

Sleep, Alcohol, and Academic Performance in Undergraduate Students

by

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Abstract

This study sought to examine the relationship between sleep, alcohol, and academic performance in undergraduate students. Previous research has demonstrated relationships between study variables, however, sleep quality has largely been ignored as it relates to alcohol consumption and academic performance together. This study sought to add to the existing literature by examining how sleep quality was related to alcohol use and academic performance in a sample of 248 undergraduate students. A hierarchical regression was used to analyze the relationship between independent variables (sleep duration, sleepiness, alcohol consumption, and sleep quality) on the dependent variable (cumulative GPA). Additionally, a backward elimination regression was used to determine the best set of predictors for GPA. Results indicated that alcohol consumption and sleep variables were significantly associated with GPA and accounted for 5% of the variance in GPA. Furthermore, results showed that sleep quality, high school GPA, and academic standing were the best predictors of cumulative GPA. Implications and areas for future research are discussed.

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I. Introduction

College students are a population that face unique challenges at a critical developmental time. Arnett (2000) proposes that individuals in-between the ages of 18-25 are in a developmental stage known as emerging adulthood. Given that the majority of college students are in-between the ages of 18-21 (U.S. Bureau of the Census 2016), traditional aged college students could be considered to be in the developmental stage of emerging adulthood. Emerging adulthood differs from the developmental periods of adolescence and adulthood in that it is a time of increased independence from adolescence, yet, individuals are not in the long-term adult roles characteristic of young adulthood (Arnett, 2000). Five characteristics of emerging adulthood include being the age of identity exploration, the age of instability, the age of self-focus, the age of feeling in-between, and the age of possibilities (Arnett, 2005).

Identity development and exploration are features that define emerging adulthood (Arnett, 2005). While other theorists pose that identity development and exploration occurs in adolescence (Erikson, 1950), Arnett (2005) argues that the majority of identity exploration and development occurs in emerging adulthood, mainly in the domains of love and work. Furthermore, emerging adulthood is known as the age of instability given that it is a time characterized by frequent changes such as place of residence, significant partners, jobs, and majors (Arnett, 2005). The age of self-focus refers to the fact that individuals within this developmental stage are free to make decisions independently (Arnett, 2005). For example, college students can decide what time to go to sleep and what time to wake up. This differs from the structure in adolescence where students may have had a curfew and where bed times and rise times were set by parents. Furthermore, parental approval may have been necessary in adolescence, but may not be essential in some circumstances in emerging adulthood. Given that

individuals within the developmental stage of emerging adulthood are not in adolescence but not yet in adulthood, this time period is also known as the “age of in-between” (Arnett, 2005). In fact, the majority of individuals in emerging adulthood do not see themselves as adults (Arnett, 2005). Lastly, emerging adulthood is also characterized as the age of possibilities. Arnett (2005) stated that “emerging adulthood is a time when hopes are high, and optimism is universal” (p. 247). Individuals in emerging adulthood typically have high hopes for their lives and believe that things will work out well for them.

While emerging adulthood may be known as a time filled with optimism, the decisions made in this critical period of development may have lasting ramifications given that risky behavior increases in emerging adulthood (Arnett, 2005; Bachman, Wadsworth, O’Malley, & Johnston, 1996). Risky behaviors include unprotected sex, substance use, and careless driving behaviors (Bachman et al., 1996). Risky behavior could be understood in the context of identity exploration and possible sensation seeking (Arnett, 2005; Bachman et al., 1996). The risky behaviors of college students, a population in emerging adulthood, has been a pivotal focus of research for decades, especially alcohol use (Wechsler & Nelson, 2008).

Alcohol

The drinking style of college students has been described as one of “excess and intoxication” (Wechsler & Nelson, 2008, p. 3). Bachman et al. (1996) found in a longitudinal study found that substance use peaks in emerging adulthood. This peak is corroborated by Presley and Pimentel (2006) who found that an overwhelming 74% of college students reported consuming alcohol. This finding is consistent with data from two leading organizations who conduct large scale surveys on college students’ alcohol consumption, the American College Health Association (ACHA) and the Core Institute, which found that approximately 57.2%-

68.7% of college students reported consuming alcohol in the past 30 days (ACHA, 2016; Core Institute, 2014). Furthermore, results from the 2013 National Survey on Drug Use and Health found that 59.4% of full-time college students reported consuming alcohol in the past 30 days (Substance Abuse and Mental Health Services Administration, [SAMHSA], 2014).

According to Arnett (2005), individuals in emerging adulthood may use substances, including alcohol, for a variety of reasons. Given that identity exploration is a hallmark of emerging adulthood, college students may want to gain an array of experiences before settling into more long-term adult roles, including experimenting with substances (Arnett, 2005). Furthermore, given that identity development can be confusing and difficult, individuals may choose to consume alcohol as a way to cope (Arnett, 2005). Relatedly, individuals may choose to engage in substance use as a means of coping with the instability of emerging adulthood (Arnett, 2005). Given that emerging adulthood is neither adolescence nor adulthood (Arnett, 2000), college students may not see the standards of adult behavior as applying to them, thus, resulting in the freedom to engage in behaviors that might not be appropriate in adulthood (Arnett, 2005)

Sleep

Similar to alcohol, sleep is a main concern for emerging adults, especially college students (Becker, Adams, Orr, & Quilter, 2008; Buboltz, Brown, & Soper, 2001; Hersner & Chervin, 2014). The population as a whole is one that is chronically sleep deprived and not obtaining the recommended amount of sleep (Ferrara & De Gennaro, 2001; National Sleep Foundation, 2014b; O'Brien & Mindell, 2005; Wolfson & Carsadon, 1998). According to the National Sleep Foundation, the recommended number of hours for individuals whose age is in-between 18 and 25 is 7-9 hours (Hirshkowitz et al., 2015). Six hours may be appropriate for some individuals in this age range as well as 10-11 hours (Hirshkowitz et al., 2015). Research

shows that approximately less than 30% of college students get the recommended hours of sleep (Hirshkowitz et al., 2015; Lund et al., 2010). Relatedly, an overwhelmingly 73% of college students reported experiencing sleep difficulties (Buboltz et al., 2001) and around a third of college students have reported sleep difficulties being traumatic or very difficult to handle (ACHA, 2016). Some factors that may impede an individual's sleep include technology, particularly television (National Sleep Foundation, 2014b). Alcohol, caffeine, and the use of stimulants also interfere with an individual's circadian rhythm or sleep cycle (Hershner & Chervin, 2014).

Research-based knowledge about sleep has increased in recent years. Sleep latency, the amount of time it takes to fall asleep, is usually 5-20 minutes (Vitiello, 1997). There are two different fundamental stages of sleep that a person progresses through across the sleep cycle; REM sleep which is sleep accompanied by rapid eye movement, and non-REM sleep. Within non-REM sleep, there are four distinct stages (stages 1-4). Within the first 60-90 minutes of sleep, an individual progressively moves through the non-REM sleep stages followed by REM sleep. These sleep cycles happen approximately every 60-120 minutes (Hershner & Chervin, 2014). Each REM sleep stage gets longer as the night progresses.

Some differences in sleep characteristics among persons at different age ranges have been discovered. Adolescents and young adults have a delayed circadian rhythm and typically have later bed times than younger or older persons. (Hershner & Chervin, 2014). This difference is partially due to the hormonal changes individuals experience during puberty. After puberty, the release of melatonin, a naturally occurring hormone that induces sleep, is delayed. They have a difficult time going to sleep early, awake often in the middle of the nights, are sleep deprived during the week, and try to catch up on sleep on the weekends (Hershner & Chervin, 2014). As

mentioned previously, given that college students in emerging adulthood experience an increase in independence compared to adolescence, sleep schedules are likely more inconsistent (Arnett, 2005). Furthermore, individuals may choose to sacrifice sleep in order to accomplish daily demands (Curcio, Ferrara, & De Gennaro, 2006). College students have a variety of daily demands such as attending classes, work, extra-curricular activities, and homework that might interfere with consistent sleep schedules. Since 21.7% of college students reported sleep difficulties interfering with their academic performance (ACHA, 2016), further research is needed to examine how these two variables are related.

Academics

Given that the developmental stage of emerging adulthood is characterized by identity exploration and instability, it is not uncommon for college students to change their majors several times, especially in the first two years of their studies (Arnett, 2005). College students have the opportunity and freedom to try out different majors, internships, and jobs that provide them with a framework for potential careers post college. Throughout emerging adulthood, college students learn more about themselves through identity exploration and begin to think about the transition into young adulthood. While the period of emerging adulthood is one full of possibilities and optimism, college students are reporting increasing difficulty managing their academic performance (ACHA, 2016).

College students report several factors that affect their academic performance. According to the American College Health Association (2016), 45.4% of college students reported that academics had been traumatic or very difficult to handle. Approximately 21.7% of college students reported that sleep difficulties have affected their academic performance (ACHA, 2016). Furthermore, a smaller percentage of students disclosed that their alcohol use has

interfered with their academic performance (3.2%; ACHA, 2016). One reason for this smaller percentage maybe that students attribute daytime sleepiness to a lack of sleep and not indirectly as a result of alcohol use. Given that college students report sleep and alcohol use as interfering with their academic performance, increased attention to how these factors contribute to academic performance is warranted. Specifically, understanding how all these variables are interrelated could provide further insight into the demands of college students in emerging adulthood.

Significance to Counseling Psychology

This dissertation is designed to further clarify the relationships between alcohol, sleep, and academic performance in college students. Professionals in the field of psychology and counseling work closely with college students in a variety of roles including providing mental health services at a university counseling center or providing prevention and intervention services related to alcohol, sleep, and general well-being. Furthermore, college students have been a population extensively examined in the psychology and counseling literature given the convenience of the sample for researchers. Results of this study will provide mental health and higher education professionals with further awareness of how two variables, sleep and alcohol affect academic performance. Further, the findings will show how those two variables may combine with one another to create a kind of double jeopardy. Finally, results of this dissertation will provide further insight into how education, prevention, and intervention services can address these variables to ensure that college students can succeed academically.

Operational Definitions

Significant key terms for the study are operationally defined as follows.

1. *Sleep duration*: The amount of time spent sleeping for a given night, also known as sleep quantity. Sleep duration differs from the amount of time spent in bed but not asleep (Galambos, Lascano, Howard, & Maggs, 2013).
2. *Sleep quality*: Sleep quality in this study will be defined as the subjective experience of having received “deep” and “restful” sleep. For example, fewer nighttime awakenings would be indicative of higher quality sleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).
3. *Daytime sleepiness*: The propensity of an individual to doze off or fall asleep in certain situations such as sitting and reading, watching television, sitting and talking with someone, as a passenger in a car for an hour without a break. Daytime sleepiness differs from feeling tired (Johns, 1991).
4. *Alcohol consumption*: The amount of alcohol, as measured by standard drinks, consumed. Additionally, binge drinking is defined as the consumption of five or more drinks in a row at least once in the past two weeks for males, and the consumption of four or more drinks in a row for females (Wechsler & Nelson, 2001).
5. *Academic performance*: For the purpose of this study, academic performance is defined as cumulative GPA.
6. *Demographic variables*: Demographic variables include age, gender, race/ethnicity, sexual orientation, completion of one semester of undergraduate work, high school GPA, participation in Greek Life, current marital status, residence, diagnosis of a sleep disorder.

Research Questions

Q1: What is the relationship between alcohol, sleep, and academic performance by measuring alcohol consumption (measured by the Daily Drinking Questionnaire), sleepiness (measured by the Epworth Sleepiness Scale), sleep duration (measured by a sleep log), sleep quality (measured by the Pittsburgh Sleep Quality Index) and academic performance (measured by cumulative GPA)?

Q2: How does sleep mediate the relationship between alcohol and academic performance?

Hypotheses

1. Poorer sleep quality will be associated with poorer academic performance.
2. Poorer sleep quality will be associated with higher levels of alcohol consumption.
3. Less sleep will be association with lower grade point averages.
4. Greater alcohol consumption will be associated with less sleep.
5. Sleep quality will mediate the relationship between alcohol consumption and academic performance.
6. Greater levels of sleepiness will be associated with greater alcohol consumption.
7. Greater levels of sleepiness will be associated with lower academic performance.
8. Greater levels of sleepiness will mediate the relationship between alcohol and academic performance.

II. Review of the Literature

Alcohol and College Students

The Harvard School of Public Health College Alcohol Study (CAS) is one of the most widely known studies on college students' alcohol use. The CAS began in 1992, spanned approximately 14 years, and resulted in four national surveys (Wechsler & Nelson, 2008). Before the CAS, earlier studies on college student alcohol use showed an increase in beer drinking during the 1960s and 1970s followed by a decline in drinking during the 1980s and 1990s (Sax, 1997). The CAS has contributed to the literature regarding college student alcohol use by examining the rates of binge drinking among college students, alcohol-related consequences, and by providing demographic information of those students who engage in binge drinking (Wechsler & Nelson, 2008). The term binge drinking is defined as consuming 5 or more drinks in a row at least once in the past two weeks for males and consuming 4 or more drinks in a row at least once in the past two weeks for females respectively (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). This definition of binge drinking has been extensively used in population-based research and continues to be the standard measure for binge drinking (Naimi et al., 2003; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee., 1998; Wechsler & Nelson, 2001).

While the term binge drinking has been a standard measure of alcohol consumption, there are many criticisms of its use (Dejong, 2003; Read, Beattie, Chamberlain, & Merrill, 2008; Wechsler & Nelson, 2008). One criticism is that “it overstates the problem of heavy drinking among college students by adopting a low threshold that includes too many students who do not experience alcohol-related risks” (Wechsler & Nelson, 2008, p. 2). Dejong (2003) also criticizes the use of the term binge drinking by stating that “any definition of high-risk drinking that uses a

fixed cutoff point implies that alcohol consumption below that level is safe, when for many people it is not” (p. 1635). Additionally, the standard measure of binge drinking does not take into account an individual’s weight, personal drinking history, or time (Dejong, 2003; Presley & Pimentel, 2006). These arguments are partially supported by research suggesting that not all binge drinkers are alike and further provides evidence for the utility in distinguishing among heavy drinkers (Presley & Pimentel, 2006; Read et al., 2008; White et al., 2006). Lastly, White et al. (2006) argued against the danger of grouping all binge drinkers into a single category by stating that it “implies that the level of risk associated with alcohol use remains constant beyond 4 or 5 drinks” (p. 1006).

