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Running Head: SES, SLEEP, AND ALCOHOL

Perceived Sleep Quality and Subjective Social Class as Predictors of Alcohol Consequences and  
Drinking Motivations in College Students

Shelby Alexandra Stewart

Undergraduate Honors Thesis

Thesis Director: Dr. Amy Copeland

Department of Psychology

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Louisiana State University

### **Abstract**

Approximately 30% of students report sleep difficulties within the last year (American College Health Association, 2015). Poorer sleep quality is correlated with binge drinking and significantly greater levels of alcohol-related consequences (Kenney et al., 2012). Those with low socioeconomic status (SES) experience poor or restless sleep which can be compounded with problematic alcohol use (Grandner et al., 2010). Higher income is generally associated with lower-risk drinking (Grandner et al., 2010; Patel et al., 2010; Karriker-jaffe, Roberts, & Bond, 2013). The current study sought to identify the impact of sleep quality on the SES-drinking motivations and SES-alcohol-related consequences relations. One hundred eighty-one college students who were at least 18 years old provided informed consent and completed a series of self-report measures via a secure online survey engine including a demographic survey, the Alcohol Use Disorders Identification Test (AUDIT), Drinking Motivations Questionnaire-Revised (DMQ-R), the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ), the Pittsburgh Sleep Quality Index (PSQI), and a socioeconomic status questionnaire (SQ). A series of hierarchical regressions were conducted and sleep significantly moderated the relationship between subjective social status and both drinking motivations and drinking consequences. Additional research is needed to explore treatments targeting risky drinkers of higher socioeconomic status with special attention to those who endorse alcohol-related drinking consequences and negative health behaviors, specifically poor sleep.

## **Perceived Sleep Quality and Subjective Social Class as Predictors of Alcohol Consequences and Drinking Motivations in College Students**

Previous research has established a relationship between poor sleep and alcohol use among college students (Trockel, Barnes, & Egget, 2000). Per the American College Health Association (2015), 4.2% of surveyed college students reported that alcohol use had a negative impact on academics, with approximately one-fourth of students reporting binge drinking one to two times within the last two weeks. Furthermore, approximately 30% of students have reported sleep difficulties within the last year, with approximately 6% meeting criteria for insomnia or another type of sleep disorder (American College Health Association, 2015). This is problematic given the negative consequences of both problematic drinking and poor sleep among this population both separately and in conjunction with one another.

### **College Students and Alcohol Use**

College students are especially at risk for problematic drinking. Demartini and Carey (2009) found that 85% of college students reported drinking alcohol in the last month and 53% of them were identified as problematic drinkers (as categorized by an Alcohol Use Disorders Identification Test - AUDIT score of 8 or above), reporting an average of approximately two binge episodes per week. These college students tended to reach average Blood Alcohol Contents (BAC) over the legal limit for driving while intoxicated and endorsed over 7 alcohol related problems in the last month. It is important to note that this sample also reported poorer health ratings and problems related to sleep deprivation (Demartini & Carey, 2009).

It has been hypothesized that college students who engage in at-risk drinking often endorse social enhancement and coping motives as reasons to drink (Van Damme, Maes, Clays, Rosiers, Van Hal, & Hublet, 2013). Previous research has established that the endorsement of

enhancement, coping, and conformity motives are positively related to heavy alcohol use. Social motives were endorsed at the highest prevalence rate, followed by enhancement drinking motives, coping drinking motives, and conformity drinking motives. Men have been shown to engage more in problematic drinking and endorse more drinking motives, with an exception for coping motives. Enhancement, coping, and social-motivated students have higher chances for problematic drinking, while the opposite is true for conformity-motivated students (Damme et al., 2013).

One research study, Damme et al. (2013), has shown that among heavy drinkers (students who report monthly bingeing and more than weekly drinking), social and enhancement motives are reported most frequently, followed by coping and conformity. Male students are cited as drinking more for social, enhancement, and conformity reasons when compared to female students (77.2, 66.5, and 15.2 %, respectively). However, in respect to coping motives, no significant gender differences have been identified. The study reported that participants were at a higher risk for problematic drinking if they reported one or more different types of drinking motives as compared to none (Damme et al., 2013). Those reporting enhancement and coping motives were more likely to be problematic drinkers, and male students reporting conformity motives were less likely to be problematic drinkers. Participants who identified using social drinking motives were the most likely to engage in problematic drinking (Damme et al., 2013).

