.540

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-D = Rutgers Alcohol Problem Index, Dependence subscale; T1 = time 1; T2
= time 2; T3 = time 3.

Table 7

Regression weights among the variables, with dichotomously-scored RAPI – personal consequences subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI-P	.088	.031	.315	.006
Drink-S → RAPI-P	.082	.068	.133	.230
Drink-B → RAPI-P	-.006	.070	-.010	.933
CES-D → RAPI-P	.026	.026	.134	.307
BAI → RAPI-P	.002	.019	.012	.923
RRS-B → RAPI-P	-.002	.031	.007	.950
PSWQ → RAPI-P	-.020	.011	-.187	.083
Regression 2				
Drink-O → RAPI-P	.093	.031	.331	.004
Drink-S → RAPI-P	.065	.068	.105	.338
Drink-B → RAPI-P	-.030	.072	-.052	.680
CES-D → RAPI-P	.016	.023	.081	.487
BAI → RAPI-P	-.003	.018	-.018	.879
PBSS → RAPI-P	-.016	.011	-.155	.142

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-P = Rutgers Alcohol Problem Index, Personal Consequences subscale; T1 =
time 1; T2 = time 2; T3 = time 3.

Table 8

Regression weights among the variables, with dichotomously-scored RAPI – social consequences subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI-S	.005	.028	.021	.855
Drink-S → RAPI-S	.050	.062	.092	.419
Drink-B → RAPI-S	.108	.062	.222	.083
CES-D → RAPI-S	-.018	.023	-.105	.433
BAI → RAPI-S	.042	.017	.305	.014
RRS-B → RAPI-S	.028	.028	.116	.313
PSWQ → RAPI-S	-.005	.010	-.051	.644
Regression 2				
Drink-O → RAPI-S	.006	.028	.026	.821
Drink-S → RAPI-S	.055	.061	.100	.376
Drink-B → RAPI-S	.106	.063	.218	.095
CES-D → RAPI-S	-.009	.020	-.051	.665
BAI → RAPI-S	.039*	.016	.284	.017
PBSS → RAPI-S	-.001	.010	-.015	.891

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-S = Rutgers Alcohol Problem Index, Social Consequences subscale; T1 =
time 1; T2 = time 2; T3 = time 3.

Table 9

Regression weights among the variables, with dichotomously-scored RAPI – dependence consequences subscale

Regression pathways and weights	<i>b</i>	Std. Error	β	<i>p</i>-value
Regression 1				
Drink-O → RAPI-D	.055	.032	.188	.088
Drink-S → RAPI-D	.031	.063	.051	.627
Drink-B → RAPI-D	.175	.069	.302	.013
CES-D → RAPI-D	.013	.027	.060	.640
BAI → RAPI-D	.009	.019	.058	.623
RRS → RAPI-D	.024	.031	.084	.441
PSWQ → RAPI-D	-.001	.011	-.010	.925
Regression 2				
Drink-O → RAPI-D	.052	.031	.180	.097
Drink-S → RAPI-D	.030	.063	.050	.635
Drink-B → RAPI-D	.169	.070	.292	.018
CES-D → RAPI-D	.021	.024	.098	.387
BAI → RAPI-D	.009	.018	.055	.628
PBSS → RAPI-D	-.005	.011	-.049	.630

Note. Drink-O = Number of occasions consuming alcohol in past 30 days; Drink-S = Average number of drinks per sitting in past 30 days; Drink - B = Number of instances of binge drinking in past 30 days; CES-D = Center for Epidemiological Studies –

Depression scale; BAI = Beck Anxiety Inventory; RRS = Ruminative Responses Scale;
PSWQ = Penn State Worry Questionnaire; PBSS = Protective Behavioral Strategies
Scale; RAPI-D = Rutgers Alcohol Problem Index, Dependence subscale; T1 = time 1; T2
= time 2; T3 = time 3.

CURRICULUM VITAE

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Education

Ph.D. Counseling Psychology (APA Accredited). Expected August 2016

University of Louisville, Louisville, KY

Dissertation: Rumination, Worry, and Drinking Behaviors in College Students: A
Mediation Analysis

*Passed the Examination for the Professional Practice in Psychology, Doctoral
Level*

M.Ed. Counseling Psychology. December 2013

University of Louisville, Louisville, KY

B.A. Psychology; History. May 2010

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Peer-Reviewed Publications

Winkeljohn Black, S., Jeppsen, B. D., Pössel, P., Rosmarin, D. H., & Tariq, A. (in
press). The stability of Poloma and Pendleton's (1989) prayer types model across
Christian, Jewish, and Muslim praying adults. *Psychology of Religion and
Spirituality.*

Winkeljohn Black, S., & Pössel, P. (in press). Integrating Beck's cognitive model and

cognitive model and the response style theory in an adolescent sample. *Journal of Youth and Adolescence*.

Jeppsen, B., Pössel, P., **Winkeljohn Black, S.**, Bjerg, A., & Wooldridge, D. (in press).

Closeness and control: Exploring the relationship between prayer and mental health. *Counseling and Values*.

Winkeljohn Black, S., Pössel, P., Jeppsen, B. D., Bjerg, A. C., & Wooldridge, D. T.

(2015). Disclosure during private prayer as a mediator between prayer type and mental health. *Journal of Religion and Health, 54*, 540-553.

Pössel, P., & **Winkeljohn Black, S.** (2014). Testing three different sequential mediational interpretations of Beck's cognitive model of depression. *Journal of Clinical Psychology, 70*, 92-94.