Instead of using the term binge drinking to describe hazardous drinking behavior, the term high-risk drinking, or focusing on the negative consequences experienced related to one’s use, has also been used in the literature (Dejong, 2003; Wechsler & Nelson, 2001). The term high-risk drinking can include consuming small quantities of alcohol, operating machinery while under the influence of alcohol, or consuming alcohol while taking medications (Wechsler & Nelson, 2001). Wechsler & Nelson (2001) argue against such terms since they “lack a specific reference to volume consumed, which, after all, is the reason such drinking is dangerous” (p. 287). Regardless of the terms used, it is apparent that college students consume alcohol in dangerous quantities, including those beyond the binge threshold (Naimi, Nelson & Brewer, 2010; Read et al., 2008; Wechsler, Lee, Kuo, & Lee, 2000b; White et al., 2006) and experience negative consequence related to their use (Read et al., 2008; Wechsler et al., 1998).

In comparing the results of the first and last administrations of the CAS (1993 and 1999), there was little change in rates of binge drinking among college students, with approximately 2 out of 5 students (or 44%) meeting criteria for binge drinking (Wechsler et al., 2000b). These

binge drinking rates are similar to current rates which estimate that 43.9% of college students engage in binge drinking (Core Institute, 2014). One main finding in examining the CAS survey results is that drinking on college campuses has become more polarized (Wechsler et al., 2000b). This is evident with the number of students who abstained from alcohol and the number of students who reported frequently binge drinking simultaneously increasing (Wechsler et al., 1998; Wechsler et al., 2000b). Results also show that a significant percentage of college students who report binge drinking actually consume more than the standard binge drinking amount (Naimi et al., 2010; Read et al., 2008; White et al., 2006). According to one study, the average number of drinks a binge drinker consumed was eight, which is well above the standard measure of binge drinking (Naimi et al., 2010). Other studies have estimated that some college students, especially males, who binge drink actually consume two or more times the established binge drinking threshold (White et al., 2006). The increase in frequent binge drinkers observed in the CAS results indicate that students are drinking at heavier amounts more frequently (Wechsler et al., 2000b). In examining differences in college student's drinking behaviors over 20 years, Hensel, Todd, and Engs (2014) found that the number of men who abstained from alcohol increased and fewer men were considered binge drinkers. While the percentage of men who have abstained from alcohol over the past twenty years has increased, it is apparent that college students are a population that engage in high-risk drinking.

Environmental Factors that Promote Binge Drinking. There are several environmental factors that may place an individual at a greater risk for binge drinking (Wechsler & Nelson, 2008). While binge drinking among the adult population has increased, yet remained stable for college students, binge drinking is more common with young adults aged 18-24 (Naimi et al., 2003; Wechsler et al., 1998). Among college students, those most likely to engage in binge

drinking are individuals that identify as male, white, 23-years-old or younger, members of a Greek organization, reside in a fraternity or sorority house, and engaged in binge drinking in high school (Wechsler et al., 1998; Wechsler et al., 2000b; Wechsler & Nelson, 2008; Weitzman, Nelson, & Wechsler, 2003). Additionally, easy access to alcohol through social affiliation, residential setting, low-cost, and attending a college with a high rate of binge drinking are correlated with binge drinking rates of first year students (Wechsler & Nelson, 2008). Furthermore, academic class, parent's income, high school class rank and high school GPA have shown to be related to quantity of alcohol consumed (Singleton, 2007; Pascall & Freisthler, 2003).

Gender and Racial Differences. Research has found gender and racial differences regarding college students' alcohol use (DeMartini & Fucito, 2014; Singleton & Wolfson, 2009; Wechsler et al., 1998). Males tend to consume more alcohol than females (Naimi et al., 2003; Naimi et al., 2010; Singleton & Wolfson, 2009; Wechsler et al., 1998; Wechsler et al., 2000a). This is consistent with other research finding that men and women differ significantly on the amount of alcohol consumed but not on frequency (Singleton, 2007). Furthermore, DeMartini and Fucito (2014) found that while men consumed more drinks than women, men also had higher Alcohol Use Disorder Identification Test- Consumption (AUDIT-C) scores than women indicating a higher risk for alcohol use disorders. Racial differences are also evident in the literature on college student's alcohol use. White students are more likely to binge drink compared to Asian American and African American students (Weitzman et al., 2003), however, research has shown that binge drinking among Asian students has increased (Wechsler et al., 1998).

Age differences. In examining differences between students who are of the legal drinking age compared to underage students, underage students consume alcohol less frequently (Harford, Wechsler, & Seibring, 2002b; Wechsler, Kuo, Lee, & Dowdall, 2000a). Despite consuming alcohol less frequently than their of-age peers, underage students consume more drinks (Engs, Diebold, & Hanson, 1996; Harford et al., 2002b; Wechsler et al., 2000a). There are several factors that may account for the differences between underage students and students of the legal drinking age. Low-cost of alcohol and ease of access have been shown to be correlated with binge drinking (Wechsler et al., 2000a). Despite being underage and not having a valid license to purchase alcohol, more than half of underage students reported that it was “very easy” to obtain alcohol and 40% said that it was “easy” (Wechsler et al., 2000a; Weitzman et al., 2003). Students who stated that it was “very easy” to obtain alcohol were more likely to binge drink (Wechsler et al., 2000a). Most underage students obtained alcohol from peers who were of the legal drinking age (Wechsler et al., 2000a). Additionally, differences have emerged between underage age students and their of-age peers related to the price of alcohol. Underage students are more likely to get free drinks and spend less on alcohol, making them a target population for off-campus bars hosting drink specials (Wechsler et al., 2000a).

Residential Settings and Party Settings. The setting in which one lives and in which one consumes alcohol have been shown to be correlated with binge drinking. Fraternity and sorority parties, off-campus parties, and off-campus bars are places where students consume large quantities of alcohol, with more students attending off-campus parties and bars (Harford et al., 2002b). Underage students are more likely to attend dormitory parties, fraternity parties, and off-campus parties compared to students who are of the legal drinking age (Wechsler et al., 2000a). Students who are of the legal drinking age were more likely to attend off-campus bars

(Harford et al., 2002b; Wechsler et al., 2000a). Additionally, while the proportion of students who attended fraternity and sorority parties was lower than those who attended off-campus parties, students who attended fraternity parties were more likely to drink and be heavier drinkers (Harford et al., 2002b).

One's place of residence has also been shown to be correlated with binge drinking. Students who lived in co-ed dormitories or fraternity and sorority houses were more likely to binge drink than students who resided in same-sex dormitories (Wechsler et al., 2000a; Weitzman et al., 2003). Furthermore, students who lived off campus were more likely to drink and drive than those students who lived in same-sex dorms (Harford, Wechsler, & Muthen, 2002a). According to the CAS results, binge drinking rates decreased among dorm residents and increased among those who lived off campus (Wechsler et al., 2000b).

There are several reasons as to why students engage in binge drinking. Students have reported that alcohol helps "break the ice" in social situations, enhances social activity and gives them something to do (Core Institute, 2014). Furthermore, some students engage in binge drinking to get drunk (Wechsler & Nelson, 2008). Other motives for students to consume alcohol is the belief that "everyone is doing it" (Wechsler et al., 2008; Weitzman et al., 2003). If students believe that the majority of college students consume alcohol, students may be more likely to consume alcohol to fit in with the perceived majority (Wechsler et al., 2008; Wechsler & Nelson, 2008; Weitzman et al., 2003). However, research has shown that students have incorrect perceptions regarding alcohol consumption of college students and commonly overestimate the drinking rates for their peers (ACHA, 2016). According to the ACHA, participants overestimated the percentage of students who consumed alcohol within the past 30 days by almost 35% (perceived: 91.9%, actual use: 57.2%; 2016). Another factor that influences college student

drinking is the positive experiences that one has related to drinking (Park, 2004). Some of the positive experiences that students have when consuming alcohol include having fun, socializing with peers, and expressing oneself (Park, 2004). These positive experiences are closely related to motivations to drink such as fitting in and enhancing one's social environment (Core Institute, 2014; Weitzman et al., 2003). Despite students reporting that they experience more positive consequences related to their alcohol use than negative ones (Park, 2004), college students experience a wide-array of negative consequences as a result of their use.

Consequences related to alcohol use. The majority of the literature has focused specifically on the negative consequences related to binge drinking. Binge drinking and alcohol consumption among college students has been correlated with experiencing negative consequences (ACHA, 2016; Core Institute, 2014). According to one national survey, 48.7% of students reported experiencing at least one negative consequence related to their alcohol use in the past year (ACHA, 2016). Of these negative consequences, the most frequent ones included doing something they later regretted, forgetting where they were or what they did, and engaging in unprotected sex (ACHA, 2016). Other negative consequences that students experience related to their alcohol use include some form of public misconduct and serious personal problems (Core Institute, 2014). According to the Core Institute's Alcohol and Drug Survey, 32.2% of students reported experiencing some form of public misconduct at least once during the past year as a result of drinking while 21.8% of students experienced a serious personal problem (e.g., suicidality, being hurt or injured, trying unsuccessfully to stop using, sexual assault; 2014). Additionally, students reported driving while under the influence of alcohol (ACHA, 2016).

The probability of experiencing negative consequences related to one's use of alcohol increases given the number of drinks one consumes (Wechsler et al., 1998; Wechsler et al.,

2000b). This is evident by research showing that binge drinkers experienced more alcohol related problems than non-binge drinkers (Read et al., 2008; Wechsler et al., 1998; Wechsler et al., 2000b). In delineating binge drinkers, heavy and frequent drinkers are at a higher risk than heavier drinkers for experiencing negative consequences related to alcohol consumption (Presley & Pimentel, 2006). Furthermore, males experienced more negative consequences related to their alcohol use than females (Engs et al., 1996). This is not surprising given that males consume alcohol in greater amounts than females (Naimi et al., 2003; Naimi et al., 2010; Singleton & Wolfson, 2009; Wechsler et al., 1998; Wechsler et al., 2000a). However, despite research showing that males consume more alcohol than females and consequently experience more alcohol-related problems, research has also shown that males and females who are considered “at-risk drinkers” reported experiencing the same number of alcohol-related problems (DeMartini & Fucito, 2014). This suggests that the differences between males and females experiencing alcohol-related problems are not as clear when both are high risk drinkers. Regardless, it is apparent that students experience a wide array of negative experiences related to their drinking.

Alcohol and academic performance. One alcohol-related problem that students experience is difficulty in their academics. Wechsler and Nelson (2008) state that consuming alcohol at heavy levels (binge drinking) has implications for college students’ academic performance; however, it appears that there are mixed findings in the literature on the relationship between alcohol and academic performance. For example, Paschall and Freisthler (2003) found that heavy alcohol use was not significantly related to academic performance while other studies have shown significant effects between alcohol and academic performance (Singleton, 2007; Singleton & Wolfson, 2009). Paschall and Freisthler’s (2003) results are similar

to another study that did not find a relationship between alcohol and academic performance in college students (Wood, Sher, Erickson, & DeBord, 1997). One possible reason why these studies did not find a relationship while others have is due to the limitations of the studies. In both studies the samples were not representative of the student population. Additionally, each study used different measures of alcohol use (Singleton, 2007).

Recent literature has found a significant relationship between alcohol use and academic performance (Engs et al., 1996; Pascarella et al., 2007; Porter & Pryor, 2007; Rau & Durand, 2000; Singleton, 2007; Wolaver, 2002; Wolaver, 2007). For example, students who reported drinking heavily had lower grade point averages (GPAs; Porter & Pryor, 2007). The relationship between alcohol and GPA becomes clearer as the amount of alcohol consumed increases. Amount of alcohol consumed on a typical weekend night is a strong predictor of academic performance (Onyper, Thacher, Gilbert, & Gradness, 2012). Research shows that there is a significant decline in GPA when comparing students who abstain from alcohol to students who consume large quantities of alcohol (Rau & Durand, 2000). Additionally, research has demonstrated that the more frequently a student engaged in binge drinking, there was a greater deficit in their GPA compared to students who did not consume alcohol (Pascarella et al., 2007). This is backed by other evidence that the probability of having a high GPA is significantly reduced as students engage in binge drinking more frequently (Porter & Pryor, 2007; Wolaver, 2002; Wolaver, 2007). These effects have been found to be true across all four years of college (Pascarella et al., 2007; Singleton, 2007). Furthermore, high school binge drinking, in addition to current binge drinking, is associated with lower GPAs (Wolaver, 2007).

Academic consequences. In addition to being related to GPA, alcohol use is associated with a number of other consequences related to academic performance. Research has found that

individuals who binge drink frequently are more likely to miss class and perform poorly on a test compared to students who are considered “non-heavy drinkers” and those that engage in binge drinking but not frequently (“heavy drinkers”; Presley & Pimentel, 2006; Zeigler et al., 2005). Additionally, heavy and frequent drinking is related to lower academic retention in males (Liguori & Lonbaken, 2015). Furthermore, heavy alcohol use has been shown to be related to student-faculty interaction (Porter & Pryor, 2007). Time studying has also been shown to be associated with alcohol consumption (Wolaver, 2002). Wolaver (2007) found that “binge drinking effects grades directly and indirectly through its effect on study hours” (p. 82). Porter and Pryor (2007) provide further evidence for the relationship between alcohol and study hours by finding a negative relationship between binge drinking and time spent on academics. Additionally, research has found that later class times were correlated with increased use of alcohol (Onyper, Thacher, Gilbert, and Gradness, 2012). One variable that may influence this association is sleep.

Sleep and College Students

As mentioned previously, college students experience significant sleep difficulties (Galambos et al, 2013; Lund, Reider, Whiting, & Prichard, 2010). According to Vail-Smith, Felts, and Becker (2009), approximately 77% of college students reported experiencing occasional sleep problems. These results are similar to other studies that have demonstrated the lack of adequate sleep in college students (Becker, Adams, Orr, & Quilter, 2008; Buboltz, Brown, & Soper, 2001; Buboltz et al., 2009). Buboltz et al. (2009) found that 65.9% of students reported experiencing occasional sleep difficulties with an estimated 22.6% reported experiencing poor sleep quality, while only 11.5% reported good sleep quality. Additionally, Gaultney (2010) found that almost 30% of college students were at risk for a sleep disorder. The

most common sleep problems reported by college students include difficulty falling asleep (Buboltz et al., 2009; Lack, 1986), staying asleep (Lack, 1986), feeling tired in the morning (Vail-Smith et al., 2009), difficulty concentrating (Alapin et al., 2000), and daytime sleepiness (Lack, 1986; Vail-Smith et al., 2009). Difficulty falling asleep has been reported more often than difficulty staying asleep (Lack, 1986).