### **College Students and Sleep**

In general, college students tend to report chronically constrained or limited sleep. Lund et al. (2010) found that mean total sleep time for undergraduates (time spent actually sleeping, as opposed to being awake in bed) was 7.02 hours (SD = 1.15), with 25% of students reported getting less than 6.5 hours of sleep per night. Only 29.4% of students reported getting 8 or more

hours of total sleep time per night, the average amount required for young adults (Lund et al., 2010). Lund et al. (2010) found that sleep schedule differed significantly by year in school, such that first-year students had significantly later bedtimes and rise times when compared to juniors and seniors during the weekends, but not during the weekdays. Males had significantly later bedtimes and rise times during the week when compared to females. However, this gender difference was not observed during the weekends (Lund et al., 2010).

Students also tend to report poorer sleep quality as well as low sleep quantity as compared to normal subsets of the population (Lund et al., 2010). Lund et al. (2010) found that 38% of participants indicated they were experiencing poor-quality sleep, citing qualities such as restricted sleep time, low sleep enthusiasm, and long sleep latencies as causal factors. 75% of students reported feeling “dragged out, tired, or sleepy” once a week or more, and 15% reported falling asleep in class once a week or more according to the Epworth Sleepiness Scale. Additionally, Lund et al. (2010) found that 25% of college students within their sample scored 10 or above on the scale, indicating significant levels of daytime sleepiness.

Poor sleep quality, characterized by delayed sleep-wake cycles, shorter amounts of sleep time, sleep disorders, and daytime sleepiness have been found to be associated with significantly higher self-reported negative moods and stress (Lund et al., 2010). Poor-quality sleepers also tend to report significantly more physical illness than optimal- and borderline-quality sleepers. Higher scores on the Pittsburgh Sleep Quality Index (PSQI) have been found to be associated with significantly increased instances of falling asleep in class and skipping class for reasons other than illness (Lund et al., 2010). Forquer, Camden, Gabriela, and Johnson (2008) also looked at sleep disorders and patterns among college students. Forquer et al. (2008), also found that women averaged 8 hours of sleep compared with 7.7 for men, and took longer to fall asleep with

27.3 minutes versus 21.2 minutes for men. 33% of participants reported that they started out energetic and then got tired or were tired all day, and 43% woke up more than once a night. College students' sleep difficulties include long sleep latencies, short sleep time, and frequent night waking (Forquer et. al., 2008).

In addition to negative physical and mental health, poor-quality sleepers report drinking more alcohol per day than optimal-quality sleepers (Lund et al., 2010). Poor-quality sleepers have been found to be twice as likely to report using alcohol to induce sleep compared to those with PSQI scores less than 8, those with borderline poor sleep quality, and optimal sleep quality. Furthermore, Lund et al. (2010) found that poor-quality sleepers who said they used alcohol to induce sleep drank significantly more alcoholic beverages per week (21), compared to poor-quality sleepers who did not report using alcohol to sleep (12). In addition to short sleep and irregular schedules, college students also experience low sleep quality, when assessed by standard measures (Lund et al., 2010). Therefore, those who experience chronically poor sleep are more likely to engage in risky alcohol behaviors.

### **Alcohol and Sleep**

Global sleep quality is an important moderator in heavier and binge-drinking college students' experience in alcohol consequences. Research examining the relationship between global sleep quality, alcohol use, and alcohol consequences among first and second year college students has shown that 64.4% of females and 39.6% of males reported poor-quality sleep, characterized by insufficient sleep, irregular sleep, sleep difficulties, or sleep disorders such as insomnia, narcolepsy, or sleep apnea, per the PSQI (Kenney, Labrie, Hummer, & Pham, 2012). Kenney et al. (2012) found that 50% of females and 53.5% of males reported binge drinking at least once within the last two weeks. Poorer sleep quality correlated with binge drinking as well

as alcohol-related consequences and heavy-drinking students with poorer sleep quality experienced significantly greater levels of alcohol consequences than those with better sleep quality (Kenney et al., 2012).