Rudasill, K. M., Pössel, P., **Winkeljohn Black, S.**, & Niehaus, K. (2014). Teacher support mediates concurrent and longitudinal associations between temperament and depressive symptoms in sixth grade. *Early Child Development and Care, 184*, 803-818.

Winkeljohn Black, S. & Pössel, P. (2013). The combined effects of self-referent information processing and ruminative responses on adolescent depression. *Journal of Youth and Adolescence, 42*, 1145-1154.

Pössel, P., **Winkeljohn Black, S.**, Bjerg, A. C., Jeppsen, B. D., & Wooldridge, D. W. (2013). Do trust-based beliefs mediate the associations of frequency of private prayer with mental health? A cross-sectional study. *Journal of Religion and Health, 53*, 904-916.

Pössel, P., Rudasill, K. M., Adelson, J. L., Wooldridge, D. T., Bjerg, A. C., &

Winkeljohn Black, S. (2013). Teaching behavior and well-being in students: Development and concurrent validity of an instrument to measure student-reported teaching behavior. *International Journal of Emotional Education*, 5, 5-30.

Manuscripts under Review

Winkeljohn Black, S., & Pössel, P. (in preparation). Comparing affective and cognitive models explaining drinking behaviors and motives among college students.

Winkeljohn Black, S., Pössel, P., Rosmarin, D. H., Tariq, A., & Jeppsen, B. D. (submitted). Disclosure during private prayer as a mediator between prayer type and mental health in Christians, Jews, and Muslims.

Pössel, P. & **Winkeljohn Black, S.** (submitted). Can the hopelessness model of depression and the response style theory be integrated?

Pössel, P., Bjerg, A. C., **Winkeljohn Black, S.,** Jeppsen, B. D., & Wooldridge, D. T. (submitted). Does rumination mediate the association between private prayer and depression? A cross-sectional study.

Gabel, C. P., Cuesta-Vargas, A., Barr, S., **Winkeljohn Black, S.,** Osborne, J. W., & Melloh, M. (submitted). Confirmatory factor analysis of the neck disability index in a whiplash population indicates a one-factor model is viable.

Neinhais, J. B., Owen, J., Valentine, J. C., **Winkeljohn Black, S.,** Halford, T. C., Parazak, S. E., Budge, S., & Hilsenroth, M. (submitted). Therapeutic alliance, empathy, and genuineness in individual adult psychotherapy: A meta-analytic review.

Manuscripts in Preparation

Winkeljohn Black, S., Mohamadnia, S., Pössel, P. (in preparation). Factor structure and psychometric properties of the Cognitive Error Questionnaire in a sample of Iranian students.

Cauley, B., Pössel, P., & **Winkeljohn Black, S.** (in preparation). Effects of teaching behavior on depressive symptoms in high school students: Does students' race/ethnicity matter?

Professional Presentations

Lopez, A., Kinkel, M. B., **Winkeljohn Black, S.,** & Lee, K. Peer review journals: Reading and responding to a reviewer letter. To be presented as APAGS programming, American Psychological Association National Convention, Toronto, 2015.

Winkeljohn Black, S., & Gutierrez, I. Hands on stats: A guide to basic statistical analyses. To be presented as APAGS programming, American Psychological Association National Convention, Toronto, 2015.

Winkeljohn Black, S. Rumination, Worry, and Drinking Behaviors in College Students: A Mediation Analysis. To be presented at the Division 17 Poster Session, American Psychological Association National Convention, Toronto, 2015.

Winkeljohn Black, S., Jeppsen, B. D., Pössel, P., Rosmarin, D. H., & Tariq, A. The stability of Poloma and Pendleton's (1991) prayer types model across Christian, Jewish, and Muslim praying adults. Presented at the American Psychological Association National Convention, Washington, D.C., 2014.

Rudasill, K., Pössel, P., **Winkeljohn Black, S.,** & Niehaus, K. Teacher support mediates relationship of temperament with adolescent depressive symptoms. Part of the

symposium, “Adolescent Depression: Can Schools Help?” Presented at the American Psychological Association National Convention, Washington, D.C., 2014.

Winkeljohn Black, S., & Pössel, P. Integrating Beck’s cognitive model and the response style theory in an adolescent sample. Presented at Southeastern Psychological Association Conference, Nashville, TN, 2014.

Winkeljohn Black, S. Distress disclosure as a mediator between prayer type and mental health. Part of the symposium, “Prayer and Mental Health: Mechanisms and Warnings.” Presented at the American Psychological Association National Convention, Orlando, FL, 2012.

Winkeljohn, S. The combined effects of self-referent information processing and ruminative responses on adolescent depression. Presented poster at the Kentucky Psychological Association Foundation Spring Academic Conference, Frankfort, KY, 2011.

Winkeljohn, S. & Fien-Helfman, S. The effects of peer alienation on the severity of a juvenile’s delinquency. Presented poster at the University of Virginia Undergraduate Research Symposium, Charlottesville, VA, 2010.

Awards & Grants

University Fellow: Granted a university fellowship for graduate study, full scholarship and stipend for two years (2010-2012), University of Louisville

07/2014 Graduate Student Council Travel Grant (\$250)

University of Louisville

07/2012 Sam and Kathleen Stringfield Graduate Student Travel Award (\$400)

University of Louisville
05/2011 Research & Faculty Development Grant (\$300)
University of Louisville
03/2011 Research conference poster competition winner (2nd place)
Kentucky Psychological Association
05/2009 Undergraduate Research Grant (\$500)
College of William & Mary