College students experience differences between weeknight and weekend sleep times (Buboltz et al., 2009; Lund et al., 2010). Students reported getting an average of 8-9 hours of sleep on a weekend night and 6-7 hours on a weeknight (Buboltz et al., 2001; Buboltz et al., 2009; Galambos, Dalton, & Maggs, 2009; Gaultney, 2010; Howell, Jahrig, & Powell, 2004; Lund et al., 2010; Pilcher, Ginter, & Sadowsky, 1997; Trockel, Barnes, & Egget, 2000). Research has found that student's bedtimes and rise times are delayed on the weekends compared to weeknights (Forquer, Camden, Gabriau, & Johnson, 2008; Lack, 1986; Lund et al., 2010; Taylor & Bramoweth, 2010). This may be due in part that college students create their own class schedules and may have a more demanding academic load than when they were in high school (Galambos et al., 2013). Students also report that they experience better quality and quantity of sleep on the weekends than weekdays (Galambos et al., 2009). Additionally, students who had earlier bedtimes reported greater quantity of sleep than students with later bedtimes (Galambos et al., 2013).

Normal sleep latency for individuals in their twenties should be fairly rapid and under 10 minutes (Vitiello, 1997), however, this does not appear to be consistent with what college students report. Buboltz et al. (2001) found that average number of minutes it took students to fall asleep was over 22 minutes, almost double the amount of time it should take them to fall asleep. This result is similar to other studies that have found similar latency times among college

students (Forquer et al., 2008; Lack, 1986). Furthermore, Forquer et al. (2008) found that over a third of students reported that it took them longer than 30 minutes to fall asleep. This is consistent with the literature stating that students report difficulty falling asleep (Buboltz et al., 2009). This increase in sleep latency may contribute to later bed times resulting in students reporting feeling tired in the morning, which is common among college students (Buboltz et al., 2009; Forquer et al., 2008).

Factors Contributing to Sleep Difficulties. There are several environmental factors that may contribute to poor sleep quality in college students. According to Buboltz et al. (2001), “it is likely that environmental and other demands during the college years contribute to students’ sleep difficulties; that student stress and demands may interfere with sleep habits; and that these sleep problems in turn, lead to further problems and thus create more sleep difficulties” (p. 133). Some factors that contribute to sleep difficulties include gender (Buboltz et al., 2001), academic year (Galambos et al., 2013), residential setting (Galambos et al., 2013), and poor sleep hygiene (Hershner & Chervin, 2014).

Gender. In examining differences between gender, females experience significantly poorer sleep quality than males (Buboltz et al., 2001; Cheng et al., 2012; Kenny, LaBrie, Hummer & Pham, 2012; Orzech, Salafsky, & Hamilton, 2011; Tsai & Li, 2004). Additionally, females reported experiencing more sleep problems such as more instances of difficulty falling asleep, disturbed sleep, and frequent nocturnal awakenings (Buboltz et al., 2001; Forquer et al., 2008; Tsai & Li, 2004). The literature seems to be inconsistent regarding the amount of time it takes for either gender to fall asleep. Some studies have found that females reported a greater sleep latency than males (Forquer et al., 2008; Tsai & Li, 2004) while other studies have found no significant differences (Buboltz et al., 2001). Males have also reported significant later bed

times and rise times than females during the week (Lund et al., 2010; Taylor & Bramoweth, 2010; Tsai & Li, 2004). These results are consistent with a longitudinal study examining the sleep patterns of Canadian college students across all four years (Galambos et al., 2013). Galambos et al. (2013) found that men went to sleep later and slept more than women during their first semester at college, however, as students progressed throughout their time at college, women reported sleeping more and men reported sleeping less. These results suggest that class year is another factor impacting the sleep habits of college students.

Academic Year. In Galambos et al.'s (2013) longitudinal study, the authors found that sleep quantity improved across four years, for female students but not for males. The authors also found that student's rise times were later each subsequent year in college (Galambos et al., 2013). While rise times were later each year in Galambos et al.'s (2013) study, Lund et al. (2010) found that first year students had later bedtimes and rise times than upper classmen on the weekends. Additionally, 1st year students have reported earlier rise times and shorter sleep times than other students on weekdays (Tsai & Li, 2004). This is consistent with Singleton and Wolfson (2007) who found that students who identified being in their first or second year of college reported getting less sleep than other class years. Other studies have found no significant differences between class years in the number of nocturnal awakenings, time to fall asleep, or hours of nightly sleep (Forquer et al., 2008).

Other factors. In addition to gender and academic year, there are other factors that can contribute to poor sleep quality and quantity such as poor sleep hygiene (Hershner & Chervin, 2014), residential setting (Galambos et al., 2013), social support (Galambos et al., 2013), and school work (Becker et al., 2008; Galambos et al., 2009). Poor sleep hygiene may contribute to poor sleep quality and quantity. Examples of poor sleep hygiene include the use of technology

prior to going to sleep and the use of alcohol, caffeine, and stimulants (Hershner & Chervin, 2014). Cheng et al., (2012) found that some predictors of poor sleep quality in a large sample of incoming freshman included being an undergraduate student, female, skipping breakfast, and consuming tea. The majority of college students report using some type of stimulant to increase alertness (Taylor & Bramoweth, 2010). While caffeine use may aide in helping daytime sleepiness, caffeine use later in the day is not recommended as it increases an individual's sleep latency and decreases critical REM sleep (Hershner & Chevrin, 2012)

Residential setting has also been shown to be associated with rise times (Galambos et al., 2013). Students who reported living at home had earlier rise times than students who lived on-campus. Additionally, students who lived away from their parents reported experiencing more sleep disturbances (Galambos et al., 2013). Galambos et al. (2013) surprisingly found that living on-campus did not have a significant effect on sleep quality. One explanation for this finding may be due to the fact that the majority of the sample reported living at home (Galambos et al., 2013).

In addition to poor sleep hygiene and residential setting, stress and social support are also associated with the sleep habits of college students (Galambos et al., 2013). Students experiencing stress reported sleeping less, had later rise times, and experienced more sleep disturbances (Galambos et al., 2013). Additionally, the amount of time spent on school work is inversely associated with the amount of sleep one gets (Galambos et al., 2009). Furthermore, students reported sleeping less when they had a test or quiz the following day compared to nights when they did not have a test the next day (Galambos et al., 2009). Conversely, students who experienced increased social support reported greater sleep quantity; however, men reported greater sleep difficulties when social support increased (Galambos et al., 2013). One explanation

for this finding may be that some men use alcohol as a means of socialization. Research has shown that students report less sleep if alcohol was consumed (Galambos et al., 2009).

Negative consequences related to sleep. Sleep deprivation and poor sleep quality have been associated with a number of negative consequences. One's quality of sleep, compared to sleep quantity, is positively related to overall health and well-being (Gray & Waters, 2002; Pilchers et al., 1997; Vail-Smith et al., 2009). Conversely, inadequate sleep and poor sleep quality has been associated with reports of increased daytime sleepiness, depressed mood, and risky-behavior (Wolfson & Carskadon, 1998).

Poor sleep quality is correlated with depressed mood and negative affect (Hershner & Chervin, 2014; Lund et al., 2010; Pilchers et al., 1997; Wolfson & Carskadon, 1998; Wong et al., 2013). Individuals with poor sleep quality report less satisfaction with life and feelings of tension and fatigue (Pilchers et al., 1997). Additionally, poor sleep quality has been associated with increased suicidal ideation (Hershner & Chervin, 2014; Vail-Smith et al., 2009) and increased levels of stress (Galambos et al., 2009; Lund et al., 2010). Conversely, better sleep quality is related to positive affect (Galambos et al., 2009). In one study, students reported that better sleep quality was related to increased self-confidence in managing stress and positive affect (Orzech et al., 2011).

In addition to mental health consequences, poor sleep quality is also related to a number of other health consequences. For example, individuals who report poor sleep quality also report experiencing more physical illnesses than individuals with better sleep quality (Lund et al., 2010; Pilchers et al., 1997). Additionally, inadequate sleep is correlated with risk-taking behavior such as driving drowsy (Hershner & Chervin, 2014), fighting (Vail-Smith et al., 2009), smoking, and alcohol use (Vail-Smith et al., 2009). Driving while sleep deprived has been shown to be a level

of impairment similar to driving under the influence (Hershner & Chervin, 2014). Furthermore, individuals who drive while sleep deprived are at an increased risk for falling asleep while driving (Taylor & Bramoweth, 2010). In adolescents, risk-taking behavior is associated with greater sleep problems and a greater difference between bedtimes on school nights versus weekend nights (O'Brien & Mindell, 2005).

Sleep and Alcohol. Alcohol has been widely researched on its effects on sleep (Roehrs & Roth, 2001; Vitiello, 1997). Research has shown that alcohol can significantly disrupt sleep causing individuals to experience impairment in their daily functioning and increased daytime sleepiness (Roehrs & Roth, 2001; Vitiello, 1997). While modest levels of alcohol may be beneficial for some individuals in helping them fall asleep, sleep is more fragmented after drinking alcohol (Roehrs & Roth, 2001). Given alcohol's classification as a sedative, alcohol consumption can result in one feeling tired or fatigued and can aid in the rapid onset of sleep (Vitiello, 1997). While alcohol may induce rapid onset of sleep and decrease sleep latency, it greatly disrupts an individual's normal sleep cycle, particularly in the second half of the night (Hershner & Chervin, 2014). Alcohol decreases the amount of time a person spends in REM sleep, especially in the first half of the night (Ebrahim, Colin, Shapiro, & Fenwick, 2013; Hershner & Chervin, 2014). Furthermore, the onset of REM sleep is significantly delayed when an individual consumes alcohol (Ebrahim et al., 2013).

Roehrs and Roth (2001) propose a bidirectional relationship between alcohol and sleep. Individuals consume alcohol to aid in sleep, but because alcohol also causes sleep difficulties, it results in increasing the use of alcohol in an attempt to further aid in sleep. Research shows that college students, primarily males, use alcohol to aid in the sleep process (Taylor & Bramoweth, 2010). For individuals who suffer from insomnia, alcohol in low doses may prove to be

beneficial, whereas individuals who do not experience sleep difficulties may report alcohol disturbing their sleep quality (Roehrs & Roth, 2001). Moderate levels of alcohol consumption can increase sleep wakefulness through the night. These sleep disruptions happen more frequently for chronic alcohol users (Vitiello, 1997). Furthermore, Lund et al. (2010) found that individuals who used alcohol as a sleep aid consumed larger amounts of alcohol compared to students who did not use alcohol as a sleep aid.

According to Vitiello (1997), “the specific effects of alcohol on sleep patterns are dependent on amount consumed” (p. 152). This is consistent with other research showing that the amount of alcohol consumed is a significant predictor of sleep patterns (DeMartini & Fucito, 2014; Singleton & Wolfson, 2009). Additionally, Singleton and Wolfson (2009) found that students who consumed more alcohol had later sleep schedules, had less sleep during the week, got more sleep on the weekends, and had a greater difference between weekday and weekend bedtimes. Other research has shown that students who report obtaining less sleep during the week also report consuming more alcohol than students who obtain more sleep during the week (O’Brien & Mindell, 2015). Furthermore, poor sleep quality is associated with heavy alcohol use and alcohol-related consequences (Galambos et al., 2009; Kenney et al., 2012; Vail-Smith et al., 2009). Kenney et al. (2012) found that sleep quality served as moderator in the relationship between amount of alcohol consumed and alcohol-related consequences. The authors found that for individuals who consumed large quantities of alcohol, the individuals who also experienced poor sleep quality experienced significantly greater alcohol-related consequences (Kenney et al., 2012).

While the majority of the literature has demonstrated significant relationships between sleep and alcohol, some studies have not find a significant association between the two variables

(Galambos et al., 2013; Orzech et al., 2011). Some explanations for their lack of significant findings include their sample reporting low levels of alcohol consumption and self-selecting into the study (Galambos et al., 2013; Orzech et al., 2011). As demonstrated by these studies, it is critical that samples be representative of the population to further understand the relationship between sleep and alcohol. Overwhelmingly, the majority of the literature shows a significant negative relationship between sleep and alcohol use. Furthermore, research has extensively examined how sleep is related to academic performance (Curcio et al., 2006; Wolfson & Carskadon, 2003).

Sleep and academic performance. Sleep quality and sleep duration both indirectly and directly influence academic performance (Becker et al., 2008; Onyper et al., 2012; Wong et al., 2013). Students who report poor sleep quality state that they are less able to concentrate, maintain focus, and remember previously learned material (Alapin, et al., 2000; Orzech et al., 2011). Furthermore, students who report poor sleep quality are more likely to miss class or fall asleep while in class (Lund et al., 2010). Students who experience poor sleep quality are also more likely to struggle academically and have lower GPAs than students who obtain good sleep (Becker et al., 2008; Orzech et al., 2011).

Additionally, students who slept less during the week tended to have lower grades than students who slept more (Gaultney, 2010; Kelly, Kelly, & Clanton, 2001; Wolfson & Carskadon, 1998). Students who reported getting more than 9 hours of sleep had higher grade point averages than students who slept less than six hours (Kelly et al., 2001). College students may engage in “all-nighters” in preparation for a test or to complete class assignments. Students who report staying up all night completing school work had lower GPAs than those who did not (Orzech et al., 2011). Additionally, students who experienced sleep deprivation of at least 24 hours

performed worse on cognitive tasks than students who had 8 hours of sleep (Pilcher & Waters, 1997).

Less sleep has also been associated with less time spent on school work (Galambos et al., 2009). While less sleep is associated with less time spent on school work, poor sleep quality is correlated with an increase in the amount of time spent on school work (Galambos et al., 2009). This may be due to students having to work harder due to the cognitive effects of poor sleep. One study found that students who had poor sleep quality took longer to complete mathematical problems and made more mistakes than students who did not have poor sleep (Campos-Morales, Valencia-Flores, Castano-Meneses, Castaneda-Figueiras, & Martinez-Guerrero, 2005).