Kenney et al. (2012) postulate that the strong relationship between heavy drinking and poor sleep quality may reveal a more direct relationship, where heavier drinking during the night may be related to sleep irregularities during the same night. Sleep problems are linked to a range of negative outcomes including alcohol-related consequences and risk-taking behaviors such as drowsy driving, violence, unsafe sex, and substance abuse. Poorer sleep quality exacerbates the effect of heavier alcohol use on the experience of alcohol-related harm and may increase alcohol risk among at-risk drinkers in that those who experience poor sleep are more likely to engage in risky alcohol behaviors (Kenney et al., 2012).

While Kenney et al. (2012) demonstrated that sleep can be an important moderator of heavy drinking, additional research has looked at the different types of sleep problems that can be experienced by college students and their relationships with alcohol. It has been hypothesized that sleep disturbances and heavy drinking can increase the risk of negative consequences in college students (Demartini & Fucito, 2014). Demartini and Fucito (2014) found that sleep-wake problems are especially common in at-risk college student drinkers, but that different students experience different gradients and types of problems including difficulty falling asleep, oversleeping and falling asleep in class. They also found that participants who experienced sleep disturbance, as well as the highest level of sleep-related impairment, tended to have the highest levels of alcohol consumption, alcohol-related consequences, illicit substance use, and the lowest perceived health. College student drinkers who reported sleep disturbances and who were susceptible to an increased probability of sleep-related impairment tended to experience more



alcohol-related consequences when consuming alcohol (Demartini & Fucito, 2014).

The combination of heavy drinking and high levels of sleep debt, the amount of sleep one should get minus the amount of actual time sleeping, and sleep-related impairment may confer a greater risk of harm. Sleep deprivation and alcohol both have negative effects on cognitive functioning and psychomotor performance, which may act in tandem. Also, individuals do not accurately perceive their levels of impairment from alcohol and/or sleepiness, so they may put themselves at greater risk by engaging in dangerous or harmful behaviors while in an inebriated state. Insufficient sleep and late bedtimes among college students may be related to neurobiological mechanisms that increase risk taking. College students with high sleep pattern delay may not only engage in heavy drinking but also other rewarding behaviors (e.g. illicit substance use) that place them at greater risk for alcohol-related consequences (Demartini & Fucito, 2014).

Furthermore, college students tend to keep late sleep schedules, obtain less sleep than recommended for their age, and maintain irregular sleep schedules (Demartini & Fucito, 2014; Singleton & Wolfson, 2009). Singleton and Wolfson (2009) found a strong association between volume of alcohol consumed and the lateness of a students' sleep schedule. Drinking was associated with a later sleep-wake schedule and an increase in daytime sleepiness and a decrease in academic performance. Alcohol, therefore, undermines academic performance through the formation of poor sleep habits. Students who go to bed later tend to drink more alcohol, which in turn, disrupts nighttime sleep (Singleton & Wolfson, 2009).

### **Drinking Motivations and Sleep**

Sleep problems and alcohol abuse can have detrimental effects on a student's overall health. Poor sleep quality tends to be associated with increased levels of alcohol consequences.

Students who experience poor sleep are more likely to consume larger quantities of alcohol, which may exacerbate the negative effects of alcohol (Demartini & Carey, 2009). In one study, sleep quality was strongly predictive of consequences and psychosocial factors that may moderate the relationship between sleep quality and alcohol-related problems by examining the intervening role of drinking motives. Poor sleep quality correlated with greater endorsement of drinking motives and greater coping motives. In drinking contexts, poor sleep may exacerbate risks associated with coping-motivated drinking by impairing cognitive abilities, motor coordination, and inhibitions toward high-risk behavior (Kenney et al., 2012).

Drinking motives often occur in varying strengths. According to Digdon and Landry (2013), social motives were the strongest followed by enhancement, coping, and then conformity motives. Evening preference for drinking alcohol was associated with greater social, enhancement, conformity, and coping drinking motives and was also associated with lower quality sleep and with less preference for problem-focused and emotion-focused coping as compared to as to those students who endorse morning and daytime drinking preference. Poor sleep quality was associated with drinking to cope, evening preference, and more avoidant coping as compared to those participants who experience good sleep quality but was not correlated with drinking motives except for drinking to cope (Digdon & Landry, 2013).