Relatedly, research has sought to examine what learning and memory processes are associated with different stages of sleep (Hershner & Chervin, 2014). For example, REM sleep has been thought to play a role in procedural memory (“knowing how”) while non-REM sleep may play a role in declarative memory (“knowing what”). Since college students have a delayed circadian rhythm and may have to get up early for classes, thus disrupting their REM sleep cycle, waking up early may interfere with procedural memory (Hershner & Chervin, 2014). Regardless of the type of memory or learning process that is affected by poor sleep, the literature overwhelmingly shows a negative association between poor sleep and measures of academic success and performance.

Other sleep variables have been associated with academic performance. Wolfson and Carskadon (1998) sought to examine the relationship between sleep and academic performance in adolescents. The authors found that while rise times were similar for all adolescents, bed times varied (Wolfson & Carskadon, 1998). More recent research has found that students who had later bed times had lower GPAs (Galambos et al., 2013). Later weekday and weekend rise times, later

weekend bedtimes, and greater number of hours of sleep on the weekend are related to lower GPAs (Curcio et al., 2006; Trockel et al., 2000). Additionally, the greater delay between weekday sleep and weekend sleep has been correlated with lower GPA (O'Brien & Mindell, 2005; Wolfson & Carskadon, 1998). While rise times are similar for adolescents due to school start times, rise times for college students vary (Galambos et al., 2013). Students who identify as "morning people," individuals with earlier bed times and rise times, had higher GPAs than students who had later bed times and rise times (Gaultney, 2010). Other research has shown that students with later class times reported sleeping longer, had later bed times and wake times, and reduced daytime sleepiness (Onyper et al., 2012). The debate between class time and an individual's status as a "morning" or "night" person may be influenced by an individual's circadian rhythm. For example, students who are considered morning people may have earlier classes that are consistent with their circadian rhythm and have higher GPAs than students who are considered "night people" and have earlier class times that are inconsistent with their circadian preference. According to Onyper et al. (2012), another variable which could influence the relationship between class start time and academic performance is alcohol.

In addition to class times and circadian preference, other sleep variables are associated with academic performance. Students who reported having at least one sleep disorder had lower GPAs than students who did not suffer from a sleep disorder and were at risk academically (GPA below a 2.0; Gaultney, 2010). This is concerning for higher education professionals given that almost 30% of students were considered at risk for a sleep disorder (Gaultney, 2010). Furthermore, research supports an association between sleepiness and academic performance (Dewald, Meijer, Oort, Kerkhof, & Bogels, 2010; Onyper et al., 2012). In a meta-analysis performed on the literature regarding sleep and academic performance, Dewald et al. (2010)

found that sleepiness was related to academic performance more than sleep quality and sleep duration. While the authors did find that sleep quality and sleep duration were associated with academic performance, the authors suggest that those two variables may have different relationships with academic performance than sleepiness (Dewald et al., 2010). Dewald et al.'s (2010) findings are similar to other research which has found a correlation between sleepiness and academic performance (Onyper et al., 2012). Onyper et al. (2012) found that students who reported sleeping more and experienced less daytime sleepiness had higher grades than individuals with less sleepiness. Additionally, the authors found that sleepiness had a larger effect on GPA than sleep duration (Onyper et al., 2012). The literature overwhelmingly suggests that poor sleep quality is negatively associated with academic performance.

Despite the extensive literature base for sleep and its indirect and direct effects on academic performance, Wolfson and Carskadon (2003) highlight the limitations in the current literature. The majority of the literature is based on self-report and is subjective and retrospective in nature. Furthermore, the authors suggest using several different measures in future studies to “provide a more comprehensive and possibly more reliable assessment than studies conducted to date” (Wolfson & Carskadon, 2003, p. 502). Lastly, the authors highlight the need to include other variables in research which might serve as mediators or moderators among the relationship between sleep and academic performance (Wolfson & Carskadon, 2003). These limitations and recommendations bring us to the current study.

The current study

The current study seeks to gain a more reliable and clear explanation of the relationship between alcohol, sleep, and academic performance. While there has been extensive research examining the relationships between alcohol and sleep, alcohol and academic performance, and

sleep and academic performance, little research has sought to examine how all three variables are related. Singleton and Wolfson (2009) sought to examine the relationship between these three variables and found that alcohol had both indirect and direct effects on academic performance. Furthermore, the authors found that alcohol was a predictor of sleep duration, bed times, the difference between weekday and weekend night time sleep, and the difference between weekday and weekend bed times (Singleton & Wolfson, 2009). Additionally, the authors found that sleep, specifically daytime sleepiness, acted as a mediator between alcohol and academic performance (Singleton & Wolfson, 2009). Alcohol was found to impact sleep quantity and sleep-wake patterns, which in turn was associated with poorer academic performance (Singleton & Wolfson, 2009).

Despite Singleton and Wolfson's (2009) study being the first study to examine the relationship between all three variables, there are certain limitations. The sample for the study was limited to students who attended a small private liberal arts college in the northeast U.S. Additionally, Singleton and Wolfson (2009) failed to take into account sleep quality which has been shown to be associated with alcohol consumption (Galambos et al., 2009; Kenney et al., 2012; Vail-Smith et al., 2009) and academic performance (Becker et al., 2008; Orzech et al., 2011). The proposed study seeks to extend Singleton and Wolfson's (2009) study by including sleep quality into the theoretical model in a study conducted at a large public university in the southeastern U.S. Given the literature on alcohol consumption, sleep, and academic performance, this study proposes that greater alcohol consumption is associated with poor sleep quality and greater levels of sleepiness resulting in poor academic performance.

III. Method

Design

The study was designed to explore the relationship between alcohol, sleep, and academic performance in undergraduate students. Data were collected regarding participant's alcohol consumption, sleep habits, and academic performance. The population of interest, measures used, and study design and procedures are further discussed.

The present study aimed to answer the following two research questions: What is the relationship between alcohol, sleep, and academic performance by measuring alcohol consumption, sleepiness, sleep duration, sleep quality, and academic performance? How does sleep mediate the relationship between alcohol and academic performance? Measures of alcohol consumption, sleepiness, and sleep quality served as independent variables. The dependent variable is academic performance. There was one mediating variable: sleep quality. The instruments were administered through Qualtrics and were partially counterbalanced to prevent order effects: Demographics Questionnaire, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index, Daily Drinking Questionnaire, Sleep log, and Academic Performance.

Participants

After gaining approval from the Institutional Review Board, participants were solicited through the College of Education SONA System. A total of 248 participants responded to all measures and were included in the analysis. A total of 22 participants either dropped out of the study or did not respond to all questions. Additionally, 5 participants indicated that they had been previously diagnosed with a sleep disorder and were excluded from analyses. One person was removed from the study due to identifying that they were not working on their undergraduate degree. In terms of age, majority of participants (92.0%, $n = 228$) reported being between the

ages of 18 and 22, whereas 8.0% ($n = 20$) reported being 23 and older. The majority of participants identified as female (62.1%, $n = 154$), with 37.9% ($n = 94$) identifying as male. Regarding race/ethnic identity, 78.2% ($n = 194$) of participants identified as Caucasian/White, 8.9% ($n = 22$) African American, 6% ($n = 15$) Asian/Pacific Islander, 1.2% ($n = 3$) Hispanic/Latino/Latina, 4.4% ($n = 11$) Multiracial, and 1.2% ($n = 3$) other. All participants were completing their undergraduate education with 6.5% ($n = 16$) being freshmen, 34.7% ($n = 86$) sophomores, 40.3% ($n = 100$) juniors, and 18.5% ($n = 46$) seniors. The participants reported their sexual orientation to be majority (83.5%, $n = 207$) heterosexual, with 16.5% ($n = 41$) reporting their sexual orientation to be lesbian, asexual, bisexual, or other. A majority of participants (63.3%, $n = 157$) reported their relationship status as single, 35.1% ($n = 87$) reported being in a relationship, and 1.6% ($n = 4$) reported being married. 49.9% ($n = 99$) identified membership in Greek Life. For their place of residence, 62.5% ($n = 155$) identified living off-campus apartment, 22.2% ($n = 55$) off-campus house, 11.3% ($n = 28$) on-campus dorm, and 4.0% ($n = 10$) fraternity or sorority house. 9.3% ($n = 23$) reported residing with their parents while 0.4% ($n = 1$) reported living with children whom they were the primary caretaker. Cumulative GPAs ranged from 1.53 to 4.00 and high school GPAs ranged from 0.00 to above a 4.0.

Table 1

Demographic Characteristics of Participants

Variable	Sample <i>n</i>	%
Age		
18	7	2.8
19	53	21.4
20	86	34.7
21	57	23.0
22	25	10.1
23	12	4.8
24	2	0.8
26	2	0.8
27	1	0.4
34	2	0.8
45	1	0.4
Ethnicity		
Caucasian/White	194	78.2
African American/Black	22	8.9
Asian/Pacific Islander	15	6.0
Hispanic/Latino/Latina	3	1.2
Multiracial	11	4.4
Other	3	1.2
Gender		
Male	94	37.9
Female	154	62.1
Academic Year		
Freshman	16	6.5
Sophomore	86	34.7
Junior	100	40.3
Senior	46	18.5
Sexual Orientation		
Heterosexual	207	83.5
Bisexual	8	3.2
Lesbian	2	0.8
Asexual	26	10.5
Other	5	2.0
Relationship Status		
Single	157	63.3
In a relationship	87	35.1
Married	4	1.6

Greek Life Membership		
Yes	99	49.9
No	141	56.9
Not currently, previously	8	3.2
Place of Residence		
Off-campus apartment	155	62.5
Off-campus house	55	22.2
On-campus dorm	28	11.3
Fraternity/Sorority House	10	4.0
Reside with parents	23	9.3
Reside with children	1	0.4
Cumulative GPA		
0.00 – 0.90	0	0
1.0 – 1.99	11	4.8
2.0 – 2.99	91	36.7
3.0 – 3.99	138	55.7
4.0	7	2.8
High School GPA		
0.00 – 1.5	1	0.4
1.51 – 2.50	13	5.2
2.51 – 2.50	38	15.3
3.10 – 3.50	45	18.1
3.51 – 4.0	86	34.7
Above 4.0	52	21.0

For the 27 participants that were not included in the analysis, 7 identified as not having completed at least one semester of coursework resulting in a cumulative GPA, therefore they were directed to the end of the study. Fifteen participants did not complete the Qualtrics Survey and the remaining 5 participants identified having been diagnosed with a clinical sleep disorder. Demographic information (i.e., age, gender, ethnicity, school year, sexual orientation, residential setting, etc.) was gathered on the 27 participants and closely resemble the sample that was used for analysis. Table 2 compares the study sample from the population.

Table 2

Demographic Information between Sample and Population

Variable	Study (%)	Population (%)
Gender		
Male	37.9	25.3
Female	62.1	74.6
Race/Ethnicity		
Caucasian/White	78.2	86
African American/Black	8.9	7
Asian/Pacific Islander	6.0	1.5
Hispanic/Latino/Latina	1.2	2
Multiracial	4.4	1.2
Other	1.2	1.4
Academic Standing		
Freshman	6.5	19.5
Sophomore	34.7	20.5
Junior	40.3	26.2
Senior	18.5	33.8

Note. Information from College of Education Fall 2017 enrollment. Population $N = 1861$

Measures

Demographic Questionnaire. The demographic questionnaire was used to gather information about the participants (Appendix A). Demographic variables gathered included age, gender, race/ethnicity, sexual orientation, completion of one semester of undergraduate work, academic standing, high school GPA, participation in Greek Life, and current marital status. Information related to the student's residential setting was also obtained such as place of

residence, living with parents, or living with small children. Furthermore, participants were asked if they have ever been clinically diagnosed with a sleep disorder. Participants who had not completed at least one semester of undergraduate coursework or who indicated being diagnosed with a sleep disorder were excluded from the study.

Epworth Sleepiness Scale. The Epworth Sleepiness Scale (ESS; Johns, 1991) was used to assess participants' self-report of daytime sleepiness (Appendix B). The ESS consists of eight items representing different situations in which a person might become sleepy including "Sitting and reading," "Watching TV," and "As a passenger in a car for an hour without a break". Participants then rate how likely they are to become sleepy or fall asleep based on their current schedules on a scale of 0 (*would never doze*) to 3 (*high chance of dozing*). Scores are then summed and range from 0 to 24, with higher scores indicating greater sleepiness. Scores between 0 and 9 are indicative of an average amount of daytime sleepiness, scores between 10 and 15 are associated with moderate levels of daytime sleepiness, and scores greater than 16 indicate excessive levels of sleepiness.

The ESS has demonstrated adequate reliability in distinguishing sleepiness scores among individuals with known differences in sleepiness levels (Johns, 1991). Scores on the ESS correlate significantly with both daytime and nighttime sleep latency (Johns, 1991). The ESS has demonstrated relatively high internal consistency in a study examining sleepiness levels of medical students (Johns, 1992). Cronbach's alpha was 0.73 for the medical students and 0.88 for patients with sleep disorders. Additionally, the ESS demonstrated high test-retest reliability over a 5-month period with an estimate of 0.82 (Johns, 1992). Furthermore, factor analysis demonstrated that the ESS measures one variable (i.e., daytime sleepiness; Johns, 1992).

Pittsburgh Sleep Quality Index. Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) was used to measure sleep quality (Appendix C). The PSQI is a 19-item self-report measure consisting of 7 components of sleep quality for the previous one-month time period. The seven components of sleep quality include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). The first four questions on the PSQI are open ended and participants report bed time, rise time, sleep latency (number of minutes it takes to fall asleep), and sleep duration. For the remaining 14 items, participants are asked how often they experience different sleep disturbances such as “How often have you taken medicine (prescribed or “over the counter” to help you sleep?” and “How often have you had trouble staying awake while driving, eating meals, or engaging in social activity?”. Participants rate how often these disturbances occur on a four-point scale (*not during the past month, less than once a month, once or twice a week, three or more times a week*). Items are broken down into seven component subscales (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleepiness medications, and daytime functioning) and are scored from 0-3 (Buysse et al., 1989). The seven component scores are then summed creating a global sleep quality score ranging from 0 to 21. A higher PSQI score is indicative of greater sleep disturbances, with scores >5 being associated with clinically significant sleep disturbances (Baron, Reid, & Zee, 2013; Buysse et al., 1989).

The PSQI has adequate reliability and validity (Buysse et al., 1989). In a study reporting the measure’s development, the seven component scores of the PSQI had an overall reliability coefficient (Cronbach’s α) of 0.83 indicating a high degree of internal consistency. Additionally, correlations for the seven component scores with the global PSQI score have been found to range

from 0.25 to 0.57 (Spira et al.,2012). Test-retest reliability over a one-month time period was also adequate with a 0.85 estimate for the global PSQI scores (Buysse et al., 1989). Furthermore, the PSQI global score > 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5 (kappa = 0.75, $p < 0.001$) in distinguishing control versus clinical samples (Buysse et al., 1989).

Academic performance. Academic performance was measured by student self-report of their cumulative GPA (Appendix D). Students were instructed to login to AU Access, a web-based portal where students accessed their current cumulative GPA from their unofficial transcripts. Additionally, students were asked questions to assess how their alcohol use has affected their class attendance or failure to complete assignments by answering, “In the past month, how many classes have you missed due to drinking alcohol?” and “In the past month, how many assignments and/or tests have you missed or performed poorly on due to drinking alcohol?”

Daily Drinking Questionnaire. The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to gather information about students’ alcohol consumption (Appendix E). The DDQ measures alcohol consumption by asking individuals to estimate the total number of standard drinks consumed on each day of the week. Participants were instructed to think of a typical week in the past 30 days and record the number of standard drinks for each day of the week. Participants were also instructed to record the number of standard drinks for each day of the week during their heaviest drinking week in the past month. Participants also answered questions such as “On how many days did you use alcohol in the last 28 days? (Write 0-28)”, “During the last 28 days, on how many days did you engage in binge drinking?”, and “During the last 28 days, what is largest number of standard drinks you consumed in one night?” The DDQ has been found to have a high degree of internal consistency (Cronbach’s α) ranging

from 0.73 to 0.83 (Cabriaes, Cooper, Hernandez, & Law, 2016; Geisner, Larimer, & Neighbors, 2004; Lewis & Neighbors, 2004).

Sleep log. Sleep duration was assessed by asking participants to think back on the past week and estimate the number of hours slept each night (Appendix F). Participants were then asked if the past week was typical of their normal sleep schedule. If participants answered no to the previous question, they were then instructed to record the number of hours slept in a typical week.

Procedure

The study and a brief description were advertised on the web-based SONA system utilized by the College of Education. Participants signed up for a timeslot and completed the Qualtrics hosted survey from their personal computer prior to the timeslot deadline. Participants first viewed an Information letter (Appendix G) where they learned basic information about the study including that participation is voluntary, potential risks, and that there were no negative consequences should they decline to participate. Participants were also told that at the end of the study they would be redirected to a separate survey where they could enter their name to receive credit for participation. Participants were informed that no identifying information would be collected with their responses. Once participants provided consent, they proceeded to complete a set of online questionnaires including: Demographic Questionnaire, Epworth Sleepiness Scale, xPittsburgh Sleep Quality Index, Daily Drinking Questionnaire, measures of academic performance, and a sleep log. The measures were administered in random order to prevent order effects, however, all participants received the demographic questionnaire first. As mentioned earlier, at the end of the study participants were redirected to a separate survey where they were asked to enter their name and their school username so that they could be granted credit.

Participants who indicated that they had not completed one semester of coursework were led directly to the end of the study given that they would not have a cumulative GPA. The total time to complete the study was expected to be approximately 30 minutes.

Data Analyses

After collecting data for the study, raw data was downloaded from Qualtrics into the Statistical Package for Social Sciences (SPSS). Descriptive analyses were run for the responses given for demographic information. Additionally, reliability coefficients of measures were also examined. Several correlational tests were run to examine the first research question: What is the relationship between alcohol, sleep, and academic performance? Lastly, several regression analyses were used to further clarify the relationship between study variables.

IV. Results

Overview

The following chapter provides information related to results of statistical analyses used to test the study's hypotheses. The present study aimed to address the following research questions: What is the relationship between alcohol, sleep, and academic performance in undergraduate students? How does sleep mediate the relationship between alcohol and academic performance? First, several correlations were run to examine the relationship between the study's main variables: alcohol consumption, sleep duration, sleep quality, sleepiness, and academic performance. Correlations were also run to examine relationships between the study's main variables and other important variables (including demographic variables). A three-step hierarchical regression was used to examine how the addition of variables into a regression model accounted for variation in GPA. Lastly, a backward elimination regression was used to determine the best subset of predictors of GPA.

Description of Measures

ESS. Cronbach's alpha was used to examine the internal consistency reliability of the ESS. The Cronbach's alpha for the ESS was estimated to be 0.72. This is similar to 0.73 reported by Johns (1992) indicating adequate reliability. The majority of participants (66.2%, $n = 164$) reported average amounts of sleepiness. Additionally, 31.4% ($n = 78$) of participants reported moderate amounts of sleepiness with 2.4% ($n = 6$) reporting excessive amounts of sleepiness. There was a significant difference between males and females with females reporting greater levels of sleepiness ($t(246) = -2.31, p = .023$).

PSQI. The seven component scores of the PSQI that make up the global PSQI score had a Cronbach's alpha of 0.65 which is lower than typically accepted (i.e. 0.70). This is similar to

what has previously been found in research (0.69 found in Spira et al., 2012). Correlations among the seven component scores with the overall global score are shown in Table 3 and are higher than what has previously been reported (Spira et al., 2012). Approximately, 42.7% ($n = 106$) of participants reported going to sleep before midnight, with 72% ($n = 179$) reported taking 15 minutes or more to fall asleep once in bed. 65.3% ($n = 162$) reported sleeping for 7 hours or more a night, while 34.7% ($n = 86$) reporting sleeping less than 7 hours a night. Of the various reasons for getting poor sleep, individuals reported the most difficulty with waking up in the middle of the night or early morning with 46.4% ($n = 115$) waking up in the middle of the night once a week or more. Furthermore, 28.7% ($n = 71$) of participants reported taking medicine within the past month to aid sleep. Over half of the participants (56%, $n = 139$) reported having a roommate or partner in another room with 16.5% ($n = 41$) reported sleeping with a partner in the same bed. Eighteen individuals indicated other reasons for sleep disturbance including animals, anxiety, academic stress, injury/illness, neighbors, outside noise, technology, dreams, and sleeping with a significant other or partner in the same bed. Overall, 80.2% ($n = 199$) of participants rated their subjective sleep quality to be “very good” or “fairly good” with 17.7% ($n = 44$) rating their sleep quality as “fairly bad” and 2% ($n = 5$) rating their sleep quality as “very bad”. Regarding the global PSQI score, the majority of participants (52.8%, $n = 131$) were poor sleepers with 47.2% ($n = 117$) found to be healthy sleepers according to clinical cutoffs. Females had statistically greater scores on the PSQI than males ($t(246) = -2.15, p = .032$). These results are similar to results found in other studies examining sleep quality in undergraduate students (Gilbert & Weaver, 2010).

Table 3

PSQI Component Correlations with Global Score

PSQI Components (Cronbach's $\alpha = .65$)	Correlations with Global Score
Sleep quality	.69
Sleep latency	.69
Sleep duration	.49
Sleep efficiency	.42
Sleep disturbances	.62
Sleep medications	.48
Daytime dysfunction	.61

Note: PSQI = Pittsburgh Sleep Quality Index

Academic performance. Academic performance was measured by cumulative GPA as well as questions pertaining to classes missed and/or performing poorly on tests. 58.5% ($n = 145$) of participants reported having a cumulative GPA of a 3.0 or above with 41.5% ($n = 103$) reported having a current cumulative GPA below a 3.0. Table 4 compares overall GPA distribution from the population with the sample. Approximately 19% ($n = 47$) of participants reported that they missed class at least once in the past month due to drinking alcohol with 12% ($n = 30$) reporting that they performed poorly on a class assignment or test due to their alcohol consumption.

Table 4

Overall Distribution of GPA between Sample and Population

Cumulative GPA	Sample (%)	Population (%)
0.00 – 0.99	0	3.2
1.0 – 1.99	4.8	5.14
2.0 – 2.99	36.7	14.37
3.0 – 3.99	55.7	28.56
4.0	2.8	43.80

DDQ. Participants reported consuming alcohol about 5.85 (Mdn = 4.00) drinks during a typical week and 9.74 (Mdn = 6.00) during heaviest drinking week over the past month. Males reported both significant greater typical weekly drinking compared to females (8.00 and 4.53, respectively) [$t(131.32) = 3.37, p = .001$], as well as significantly greater consumption on heavier drinking days (13.84 and 7.28) [$t(117.79) = 3.81, p = .000$]. Males also reported engaging in binge drinking more frequently than females [$t(165.22) = 2.29, p = .023$]. There were no significant differences between individuals who endorsed membership in Greek life and those who did not.

Sleep log. Participants reported averaging about 7.32 ($SD = 1.10$) hours of sleep a night in a typical week. Approximately 9.7% ($n = 24$) of participants reported that the past week of sleep was atypical and provided a more typical week of sleep. Participants also reported getting more sleep on the weekends than weekdays. Furthermore, there were no significant differences amongst males and females.

Simple Correlations between Variables

Simple correlations were run to examine the relationship between cumulative GPA, gender, academic standing, high school GPA, Greek Life, alcohol consumption (typical weekly and heavy week), sleepiness, sleep duration, and sleep quality. Descriptive statistics including means and standard deviations are presented in Table 5. Sleep quality was negatively associated with GPA indicating that individuals who scored higher on the PSQI (indicating poor sleep quality), also had lower GPAs ($r = -.21, p = .00$). Additionally, sleep quality was associated with alcohol consumption suggesting that individuals who tended to consume more alcohol scored higher on the PSQI ($r = .14, p = .03$). Sleep duration was not significantly related with academic performance ($r = .08, p = .22$) or alcohol consumption ($r = .02, p = .74$). Sleepiness was not significantly associated with alcohol consumption ($r = .07, p = .26$) or academic performance ($r = -.03, p = .67$). Contrary to expectations based on past research, alcohol consumption was not significantly related to GPA ($r = -.08, p = .20$).

Additionally, sleep quality was associated with sleepiness ($r = .27, p = .00$) and sleep duration ($r = -.42, p = .00$) suggesting that individuals who scored higher on the PSQI (indicating poor sleep quality) slept less and reported higher levels of sleepiness. High school GPA was also positively correlated with cumulative GPA ($r = .51, p = .001$) indicating that individuals who had higher grade point averages in high school tended to have higher cumulative GPAs in college.

Table 5

Descriptive Statistics and Intercorrelations for Study Variables

Variables	1	2	3	4	5	6	7	8	9	10
Cumulative GPA										
Gender	.08									
Academic Standing	.18**	-.15*								
High School GPA	.51**	.18**	.03							
Greek Life	-.11	-.19**	.13*	-.16*						
Alcohol Weekly	-.03	-.24**	.10	-.08	-.04					
Alcohol Heavy	-.08	-.27**	.10	-.07	.00	.88**				
ESS	-.03	.15*	-.06	.06	-.08	.07	.03			
Sleep Duration	.08	.09	-.09	.03	-.05	.02	.12	-.08		
PSQI	-.21**	.14*	-.04	-.10	.03	.14*	.13	.27**	-.42**	
<i>M</i>	3.07	1.62	2.71	—	1.67	5.85	9.74	7.82	7.33	5.85
<i>SD</i>	.57	.49	.84	—	.65	7.14	11.61	3.77	1.10	2.98

Note. ESS = Epworth Sleepiness Scale. PSQI = Pittsburgh Sleep Quality Index. *N* = 235 for High School GPA. *N* = 242 for Alcohol Heavy. Otherwise, *N* = 248. *M* and *SD* for High School GPA was not able to be calculated due to how it was reported. **p* < .05; ***p* < .01

Mediation Analyses

This study hypothesized that sleep quality and sleepiness mediated the relationship between alcohol and academic performance. According to Baron and Kenny's (1986) method to assess mediation, there must be a significant relationship between alcohol and academic performance to assess the mediating effect of sleepiness and sleep quality. While this study found a significant relationship between sleep quality and academic performance and sleep quality and alcohol use, a significant relationship between alcohol use and academic performance was not found. Additionally, sleepiness was not associated with academic performance. Due to there not being a relationship between alcohol and academic performance, this researcher was unable to test the hypotheses that sleep quality and sleepiness mediated the relationship between alcohol and GPA.

Regression Analyses

A hierarchical regression was used to examine the amount of variation independent variables accounted for. Tests for multicollinearity indicated a very low level of multicollinearity was present ($VIF = 1.08$ for gender, 1.04 for academic standing, 1.06 for high school GPA, 1.07 for Greek life membership, 1.07 for alcohol consumption, 1.10 for sleepiness, 1.29 for sleep duration, and 1.41 for sleep quality). Demographic variables, including gender, academic standing, high school GPA, and membership in Greek life, were the first variables entered into the model, followed by alcohol consumption at step 2, and then sleep duration, sleepiness, and sleep quality at step 3. At step one, gender, academic standing, high school GPA, and membership in Greek life significantly contributed to the regression model, $F(4, 230) = 22.68, p < .001$ and accounted for 28.3% of the variation in GPA. Introducing alcohol consumption

explained an additional 1.2% variation in GPA and this change in R^2 was significant, $F(5, 229) = 19.19, p = .046$. Lastly, adding sleep duration, sleepiness, and sleep quality explained an additional 2.8% of variation in GPA and this R^2 was significant, $F(8, 226) = 13.50, p = .026$. Overall, the last model accounted for 32% of the variation in GPA indicating a small effect size (Cohen, 1988).

Regression coefficients results indicated that academic standing had a positive relationship with academic performance that was significant ($\beta = .10, t = 2.70, sr = .02, p = .007$). Additionally, high school GPA was also positively associated with GPA ($\beta = .26, t = 8.58, sr = .23, p < .001$). In step two of the regression model, academic standing ($\beta = .11, t = 2.88, sr = .03, p = .004$) and high school GPA ($\beta = .23, t = 8.50, sr = .22, p < .001$) remained significant and was not affected by the addition of alcohol consumption. In step three of the model, academic standing ($\beta = .11, t = 2.88, sr = .02, p = .004$) and high school GPA ($\beta = .22, t = 8.19, sr = .20, p < .001$) again remained significantly related to GPA. Additionally, sleep quality had a negative relationship with GPA ($\beta = -.03, t = -2.41, sr = .02, p = .017$). A summary of the hierarchical regression analysis is presented in Table 6.