Drinking motivations and sleep are also related to other student health behaviors. Kenney et al. (2013) studied the comorbidity of poor mental health, consisting of depression, anxiety, and stress, and alcohol use and alcohol-related consequences. The study investigated the interrelationship of the following risk factors: social, enhancement, coping, and conformity motives in a sample of heavy-drinking college students (Kenney, Lac, Brie, Hummer, & Pham, 2013). A majority of participants, 54.3%, experienced poor global sleep quality according to the

PSQI, and nearly half of the participants, 49.5%, experienced some form of mental stress. For those participants with mental distress, rates of poor sleep quality were higher than their counterparts without mental stress, 58.6% versus 32.2% respectively. Poor mental health significantly contributed to higher levels of social motives, coping motives, conformity motives, enhancement motives, and poor sleep quality which in turn together were significant predictors of increased alcohol use. Poor mental health, coping motives, conformity motives, enhancement motives and poor sleep quality concurrently predicted negative alcohol consequences. However, poor mental health was not found to be directly related to alcohol use (Kenney et al., 2013).

### **Alcohol and Socioeconomic Status**

Harrel, Huang, and Kepler (2013) demonstrated that parent-reported socioeconomic status (SES) is associated with greater alcohol problems in that those participants with parents of a higher income report engaging in alcohol use at a significantly younger age. Early alcohol experimentation might point to less parental monitoring and involvement among those from higher SES backgrounds, as well (Harrell et al., 2013). Furthermore, inequality measured by poverty ratios, but not overall income inequality, was positively associated with light and heavy drinking. Alcohol use varies across social gradients, with higher income tending to be associated with lower-risk drinking, but negatively associated with heavier drinking and alcohol-related problems. (Karriker-jaffe, Roberts, & Bond, 2013).

### **Sleep and Socioeconomic Status**

Research conducted by Patel et al. (2010) established that poor sleep quality is strongly associated with poverty and race. Factors such as employment, education and health status, amongst others, significantly mediated this effect only in poor subjects, suggesting a differential vulnerability to these factors in poor relative to non-poor individuals in the context of sleep

quality (Patel, Grandner, Xie, Branas, & Gooneratne, 2010). Patel et al. (2010) found that African-Americans and Latinos reported poorer sleep quality when compared to Whites. Among these minority subjects, the impoverished subgroups reported the highest odds for poor sleep, which is correlated with low-income status and lower education status. Minority groups had worse overall sleep quality than Whites, but when examining poor subjects in various race/ethnic subgroups, impoverished Whites had paradoxically worse sleep than corresponding impoverished minority groups. Furthermore, poor sleep quality was significantly mediated by education, employment, and health factors in poor individuals, but not in individuals above the poverty line (Patel et al., 2010).

The relationship between sleep complaints and lower education was stronger in men than it was for women, especially if they did not finish high school (Grandner et al., 2010). Based on the data, greater socioeconomic status is associated with fewer sleep complaints. The sleep of men may be more sensitive to more social variables such as marital status, employment status, and ethnicity, while the sleep of women may be more sensitive to more concrete measures of status, such as income and education. Further complicating this issue, racial/ethnic differences seem to show interesting relationships with lower income and educational attainment in Hispanic/Latino men and women, employment status in African-American men, relationship status in Asian/Other men and educational attainment in Asian/Other women (Grandner et al., 2010).

### **Summary**

The current literature shows that a large percentage of college students have sleeping problems and engage in problematic alcohol use (American College Health Association, 2015). Poorer sleep quality is correlated with binge drinking and significantly greater levels of alcohol-

related consequences (Kenney et al., 2012). Studies have also shown that those who exhibit positive social and enhancement drinking motivations, as well as negative coping drinking motives, are more likely to identify as problematic drinkers compared to those who exhibit negative conformity drinking motives (Damme et al., 2013). Low socioeconomic status has also been shown to negatively affect sleep, with higher rates of sleep disorders such as insomnia and constrained sleep seen in this population (Patel et al., 2010). Thus, those with low socioeconomic status often suffer from poor or restless sleep as well as daytime sleepiness and other sleep disorders, which can be compounded with problematic alcohol use (Grandner et al., 2010; Patel et al., 2010). The current study seeks to examine the relationship between low socioeconomic status and poor sleep in regard to drinking motivations and consequences.