Table 6

Summary of Hierarchical Regression Analysis

Variable	Model 1			Model 2			Model 3		
	B	SE _B	β	B	SE _B	β	B	SE _B	β
Gender	.04	.07	.03	.01	.07	.01	.04	.07	.04
Academic standing	.10*	.04	.15	.11*	.04	.16	.11*	.04	.16
High School GPA	.24**	.03	.49	.23**	.03	.49	.22**	.03	.47
Greek Life	-.04	.05	-.04	-.05	.05	-.05	-.04	.05	-.04
Alcohol consumption				-.01*	.01	-.12	-.01	.01	-.09
Sleepiness							.00	.01	.01
Sleep duration							.02	.03	.04
Sleep quality							-.03*	.01	-.16
<i>F</i>	22.68**			19.19*			13.50*		
<i>R</i> ²	.28			.30			.32		
ΔR^2	.28			.01			.03		

Note. *N* = 234; * *p* < .05, ***p* < .001.

A backward elimination regression was also used to examine the best subset of predictors of cumulative GPA. Tests of multicollinearity indicated low levels of multicollinearity ($VIF = 1.09$ for membership in Greek life, 1.06 for academic standing, 1.21 for gender, 1.08 for high school GPA, 1.13 for alcohol consumption, 1.10 for sleepiness, and 1.41 for sleep quality). The first model included all variables: gender, academic standing, high school GPA, membership in Greek life, alcohol consumption, sleepiness, sleep duration, and sleep quality which produced a significant model, $F(8, 226) = 13.50, p < .001$. Variables were then removed at each step to determine which subset of predictors produced the best model. Sleepiness was removed in step two, followed by sleep duration, gender, membership in Greek life, and alcohol consumption. The removal of variables in each step did not lead to a statistically increase in R^2 . The final model produced the best fit and included sleep quality, academic standing, and high school GPA, $F(3, 231) = 34.61, p < .001$ and accounted for 31% of the variance. A summary of the backward elimination regression is presented in Table 7.

Table 7

Summary of Backward Elimination Regression Analysis

Variable	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	B	SE _B	β	B	SE _B	β	B	SE _B	β	B	SE _B	β	B	SE _B	β	B	SE _B	β
Sleepiness	.00	.01	.01															
Sleep duration	.02	.03	.04	.02	.03	.04												
Gender	.04	.07	.04	.04	.07	.04	.05	.07	.04									
Greek Life	-.04	.05	-.04	-.04	.05	-.05	-.04	.05	-.05	-.04	.05	-.05						
Alcohol	-.01	.01	-.09	-.01	.01	-.09	-.01	.01	-.09	-.01	.01	-.10	-.01	.01	-.10			
High school GPA	.22**	.03	.47	.22**	.03	.47	.22**	.03	.47	.23**	.03	.47	.23**	.03	.48	.23**	.03	.49
Academic standing	.11*	.04	.16	.11*	.04	.16	.11*	.04	.16	.10*	.04	.15	.10*	.04	.15	.09*	.04	.14
Sleep quality	-.03*	.01	-.16	-.03*	.01	-.15	-.03*	.01	-.17	-.03*	.01	-.16	-.05*	.01	-.16	-.03*	.01	-.18
<i>F</i>	13.50**			15.49			18.07			21.62			26.83			34.61		
<i>R</i> ²	.32			.32			.32			.32			.32			.31		
Δ <i>R</i> ²	.32			.00			-.00			-.00			-.00			-.01		

Note. $N = 235$; * $p < .05$, ** $p < .001$.

V. Discussion

The current study was intended to provide a better understanding of the relationship between alcohol, sleep, and academic performance in undergraduate students. Specifically, this research study sought to add to the existing literature by examining how sleep quality is associated with college students' alcohol consumption and academic performance. Knowledge about college student's alcohol consumption and sleep behaviors may help inform the field of higher education. The present study examined the following research questions:

1. What is the relationship between alcohol, sleep, and academic performance (GPA)?
2. How does sleep mediate the relationship between alcohol and academic performance (GPA)?

Simple correlations were run to test that relationships among variables. A hierarchical regression was used to analyze the amount of variance alcohol, sleep, sleep duration, and sleep quality accounted for after controlling for other variables. Additionally, a backward elimination regression was used to determine the best subset of predictors of GPA.

Sleep Habits

As mentioned previously, the majority of participants reported sleeping 7 hours or more a night which is consistent with previous research finding that college students report sleeping on average between 6-8 hours of sleep a night (Buboltz et al., 2001; Buboltz et al., 2009; Gilbert & Weaver, 2010). Past research has demonstrated that college students experience difficulty falling asleep and have longer sleep latencies (Buboltz, 2001) and this was supported by this study with the majority of students reporting that it takes 15 minutes or more to fall asleep. Additionally, the majority of participants reported average amounts of sleepiness according to cutoffs (Johns,

1992). Previous research has found that approximately 45% of undergraduate students report moderate to severe amounts of sleepiness (Kaur & Singh, 2017).

Participants reported several factors that contributed to sleep disturbances such as pets, neighbors, and technology. Consistent with previous research, females had higher levels of sleepiness and poor sleep quality than males (Singleton & Wolfson, 2007). Regarding sleep quality, a little over half of the participants experienced poor sleep quality according to clinical cut offs yet 80% of participants subjectively rated their sleep quality to be “very good” or “fairly good” despite experiencing daily sleepiness. This finding may indicate that college student’s subjective rating of their sleep quality may be different than objective measures. College students’ subjective rating of their sleep quality may minimize the potential impact of sleep quality and how this interferes in their daily lives (e.g., maintaining concentration). Lastly, while the majority of participants reported that the past week of sleep was typical, some students stated that it was atypical. This provides further data that college students may vary their sleep habits in response to a variety of demands. For example, students may experience more stress and less sleep if they have several tests in one week or during finals week.

Alcohol Use

Students reported consuming on average 5.85 standard drinks in a typical week and 9.74 drinks in a typical week. These results are similar to drinking rates found in other studies (Singleton, 2007; Singleton & Wolfson, 2009). Additionally, males tended to consume more alcohol than females during a typical week and a heavy week and engaged in binge drinking more frequently which is also consistent with previous research (Naimi et al., 2010; Singleton & Wolfson, 2009; Wechsler et al., 2000a). This study did not find a significant difference between individuals who endorsed membership in Greek Life and those who did not as it related to

drinking habits. This is contradictory to previous research which has found that those most likely to engage in binge drinking are white males who are members of a fraternity (Wechsler et al., 2000a). One reason as to why this study did not find a relationship between alcohol and membership in Greek Life may be that the sample was not representative of the college student population given the low response rate from freshmen.

Alcohol and Academic Performance

Unexpectedly, this study did not find a significant relationship between alcohol consumption and GPA. However, previous research has shown mixed results with some studies finding significant associations (Singleton & Wolfson, 2007) and others not (Paschall & Freisthler, 2003). There are several reasons as to why this may be. One reason may be that past studies have not been consistent in how they measure alcohol consumption. For example, past studies may have categorized participants into different levels related to their alcohol consumption such as light, moderate, or heavy drinkers (Singleton & Wolfson, 2007) while others have only delineated participants based on binge drinking behaviors. This study did not ask participants to describe themselves as “light, moderate, or heavy drinkers” due to the varying definitions one might have regarding those categories. Additionally, some studies that did not have a representative sample of the college student population failed to find a relationship between alcohol and GPA (e.g. Singleton, 2007).

Furthermore, 19% of students reported missing class at least once a month due and 12% reported feeling that they performed poorly on a class assignment or test due to alcohol consumption. These rates are higher than what has been found in previous research where 3.2% of students reported that their alcohol use interfered with their academics (ACHA, 2016). One reason why this may be is that students may not see missing class as interfering with their

academics therefore leading students to underreport how alcohol consumption may actually interfere. Results from this study provide more information into how college student's alcohol use may impact their ability to succeed academically.

Relationship between Variables

Results from this study significantly add to the literature on the relationship between alcohol consumption, sleep duration, sleepiness, and sleep quality as it relates to academic performance. Sleep quality has largely been ignored in past studies examining the relationship between variables, however, results from this study demonstrate the importance of sleep quality, and other sleep variables, as it relates to college student's academic performance. While sleep quality was significantly related to alcohol consumption and academic performance, there was not a significant relationship between alcohol and academic performance. Other study variables that were significantly related to sleep quality include gender, sleepiness, and sleep duration. Previous research demonstrated a relationship between daytime sleepiness and GPA, however this association was not replicated in this study (Singleton & Wolfson, 2007). Additionally, sleep duration was not associated with sleepiness as one might expect. That may be due to the majority of the sample getting the recommended number of hours of sleep a night. Furthermore, college students may consume caffeine in an attempt to decrease sleepiness levels and increase alertness to study.

Support for Hypotheses

Results provided adequate support for hypothesis 1 in that poor sleep quality was significantly associated with poor academic performance. Additionally, hypothesis 2 was supported in that individuals who experienced poor sleep quality tended to have higher levels of alcohol consumption. There was no evidence to support the remaining hypotheses. There are

many factors that may have contributed to the lack of evidence to support the other hypotheses and limitations of the study and they are discussed next.

Limitations

There are several limitations to the current study. First, the sample was not representative of the college student population due to the limited number of students that identified as freshmen. As mentioned previously, underage students' alcohol consumption differs from those that are of the legal drinking age in that underage students consume more drinks (Engs et al., 1996; Harford et al., 2002b; Wechsler et al., 2000a). Careful consideration should be taken into account when generalizing results from this study to the college student population given the low response level from freshmen. Another limitation related to the sample was that all students were taking classes within the College of Education, however, not all students may have been education majors. This may introduce a bias that students taking classes within the College of Education may have different behaviors when it comes to alcohol and sleep hygiene than students in other colleges across the university. Additionally, this study had a greater percentage of males and students who identified as Asian or biracial take the study compared to enrollment statistics. Furthermore, students were recruited from one university in the Southeast and may not be representative of college students from different geographic regions of the United States.

Second, another limitation is the retrospective nature of the measures used. Given that the DDQ, the PSQI, and sleep log were all self-report retrospective measures, this introduces the possibility that participants were providing approximate measures of sleep behaviors and alcohol consumption that were not accurate. While previous research has demonstrated that self-report data is valid for high schoolers (Wolfson et al., 2003), college students may have different weekly demands that may affect their alcohol and sleep behaviors. While the majority of

participants in the study reported that their previous week of sleep was typical, some students reported that it was not, thus providing evidence that college students sleep and alcohol consumption may fluctuate due to other demands. Furthermore, while participants were given instructions on how to obtain their official cumulative GPA, this researcher cannot guarantee that students followed these instructions. Lastly, individuals were asked to report their most recent cumulative GPAs resulting in some students potentially providing information related to alcohol and sleep habits in the current semester and grade point averages from previous academic semesters. Future research may want to ensure that cumulative GPA is obtained from the same semester as other information.

Another limitation of the design is that SAT scores were not taken into consideration despite past research demonstrating a positive correlation between SAT score and GPA (Singleton & Wolfson, 2009). This researcher did not ask for SAT scores on the assumption that students may not accurately remember their SAT scores thus introducing more error. Past research that included SAT scores obtained that information from official college records with student's consent.

Lastly, another limitation was the lower than expected Cronbach's alpha for the PSQI. The Cronbach's alpha for the seven component scores was 0.65 which is lower than typically accepted (i.e. 0.70). This may suggest that there was poor inter-relatedness between the seven component scores. Sleep efficiency had the lowest correlation with the global PSQI score and may be due to students underestimating the amount of time spent in bed and overestimating how many hours they typically slept in a night. The reliability among all items was not able to be assessed due to how the data was coded in SPSS. It is important to note that results from this

sample, particularly as it relates to sleep quality, cannot be generalized to other college students given the low level of reliability for the PSQI.

Recommendations for Future Research

Future research continues to be needed to better understand the relationship between alcohol, sleep, and academic performance in undergraduate students. While this study utilized retrospective measures, more accurate measures of sleep and alcohol consumption may provide more insight into how these variables are related. The use of sleep diaries, using actigraphs to measure sleep objectively, as well as ways to measure daily drinking habits through the use of self-monitoring logs, could provide more accurate representations of their behaviors.

Longitudinal studies may provide researchers with a clearer understanding regarding the relationship between alcohol and sleep. As mentioned previously, Roehrs and Roth (2001) propose a bidirectional relationship between alcohol and sleep where individuals may consume alcohol as a sleep aid yet experience poor quality sleep as a result of alcohol thus increasing the use of alcohol to aid in sleep. Additionally, future research should also examine how sleep regularity is related to sleepiness, sleep quality, and academic performance given that previous research has found that irregular sleep-wake schedules is associated with academic performance (Medeiros, Mendes, Lima, & Araujo, 2001) and greater levels of sleepiness (Manber, Bootzin, Acebo, & Carskadon, 1996).

While this study provided students with instructions on how to report their cumulative GPA, past research has obtained information related to college student's academic performance through the registrar's office.

Future research should examine other factors that contribute to the relationship between alcohol, sleep, and academic performance given that the final model only accounted for

approximately 30% of the variance. Other factors worth examining include mental health and stress. According to the NCHA (2016), college students report that stress, anxiety, and depression interfere with their academics and previous research has found that poor sleep quality is associated with depressed mood (Hersner & Cherbin, 2014). College students may consume alcohol in an effort to reduce stress or as a “reward” for getting through a heavy test week and completing assignments. Additionally, college students may experience sleep difficulties due to anxiety and stress.

Other factors worth considering include physical activity, physical health, and interpersonal relationships as it relates to alcohol, sleep, and academic performance. Sleep quality has been associated with overall health and well-being (Gray & Waters, 2002) as well as physical illness (Lund et al., 2010) thus demonstrating a need for further research into how other factors relate to study variables. Despite males consuming more alcohol and engaging in binge drinking more frequently, females still reported higher levels of sleepiness and poor sleep quality thus indicating further research is needed to further examine how gender affects the relationship between variables.

Lastly, it is recommended that future research ensures that their sample is representative of the college student population in order to clarify the relationship amongst study variables. This researcher hypothesizes that correlations that were expected but not found in this study (e.g., alcohol consumption and sleepiness, alcohol consumption and GPA) might be stronger if the sample was representative of the student population and had similar response rates amongst academic years. Furthermore, a representative sample reduces the potential for other confounds while also increasing the ability to generalize findings to college students.

Implications

Results of this study have several important implications. This study demonstrates the important relationship between sleep quality and academic performance. Educating college students on the importance of sleep and maintaining good sleep quality through good hygiene may be useful. Due to the vastly different schedules college students hold compared to high school, college students may need instruction and guidance on how to develop good sleep habits in an environment that is not conducive to good sleep habits. Due to class times potentially varying from day to day for college students, college students may find it difficult to establish consistent sleep schedules. However, since college students have some control over their class schedule, students may benefit from being mindful about scheduling class times in an effort to establish more consistent sleep-wake routines.

Additionally, this study provided further insight into the relationship between alcohol consumption and sleep quality. Given that most colleges already have prevention and intervention services related to alcohol use, clinical providers in these settings can provide college students with psychoeducation on the relationship between alcohol and sleep in services that are already provided to students. Academic advisors, health clinics, and mental health providers may also want to briefly assess how students are coping with demands of college by asking information related to sleep habits and alcohol consumption.

Conclusion

While the results of this study add to the existing literature by demonstrating the importance of sleep quality as it relates to alcohol consumption and academic performance, the study also raises more questions about the relationship between alcohol, sleep, and academic performance. Specifically, how does alcohol relate to academic performance and what other factors may be related to sleep quality? Future studies should ensure adequate reliability among

measures as well as ensuring that their sample is representative of the college student population. Clinically, providing college students with information related to establishing good sleep hygiene may be beneficial in ensuring that college students are maintaining good sleep quality in an environment that interferes with sleep. Ultimately, further research is needed to investigate how alcohol and sleep impact not only academic performance, but also other domains of collegiate life.

References

- Alapin, I., Fichten, C. S., Libman, E., Creti, L., Bailes, S., & Wright, J. (2000). How is good and poor sleep in older adults and college students related to daytime sleepiness, fatigue, and ability to concentrate? *Journal of Psychosomatic Research, 49*, 381-390.
doi:10.1016/S0022-3999(00)00194-X
- American College Health Association. (2016). *Data from the 2015 National College Health Assessment-II*. Retrieved from http://www.acha-ncha.org/docs/NCHA-II_FALL_2015_UNDERGRADUATE_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480. doi:10.1037/0003-066X.55.5.469
- Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues, 35*(2), 235-253.
- Bachman, J. G., Wadsworth, K. N., O'Malley, P. M., & Johnston, L. D. (1997). *Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities*. Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.
- Baron, R. M., and Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical consideration. *Journal of Personality and Social Psychology, 51*(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Baron, K. G., Reid, K. J., & Zee, P. C. (2013). Exercise to improve sleep in insomnia: Exploration of the bidirectional effects. *Journal of Clinical Sleep Medicine, 9*(8), 819-824. <http://dx.doi.org/10.5664/jcsm.2930>

- Becker, C. M., Adams, T., Orr, C., & Quilter, L. (2008). Correlates of quality sleep and academic performance. *Health Educator, 40*, 82-89.
- Buboltz Jr, W. C., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: A preliminary study. *Journal of American College Health, 50*, 131. doi: 10.1080/07448480109596017
- Buboltz Jr., W., Jenkins, S. M., Soper, B., Woller, K., Johnson, P., & Faes, T. (2009). Sleep habits and patterns of college students: An expanded study. *Journal of College Counseling, 12*, 113-124.
- Buyse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193-213.
- Cabriales, J. A., Cooper, T. V., Hernandez, N., & Law, J. (2016). Psychographic characteristics, tobacco, and alcohol use in a sample of young adults on the U.S./México border. *Addictive Behaviors, 63*12-18. doi:10.1016/j.addbeh.2016.06.028
- Campos-Morales, R. M., Valencia-Flores, M., Castaño-Meneses, A., Castañeda-Figueiras, S., & Martínez-Guerrero, J. (2005). Sleepiness, performance and mood state in a group of Mexican undergraduate students. *Biological Rhythm Research* [serial online], 36(1-2), 9-13. Available from: PsycINFO, Ipswich, MA. Accessed June 4, 2016.
- Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology, 53*, 189-200.
- Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity and academic Performance. *Sleep Medicine Reviews, 10*, 323-337.

- Cheng, S., Shih, C., Lee, I., Hou, Y., Chen, K., Chen, K., & ... Yang, Y. (2012). A study on the sleep quality of incoming university students. *Psychiatry Research*, *197*(3), 270-274.
doi:10.1016/j.psychres.2011.08.011
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ, US: Lawrence Erlbaum Associates Inc.
- Core Institute. (2014). *Data from the 2011-2013 Core Alcohol and Drug Survey*. Retrieved from http://core.siu.edu/_common/documents/2011%20-%202013.pdf
- Dejong, W. (2003). Definitions of binge drinking. *JAMA: Journal of the American Medical Association*, *289*, 1935.
- DeMartini, K. S., & Fucito, L. M. (2014). Variations in sleep characteristics and sleep-related impairment in at-risk college drinkers: A latent profile analysis. *Health Psychology*, *33*, 1164-1173. doi:10.1037/hea0000115
- Dewald, J. F., Meijer, A. M., Oort, F. J., Kerkhof, G. A., & Bögels, S. M. (2010). The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*, *14*(3), 179-189.
doi:10.1016/j.smr.2009.10.004
- Ebrahim, I. O., Shapiro, C. M., Williams, A. J., & Fenwick, P. B. (2013). Alcohol and sleep I: Effects on normal sleep. *Alcoholism: Clinical and Experimental Research*, *37*(4), 539-549. doi:10.1111/acer.12006
- Engs, R. C., & Diebold, B. A., & Hanson, D. J. (1996). The drinking patterns and problems of a national sample of college students, 1994. *Journal of Alcohol & Drug Education*, *41*(3), 13-33.
- Erickson, E. H. (1950). *Childhood and society*. New York: Norton.

- Ferrara, M., & De Gennaro, L. (2001). How much sleep do we need? *Sleep Medicine Reviews*, 5(2), 155–179. doi:10.1053/smrv.2000.0138
- Forquer, L. M., Camden, A. E., Gabriela, K. M., & Johnson, C. (2008). Sleep patterns of college students at a public university. *Journal of American College Health*, 56(5), 563-565. doi:10.3200/JACH.56.5.563-565
- Galambos, N. L., Dalton, A. L., & Maggs, J. L. (2009). Losing sleep over it: Daily variation in sleep quantity and quality in Canadian students' first semester of university. *Journal of Research on Adolescence*, 19(4), 741-761. doi:10.1111/j.1532-7795.2009.00618.x
- Galambos, N. L., Vargas Lascano, D. I., Howard, A. L., & Maggs, J. L. (2013). Who sleeps best? Longitudinal patterns and covariates of change in sleep quantity, quality, and timing across four university years. *Behavioral Sleep Medicine*, 11(1), 8-22. doi:10.1080/15402002.2011.596234
- Gaultney, J. F. (2010). The prevalence of sleep disorders in college students: Impact on academic performance. *Journal of American College Health*, 59, 91-97.
- Geisner, I. M., Larimer, M. E., & Neighbors, C. (2004). The relationship among alcohol use, related problems, and symptoms of psychological distress: Gender as a moderator in a college sample. *Addictive Behaviors*, 29(5), 843-848. doi:10.1016/j.addbeh.2004.02.024
- Gilbert, S. P., & Weaver, C. C. (2010). Sleep quality and academic performance in university students: A wake-up call for college psychologists. *Journal of College Student Psychotherapy*, 24(4), 295-306.
- Gray, E. K., & Watson, D. (2002). General and specific traits of personality and their relation to sleep and academic performance. *Journal of Personality*, 70(2), 177-206.

- Harford, T. C., Wechsler, H., & Muthén, B. O. (2002a). The impact of current residence and high school drinking on alcohol problems among college students. *Journal of Studies on Alcohol*, 63(3), 271-279.
- Harford, T. C., Wechsler, H., & Seibring, M. (2002b). Attendance and alcohol use at parties and bars in college: A national survey of current drinkers. *Journal of Studies on Alcohol*, 63(6), 726-733.
- Hensel, D., Todd, K. L., & Engs, R. C. (2014). College student's health, drinking and smoking patterns: What has changed in 20 years?. *College Student Journal*, 48(3), 378-385.
- Hershner, S., & Chervin, R. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, 6, 73-84.
- Hirshkowitz, M., Whiton, K., Albert, S., Alessi, C., Bruni, O., DonCarlos, L., ... Adams Hillard, P. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Journal of the National Sleep Foundation*, 1(1), 40-43. DOI: <http://dx.doi.org/10.1016/j.sleh.2014.12.010>
- Howell, A. J., Jahrig, J. C., & Powell, R. A. (2004). Sleep quality, sleep propensity and academic performance. *Perceptual and Motor Skills*, 99, 525-535. doi:10.2466/PMS.99.5.525-535
- Johns, M. W. (1991). A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale. *Sleep: Journal of Sleep Research & Sleep Medicine*, 14(6), 540-545.
- Johns, M. W. (1992). Reliability and factor analysis of the Epworth Sleepiness Scale. *Sleep: Journal of Sleep Research & Sleep Medicine*, 15(4), 376-381.
- Kaur, G., & Singh, A. (2017). Excessive daytime sleepiness and its pattern among Indian college students. *Sleep Medicine*, 2923-28.

- Kivlahan, D. R., Coppel, D. B., Fromme, K., Miller, E., & Marlatt, G. A. (1990). Secondary prevention of alcohol-related problems in young adults at risk. In K. D. Craig, S. M. Weiss, K. D. Craig, S. M. Weiss (Eds.), *Health enhancement, disease prevention, and early intervention: Biobehavioral perspectives* (pp. 287-300). New York, NY, US: Springer Publishing Co.
- Kenney, S. R., LaBrie, J. W., Hummer, J. F., & Pham, A. T. (2012). Global sleep quality as a moderator of alcohol consumption and consequences in college students. *Addictive Behaviors, 37*(4), 507-512.
- Kelly, W. E., Kelly, K. E., & Clanton, R. C. (2001). The relationship between sleep length and grade-point average among college students. *College Student Journal, 35*(1), 84.
- Lack, L. C. (1986). Delayed sleep and sleep loss in university students. *Journal of American College Health, 35*, 105-110.
- Lewis, M. A., & Neighbors, C. (2004). Gender-specific misperceptions of college student drinking norms. *Psychology of Addictive Behaviors, 18*(4), 334-339. doi:10.1037/0893-164X.18.4.334
- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health, 46*, 124-132.
- Liguori, G., & Lonbaken, B. (2015). Alcohol consumption and academic retention in first-year college students. *College Student Journal, 49*(1), 69-77.
- Manber, R., Bootzin, R., Acebo, C., & Carskadon, M. (1996). The effects of regularizing sleep-wake schedules on daytime sleepiness. *Sleep, 19*(5), 432-441.

- Medeiros, A., Mendes, S., Lima, P., & Araujo, J. (2001). The relationship between sleep-wake cycle and academic performance in medical students. *Biological Rhythm Research*, 32(2), 263-270.
- Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge Drinking Among US Adults. *JAMA: Journal of the American Medical Association*, 289(1), 70-75.
- Naimi, T. S., Nelson, D. E., & Brewer, R. D. (2010). The intensity of binge alcohol consumption among U.S. adults. *American Journal of Preventive Medicine*, 38(2), 201-207.
doi:10.1016/j.amepre.2009.09.039
- National Sleep Foundation. (2014a). NSF Official Sleep Diary. *National Sleep Foundation*. Retrieved June 25, 2016, from:
<http://sleepfoundation.org/content/nsf-official-sleep-diary>.
- National Sleep Foundation. (2014b). Sleep in America: Sleep in the Modern Family. Arlington, VA: National Sleep Foundation; 2014. Available at:
<http://sleepfoundation.org/sleep-polls-data/2014-sleep-the-modern-family>. Accessed May 10, 2016.
- O'Brien, E. M., & Mindell, J. A. (2005). Sleep and risk-taking behavior in adolescents. *Behavioral Sleep Medicine*, 3(3), 113-133. doi:10.1207/s15402010bsm0303_1
- Onyper, S. V., Thacher, P. V., Gilbert, J. W., & Gradess, S. G. (2012). Class start times, sleep, and academic performance in college: A path analysis. *Chronobiology International: The Journal of Biological & Medical Rhythm Research*, 29(3), 318-335.
doi:10.3109/07420528.2012.655868

- Orzech, K. M., Salafsky, D. B., & Hamilton, L. A. (2011). The state of sleep among college students at a large public university. *Journal of American College Health, 59*(7), 612-619. doi:10.1080/07448481.2010.520051
- Park, C. L. (2004). Positive and negative consequences of alcohol consumption in college students. *Addictive Behaviors, 29*(2), 311-321. doi:10.1016/j.addbeh.2003.08.006
- Pascarella, E. T., Goodman, K. M., Seifert, T. A., Tagliapietra-Nicoli, G., Park, S., Whitt, E. J. (2007). College student binge drinking and academic achievement: A longitudinal replication and extension. *Journal of College Student Development, 48*(6), 715-727. doi:10.1353/csd.2007.0060
- Paschall, M. J., & Freisthler, B. (2003). Does heavy drinking affect academic performance in college? Findings from a prospective study of high achievers. *Journal of Studies on Alcohol, 64*, 515-519.
- Pilcher, J. J., Ginter, D. R., & Sadowsky, B. (1997). Sleep quality versus sleep quantity: Relationships between sleep and measures of health, well-being and sleepiness in college students. *Journal of Psychosomatic Research, 42*, 583-596. doi:10.1016/S0022-3999(97)00004-4
- Pilcher, J. J., & Walters, A. S. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health, 46*(3), 121-126. doi:10.1080/07448489709595597
- Porter, S. R., & Pryor, J. (2007). The effects of heavy episodic alcohol use on student engagement, academic performance, and time use. *Journal of College Student Development, 48*(4), 455-467. doi: 10.1353/csd.2007.0042