### **Hypotheses**

1. Socioeconomic status would predict the endorsement of drinking motivations and this effect would be moderated by subjective sleep quality, such that lower socioeconomic status and poorer sleep quality would be predictive of endorsement of drinking motivations.
2. Socioeconomic status would predict the endorsement of negative alcohol-related consequences and this effect will be moderated by subjective sleep quality, such that lower socioeconomic status and poorer sleep quality would be predictive of endorsement of negative alcohol-related consequences.

## **METHODS**

### **Participants**

Participants were recruited through the Louisiana State University (LSU) Psychology Department undergraduate research participant pool. Participants received research credit for

participating in the study. All participants met the following inclusion criteria: they must have been at least 18 years of age and an undergraduate student at Louisiana State University. The sample was primarily female (81.5%) and non-Hispanic White (71.7%) with an average age of 20.08 years ( $SD = 1.509$ ). Complete ethnic/racial background of participants was broken down as follows: 71.7% non-Hispanic White, 13.6% Black, 5.2% Hispanic/ Latino, 6.3% Asian/ Pacific Islander, 2.6% Multiracial, .5% Other. A majority of participants were enrolled full-time in school (95.8%) and reported living in off-campus housing (59.2%)

### Measures

**Alcohol Use Disorder Identification Test: Self-Report Version** (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2002). Problematic drinking was measured using the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT was used to identify people with hazardous and harmful patterns of alcohol consumption. It provides an outline for intervention to help hazardous and harmful drinkers reduce or cease alcohol consumption. A score above an 8 for men and above a 5 for women on the AUDIT is recommended as an indicator of being at risk for problematic drinking. The results indicate high internal consistency with a sensitivity of .84 and test-retest reliability ( $r=.86$ ) (Babor et al., 2002; Fleming, Barry, & MacDonald, 1991).

**The Daily Drinking Questionnaire** (DDQ; Collins, Parks, & Marlatt, 1985). The DDQ will be used to assess typical weekly drinking in the previous month. Participants were first provided with the definition of a standard drink and then instructed to “consider a typical week within the past month” before answering. Binge drinking was also assessed by asking participants how many times they consumed 4 (female) or 5 (male) drinks within a two-hour period within the last two weeks. The DDQ is moderately reliable ( $r=.58$ ) and a reported test-

retest reliability of ( $r = .86$ ) (Carey, Carey, Maisto, & Henson, 2006; Miller et al., 2002).

**Drinking Motives Questionnaire Revised** (DMQ-R; Cooper, 1994). The DMQ-R was used to assess motivations for drinking alcohol using four subscales: Social (Drinking to be sociable, to celebrate parties), Coping (Drinking because it makes you forget about problems), Enhancement (Drinking to feel better or to be able to do things otherwise impossible), and Conformity (Drinking because others do, to fit in). Respondents are asked within the last thirty days if they drank for any of the following reasons. Responses are measured on a 5-point Likert scale from 1 (never) to 5 (always) and 4 subscales were assessed, each using summed composites: coping, conformity, social, or enhancement. The conceptual validity and pragmatic utility of the DMQ-R has been documented in that each motive is related to a distinct set of alcohol-related consequences (Cooper, 1994).

**The Brief Young Adult Alcohol Consequences Questionnaire** (BYAACQ; Merrill & Read, 2012). The BYAACQ measures alcohol-related problems, specifically within the collegiate community. The BYAACQ items include driving while intoxicated, unplanned sexual activity, and waking up in unexpected places after drinking. Participants self-report if any of the items have occurred within the previous 30 days. The BYAACQ is comprised of 24 items, which are scored dichotomously. The BYAACQ total score indicates how many unique types of consequences were experienced in a given time frame (e.g., past year, past six months, past month). The 24 items assess eight domains of consequences, all of which load on a single, higher-order consequences factor.