- Presley, C. A., & Pimentel, E. R. (2006). The introduction of the heavy and frequent drinker: A proposed classification to increase accuracy of alcohol assessments in postsecondary educational settings. *Journal of Studies on Alcohol*, *67*(2), 324-331.
- Rau, W. & Durand, A. (2000). The academic ethic and college grades: Does hard work help students to “make the grade”? *Sociology of Education*, *73*(1), 19-38.
- Read, J. P., Beattie, M., Chamberlain, R., & Merrill, J. E. (2008). Beyond the 'binge' threshold: Heavy drinking patterns and their association with alcohol involvement indices in college students. *Addictive Behaviors*, *33*(2), 225-234. doi:10.1016/j.addbeh.2007.09.001
- Roehrs, T., & Roth, T. (2001). Sleep, sleepiness, and alcohol use. *Alcohol Research & Health*, *25*, 101-109.
- SAMHSA. (2014). Results from the 2013 National Survey on Drug Use and Health: Summary of national findings. Retrieved from <http://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf>
- Sax, L. J. (1997). Health trends among college freshmen. *Journal of American College Health*, *45*, 252-264. doi: 10.1080/07448481.1997.9936895
- Singleton, R. J. (2007). Collegiate alcohol consumption and academic performance. *Journal of Studies on Alcohol and Drugs*, *68*, 548-555.
- Singleton, R. A., & Wolfson, A., R. (2009). Alcohol consumption, sleep, and academic performance among college students. *Journal of Studies on Alcohol and Drugs*, *70*, 355-363.
- Spira, A. P., Beaudreau, S. A., Stone, K. L., Kezirian, E. J., Lui, L.-Y., Redline, S., ... Stewart, A. (2012). Reliability and validity of the Pittsburgh Sleep Quality Index and the Epworth

- Sleepiness Scale in older men. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 67A(4), 433–439. <http://doi.org/10.1093/gerona/glr172>
- Taylor, D. J., & Bramoweth, A. D. (2010). Patterns and consequences of inadequate sleep in college students: Substance use and motor vehicle accidents. *Journal of Adolescent Health*, 46(6), 610-612. doi:10.1016/j.jadohealth.2009.12.010
- Trockel, M. T., Barnes, M. D., & Egget, D. L. (2000). Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors. *Journal of American College Health*, 49, 125-131.
- Tsai, L., & Li, S. (2004). Sleep patterns in college students: Gender and grade differences. *Journal of Psychosomatic Research*, 56(2), 231-237. doi:10.1016/S0022-3999(03)00507-05
- U.S. Bureau of the Census. (2014). *Educational Attainment: 2010-2014 American community survey 5-year estimates*. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S1501&src=pt
- Vail-Smith, K., Felts, W. M., & Becker, C. (2009). Relationship between sleep quality and health risk behaviors in undergraduate college students. *College Student Journal*, 43, 924-930.
- Vitiello, M. V. (1997). Sleep, alcohol and alcohol abuse. *Addiction Biology*, 2, 151-158.
- Wechsler, H., Davenport, A., Dowdall, G., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of the American Medical Association*, 272, 1672-1977.

- Wechsler, H., Dowdall, G. W., Maenner, G., Gledhill-Hoyt, J., & Lee, H. (1998). Changes in binge drinking and related problems among American college students between 1993 and 1997. *Journal of American College Health, 47*, 57-58.
- Wechsler, H., Kuo, M., Lee, H., & Dowdall, G. W. (2000a). Environmental correlates of underage alcohol use and related problems of college students. *American Journal of Preventive Medicine, 19*(1), 24-29. doi:10.1016/S0749-3797(00)00163-X
- Wechsler, H., Lee, J. E., Kuo, M., & Lee, H. (2000b). College binge drinking in the 1990s: A continuing problem. *Journal of American College Health, 48*(5), 199-210.
- Wechsler, H., & Nelson, T. F. (2001). Binge drinking and the American college students: What's five drinks? *Psychology of Addictive Behaviors, 15*(4), 287-291. doi:10.1037/0893-164X.15.4.287
- Wechsler, H., & Nelson, T. F. (2008). What we have learned from the Harvard school of public health college alcohol study: Focusing attention on college student alcohol consumption and the environmental conditions that promote it. *Journal of Studies on Alcohol and Drugs, 69*, 481-490.
- Weitzman, E. R., Nelson, T. F., & Wechsler, H. (2003). Taking up binge drinking in college: The influences of person, social group, and environment. *Journal of Adolescent Health, 32*, 26-35.
- White, A. M., Kraus, C. L., & Swartzwelder, H. S. (2006). Many college freshman drink at levels far beyond the binge threshold. *Alcoholism, Clinical and Experimental Research, 30*, 1006-1022.
- Wolaver, A. M. (2002). Effect of heavy drinking in college on student effort, grade point average, and major choice. *Contemporary Economic Policy, 20*(4), 415-428.

- Wolaver, A. M. (2007). Does drinking affect grades more for women? Gender differences in the effects of heavy episodic drinking in college. *The American Economist*, 51, 72-88.
- Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development*, 69(4), 875-887. doi:10.2307/1132351
- Wolfson, A. R., & Carskadon, M. A. (2003). Understanding adolescents' sleep patterns and school performance: A critical appraisal. *Sleep Medicine Reviews*, 7(6), 491-506.
- Wong, M., Lau, E., Wan, J., Cheung, S., Hui, C., & Mok, D. (2013). The interplay between sleep and mood in predicting academic functioning, physical health and psychological health: A longitudinal study. *Journal of Psychosomatic Research*, 74(4), 271-277.
- Wood, P. K., Sher, K. J., Erickson, D. J., & DeBord, K. A. (1997). Predicting academic problems in college from freshman alcohol involvement. *Journal of Studies on Alcohol*, 58(2), 200-210.
- Zeigler, D. W., Wang, C. C., Yoast, R. A., Dickinson, B. D., McCaffree, M. A., Robinowitz, C. B., & Sterling, M. L. (2005). The neurocognitive effects of alcohol on adolescents and college students. *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 40(1), 23-32.

Appendix A
Demographic Questionnaire

1. What is your age? _____

2. What is your gender? (Choose one)
Male Female Transgender Male to Female Transgender Female to Male Other
Prefer not to answer

3. What is your ethnicity? (Mark all that apply)
African American/Black Asian/Pacific Islander Caucasian/White
Hispanic/Latino/Latina Native American/Alaska Native Other

4. What is your sexual orientation? (Choose one)
Asexual Bisexual Gay Male Lesbian Female Heterosexual
Other

5. What is your current academic standing? (Choose one)
Freshman Sophomore Junior Senior Non-degree seeking/other

6. Have you completed at least one semester of undergraduate coursework at Auburn University?
Yes No

7. What was your cumulative high school GPA? IF you don't know, please skip.
0.00-1.5 1.51-2.50 2.51-3.0 3.1-3.50 3.51-4.0 Above 4.0

8. Are you participating in Greek Life (i.e. rushing or are part of a fraternity or sorority)?
Yes No Not currently, but was previously

9. What is your current marital status? (Choose one)
Single In a relationship Married Divorced

10. What type of residence do you currently live in? (Choose one)
Dorm Off-campus apartment Off-campus house
Fraternity/Sorority House

11. Do you currently reside with your parents?

Yes No

12. Do you currently reside with any children on whom you are the primary caretaker?

Yes No

13. Have you ever been diagnosed with a clinical sleep disorder?

Yes No

Appendix B
Epworth Sleepiness Scale – ESS

Instructions: How likely are you to doze off or fall asleep in the following situations, in contrast to just feeling tired?

This refers to your usual way of life in recent times.

Even if you haven't done some of these things recently try to work out how they would have affected you.

Use the following scale to choose the most appropriate number for each situation.

- 0 = would never doze
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

It is important you answer each question as best you can.

Situation	Chance of Dozing (0-3)
Sitting and Reading _____	_____
Watching TV _____	_____
Sitting, inactive in a public place (e.g., a theatre or a meeting) _____	_____
As a passenger in a car for an hour without a break _____	_____
Lying down to rest in the afternoon when circumstances permit _____	_____
Sitting and talking to someone _____	_____
Sitting quietly after a lunch without alcohol _____	_____
In a car, while stopped for a few minutes in the traffic _____	_____

Appendix C
Pittsburg Sleep Quality Scale – PSQI

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, what time have you usually gone to bed at night?

BED TIME _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES _____

3. During the past month, what time have you usually gotten up in the morning?

GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed).

HOURS OF SLEEP PER NIGHT _____

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you ...

- a) Cannot get to sleep within 30 minutes

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
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- b) Wake up in the middle of the night or early morning

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
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- c) Have to get up to use the bathroom

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

d) Cannot breathe comfortable

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

e) Cough or snore loudly

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

f) Feel too cold

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

g) Feel too hot

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

h) Had bad dreams

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

i) Have pain

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

j) Other reason(s), please describe

How often during the past month have you had trouble sleeping because of this?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

6. During the past month, how would you rate your sleep quality overall?

Very good	Fairly good	Fairly bad	Very bad
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7. During the past month, how often have you taken medicine to help you sleep (prescribed or “over the counter”)?

Not during the past month____ Less than once a week____ Once or twice a week____ Three or more times a week____

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month____ Less than once a week____ Once or twice a week____ Three or more times a week____

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all

Only a very slight problem

Somewhat of a problem

A very big problem

10. Do you have a bed partner or roommate?

No bed partner or roommate

Partner/roommate in other room

Partner in same room, but not same bed

Partner in same bed

Appendix D
Academic Performance Measure

Instructions: To answer this question you will need to log on to AU Access. Please open a web browser and log on to AU Access (auaccess.auburn.edu) using your Auburn username and password. Once in AU Access, make sure you are under the “My Academics Tab.” In the middle of the screen will be a section titled “Student Records.” Please click on “Unofficial Transcript.” The next page will ask you about transcript options. For transcript level please select “All levels” and for transcript type, please select “Unofficial transcript.” Your unofficial transcript should pop up. Please scroll down to where you see a section titled “Transcript totals.” Under that section you will find your current cumulative GPA. Please type in your current cumulative GPA (NOT semester GPA).

What is your current cumulative (not semester) GPA? _____

In the past *month*, how many classes have you missed due to drinking alcohol? _____

In the past *month*, how many assignments have you missed or performed poorly on due to drinking alcohol? _____

Appendix E
Daily Drinking Questionnaire - Revised (DDQ-R)

Instructions: Please use the charts below to describe your recent drinking patterns. Please report your drinking in standard drinks, where 1 standard drink equals 12 ounces of beer, 4 ounces of wine, and or a 1 ounce shot of hard liquor.

For the **past month** fill in for each calendar day the number of standard drinks you **usually drink** on that day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Now fill in for the **past month** the **maximum number** of standard drinks you had on each calendar day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

- 1) On how many days did you use alcohol in the last 28 days? (Write 0-28) _____

- 2) MALES ONLY: During the last 28 days, on how many days did you have 5 or more standard drinks? _____

FEMALES ONLY: During the last 28 days, on how many days did you have 4 or more standard drinks? _____

- 3) During the last 28 days, what is the largest number of standard drinks you consumed in one night?

Appendix F
Sleep Log

Instructions: In the blanks below, please fill-in the number of hours slept in the past *week*.

First, think back on the past week, starting with today. What classes do you have on what days? What were your regular weekly activities? Did you have any important events in the past week? Etc. Try to remember as accurately as you can how long you slept each night in the past week.

For each day of the week in the boxes below, fill in the number of hours slept in the past week. For example, if today is Thursday, you will fill in the number of hours you slept last night in the Wednesday box and go back one week from there.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Was this past week atypical? Yes No

If you answered yes to the question above, please fill-in the number of hours you sleep in a typical week in the boxes below.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Appendix G
Information Letter

**DEPARTMENT OF SPECIAL EDUCATION, REHABILITATION, AND COUNSELING
(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL NUMBER
WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)**

**INFORMATION LETTER for a Research Study entitled
“Re-examining the Relationship between Alcohol, Sleep, and Academic Performance in
Undergraduate Students”**

You are invited to participate in a research study that investigates the relationship between alcohol, sleep, and academic performance in undergraduate students. The study is being conducted by Molly Moore, M.Ed., under the supervision of Dr. Joseph Buckhalt, Ph.D., Professor in the Auburn University Department of Special Education, Rehabilitation, and Counseling. You were selected as a possible participant because you are currently enrolled in a College of Education course that is using SONA as a method to offer extra credit and you are 19 years or older.

What will be involved if you participate? If you decide to participate in this research study, you will provide information about your use of alcohol, sleep habits, and academic performance. Your total time commitment will be approximately 30 minutes.

Are there any risks or discomforts? The risks to participate are no greater than ordinarily encountered in everyday life. Upon participation in this study, there may be minimal risk or discomfort in answering questions related to your alcohol use and sleep habits. If there is a need for psychological services, please contact Student Counseling Services (334-844-5123) or the Office of Health Promotion and Wellness (334-844-1528). Additionally, we cannot guarantee privacy in regards to the surrounding area that you take this survey; therefore, we recommend that you take this survey in an area in which others cannot see your computer screen.

Are there any benefits to yourself or others? There are no direct benefits to you for participating.

Will you receive compensation for participating? To thank you for your time you will be offered 1 hour of SONA credit.

Are there any costs? There are no costs for you to participate in this study.

If you change your mind about participating, you can withdraw at any time during the study. Your participation is completely voluntary. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, the Department of Special Education, Rehabilitation, and Counseling, Molly Moore, M.Ed. or Joseph Buckhalt, Ph.D.

Any data obtained in connection with this study will remain anonymous. We have created a separate survey that you will automatically appear after you see the screen indicating you have completed the study. You will enter your name and AU user name in that separate survey. The responses from the two surveys are kept separate and are not linked. In addition, only your responses to the study questions (not your name or AU username) will be downloaded and retained after the end of the semester. Keeping your name separate will prevent individuals from matching your name to your responses to the questionnaires. The data you provide will be confidential and stored in a format making it unidentifiable. Only average responses for large groups of people will be reported.

If you have questions about this study, please contact Molly Moore, M.Ed. at msm0023@auburn.edu or Joseph Buckhalt, Ph.D. at buckhja@auburn.edu. You may also print this screen to keep for your records.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP, WHICH REQUIRES YOU PRINT OR SAVE A COPY OF THE SCREEN NOW.

Molly Moore, M.Ed.

Joseph Buckhalt, Ph.D.

April 15, 2017

The Auburn University Institutional Review Board has approved this document for use from November 12, 2017 to November 11, 2018. Protocol #17-352 EP 1711.