The consequence subscales are as follows: Social/Interpersonal (e.g., “I have

become very rude, obnoxious or insulting after drinking”), Academic/Occupational (e.g., “I have neglected my obligations to family, work, or school because of my drinking”), Risky Behavior (e.g., “I have taken foolish risks when I have been drinking”), Impaired Control (e.g., “I often drank more than I originally had planned.”), Poor Self-Care (e.g., “I have been less physically active because of drinking”), Diminished Self-Perception (e.g., “I have felt badly about myself because of my drinking”), Blackout Drinking (e.g., “I have awakened the day after drinking and found that I could not remember a part of the evening before”), and Physiological Dependence (e.g., “I have felt anxious, agitated, or restless after stopping or cutting down on drinking”).

Internal consistency of the BYAACQ is high at baseline ( $\alpha = .84$ ) and item responses fit a Rasch model within the desired range of 0.6 – 1.4 (Kahler, Hustad, Barnett, Strong, & Borsari, 2008).

**Pittsburgh Sleep Quality Index (PSQI)** (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Global sleep quality was assessed using the PSQI, which measures past-month sleep habits, use of sleeping medications, and daytime drowsiness. The PSQI assesses past month sleep using seven subscales: sleep duration, sleep latency, sleep disturbance, use of sleeping medication, daytime sleepiness, sleep efficiency, and overall sleep quality. Scores range from 0–21 and higher cumulative scores indicate poorer global sleep quality. A global score greater than 5 is indicative of a poor-quality sleeper, whereas a score of 5 or less is indicative of a good-quality sleeper. The test–retest reliability for the PSQI is high for the global score and all subscores ( $r=.87$ ) (Backhaus, Junghanns, Broocks, Riemann, & Hohagen, 2002).

**Socioeconomic Questionnaire (SQ)**. A socioeconomic questionnaire was adapted from a study by Harrell, Huang, and Kepler (2013). The questionnaire asked about participants’ family income and their social class. The family annual income scale includes eleven categories: 1 (\$0–



14,999), 2 (\$15,000–\$24,999), 3 (\$25,000–\$34,999), 4 (\$35,000–44,999), 5 (\$45,000–\$54,999), 6 (\$55,000– 64,999), 7 (\$65,000–74,999), 8 (\$75,000–84,999), 9 (\$85,000–\$94,999), 10 (\$95,000–104,999), and 11 (\$105,000 or more). Students were asked to describe their experience with social class by answering the following question: “How would you best describe the economic situation as you were growing up?” The measure had five response answers: 0 (had barely enough to get by), 1 (enough to get by but no more), 2 (were solidly middle class), 3 (had plenty of extras), and 4 (had plenty of luxuries). Participants were asked to specify their current social class using the following categories: (1) Working class/lower-middle class, (2) middle class, (3) upper-middle class (4), upper class, and (5) other. General demographic information such as age, gender, classification, and race was also assessed (One, 2010).

## **Procedure**

The study was approved by the university’s Institutional Review Board prior to data collection. Interested participants provided informed consent and complete a series of measures online via surveymonkey.com. Measures completed included the AUDIT, Pittsburgh Sleep Quality Index (PSQI), Daily Drinking Questionnaire (DDQ), Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ), Drinking Motives Questionnaire, and Socioeconomic Questionnaire (SQ). It took participants ten to twelve minutes to complete the surveys.

## **Results**

### *Descriptive Statistics*

According to the AUDIT (cut-off score >8), 27.51% of participants identified as problematic drinkers. Participants were more likely to drink on Saturdays and consumed an average of two drinks, according to the DDQ. Social drinking motives were the most likely to be

endorsed ( $M = 13.396$ ,  $SD = 6.041$ ), then Enhancement motives ( $M = 10.139$ ,  $SD = 4.547$ ), followed by Coping motives ( $M = 8.209$ ;  $SD = 3.858$ ), and Conformity motives ( $M = 6.524$ ,  $SD = 2.889$ ). Blackout Drinking consequences were the most commonly endorsed ( $M = 6.406$ ,  $SD = 1.306$ ), then Risky Behavior consequences ( $M = 4.636$ ,  $SD = 1.030$ ), then Social/Interpersonal ( $M = 3.749$ ,  $SD = 0.773$ ), then Poor Self-Care ( $M = 3.540$ ,  $SD = 0.764$ ), then Academic/Occupational ( $M = 3.380$ ,  $SD = 0.726$ ), then Impaired Control ( $M = 3.353$ ,  $SD = 0.634$ ), then Physiological Dependence ( $M = 2.155$ ;  $SD = 0.377$ ), and lastly, Diminished Self-Perception ( $M = 1.144$ ,  $SD = 0.352$ ). Participants generally reported good Subjective Sleep ( $M = 0.951$ ,  $SD = 0.638$ ) and higher social class status ( $M = 2.17$ ,  $SD = 0.696$ ).

#### *Correlations Hierarchical Regressions*

A small to medium significant positive correlation was found between self-reported social class and problematic drinking as measured by the AUDIT (cut-off score  $\geq 8$ ) ( $r = 0.228$ ,  $p = 0.002$ ). Contrary to the current literature, those participants that identified as upper-middle class and upper class were significantly more likely to report problematic alcohol use.

Correlational analyses were run between subjective social status, self-reported sleep quality as measured by the PSQI-16, and drinking motives as measured by the DMQ-R (See Table 1). Correlational analyses were run between subjective social status, self-reported sleep quality as measured by the PSQI-16, and drinking consequences as measured by the B-YAACQ (See Table 2).

#### *DMQ-R Analyses*

In order to test the moderation hypotheses involving drinking motives, four separate hierarchical regression analyses were conducted with subjective social class (SQ) and subjective sleep quality (PSQI-16) as the independent variables (IVs) and the four separate DMQ-R

subscales (Social, Coping, Enhancement, Conformity) as the dependent variables (DVs). For each of the four regression analyses, SQ and PSQI were entered on the first step, and the interaction term (the product of SQ and PSQI) was entered on the second step. In the hierarchical regression analyses, the PSQI was reversed scores so that lower scores would equate to poorer sleep and standardized betas from the regressions would be easier to interpret.

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the DMQ-R Social subscale as the DV. The overall model was significant when only social class and sleep quality were included  $F(2, 176) = 3.613, p = 0.029, R^2 = 0.039$ . The interaction did not add any explained variance to the model. In Step 1, results indicated that social class was not a significant predictor of social drinking motives ( $\beta = 0.088, p = 0.235$ ). However, subjective sleep quality was a significant predictor of social drinking motives ( $\beta = -.176, p = 0.018$ ), such that individuals who reported poorer sleep tended to score higher on the social drinking motives subscale. In Step 2, the interaction of social class and sleep quality on social drinking motives was not significant and did not contribute any explained variance to model.

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the DMQ-R Coping subscale as the DV. The overall model was significant when only social class and sleep quality were included  $F(2, 176) = 8.107, p = 0.000, R^2 = 0.084$ . The interaction did not add any explained variance to the model. In Step 1, results indicated that social class was not a significant predictor of coping drinking motives ( $\beta = 0.110, p = 0.130$ ). However, subjective sleep quality was a significant predictor of coping drinking motives ( $\beta = -0.266, p = 0.000$ ), such that individuals who reported poorer sleep tended to score higher on the coping drinking motives subscale. In Step 2, the interaction of social class and sleep quality on

coping drinking motives was not significant and did not contribute any explained variance to model.

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the DMQ-R Enhancement subscale as the DV. The overall model was significant when only social class and sleep quality were included  $F(2, 176) = 4.160, p = 0.017, R^2 = 0.045$ . The interaction did not add any explained variance to the model. In Step 1, results indicated that social class was not a significant predictor of enhancement drinking motives ( $\beta = 0.090, p = 0.225$ ). However, subjective sleep quality was a significant predictor of enhancement drinking motives ( $\beta = -0.190, p = 0.011$ ), such that individuals who reported poorer sleep tended to score higher on the enhancement drinking motives subscale. In Step 2, the interaction of social class and sleep quality on enhancement drinking motives was not significant and did not contribute any explained variance to model.

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the DMQ-R Conformity subscale as the DV. The overall model was not significant when only social class and sleep quality were included. However, when the interaction term was included the model became significant,  $F(3, 175) = 4.878, p = 0.003, R^2 = 0.077$ . In Step 1, results indicated that neither social class nor subjective sleep quality significantly predicts conformity drinking motives on their own. In Step 2, the interaction of social class and sleep quality on conformity drinking motives was significant ( $\beta = -0.243, p = 0.001$ ), such that participants who identified as high social class and having poor sleep reported high levels of conformity drinking motives (See Figure 1).

### *B-YAACQ Analyses*

In order to test the moderation hypotheses involving drinking motives, eight separate

hierarchical regression analyses were conducted with subjective social class (SQ) and subjective sleep quality (PSQI-16) as the independent variables (IVs) and the eight separate B-YAACQ subscales (Social/Interpersonal, Academic/Occupational, Risky Behavior, Impaired Control, Poor Self-Care, Diminished Self-Perception, Blackout Drinking, and Physiological Dependence) as the dependent variables (DVs). For each of the eight regression analyses, SQ and PSQI were entered on the first step, and the interaction term (the product of SQ and PSQI) was entered on the second step. In the hierarchical regression analyses, the PSQI was reversed scores so that lower scores would equate to poorer sleep and standardized betas from the regressions would be easier to interpret.

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Social/Interpersonal subscale as the DV. The overall model was not significant  $F(2, 176) = 0.452, p = 0.637, R^2 = 0.005$ . In Step 1, results indicated that social class ( $\beta = 0.071, p = 0.344$ ) was not a significant predictor of social/interpersonal drinking consequences, and neither was sleep quality ( $\beta = -0.006, p = 0.932$ ). In Step 2, the interaction of social class and sleep quality on social/interpersonal drinking consequences was significant ( $\beta = -0.154, p = 0.042$ ), however, the variance added to the overall model by the addition of the interaction was minimal,  $F(3, 175) = 4.192, p = 0.168, R^2 = 0.023$ .

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Academic/Occupational subscale as the DV. The overall model was significant  $F(2, 176) = 3.103, p = 0.047, R^2 = 0.034$ . In Step 1, results indicated that social class ( $\beta = 0.151, p = 0.043$ ) was a significant predictor of academic/occupational consequences, and sleep quality was not ( $\beta = -0.102, p = 0.169$ ). In Step 2, the interaction of social class and sleep quality on academic/occupational drinking consequences was not

significant ( $\beta = -0.136, p = 0.068$ ). However, the addition of, but the interaction to the model did add explained variance  $F(31, 175) = 3.362, p = 0.024, R^2 = 0.0522$ .

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Risky Behavior subscale as the DV. The overall model was significant  $F(2, 176) = 3.650, p = 0.028, R^2 = 0.040$ . In Step 1, results indicated that social class ( $\beta = 0.198, p = 0.008$ ) was a significant predictor of risky behavior consequences, but sleep quality was not ( $\beta = -0.022, p = 0.765$ ). In Step 2, the interaction of social class and sleep quality on risky behavior drinking consequences was significant ( $\beta = -0.152, p = 0.041$ ), and the interaction did add explained variance  $F(3, 175) = 3.895, p = 0.010, R^2 = 0.063$ .

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Impaired Control subscale as the DV. The overall model was not significant  $F(2, 176) = 2.115, p = 0.124, R^2 = 0.023$ . In Step 1, results indicated that social class ( $\beta = 0.069, p = 0.355$ ) was not a significant predictor of impaired control consequences, and neither was sleep quality ( $\beta = -0.135, p = 0.072$ ). In Step 2, the interaction of social class and sleep quality on impaired control drinking consequences was not significant ( $\beta = -0.106, p = 0.159$ ), and the interaction did not add any explained variance  $F(31, 175) = 2.085, p = 0.104, R^2 = 0.035$ .

A hierarchical regression analysis was conducted with subjective social class as the IV and the B-YAACQ Self-Care subscale as the DV, moderated by subjective sleep quality. The overall model was significant  $F(2, 176) = 9.577, p = 0.000, R^2 = 0.098$ . In Step 1, results indicated that social class ( $\beta = 0.209, p = 0.004$ ) and sleep quality ( $\beta = -0.228, p = 0.002$ ) both significantly predicted self-care drinking consequences. In Step 2, however, there was no interaction observed between social class and sleep quality on self-care drinking consequences ( $\beta$

= -0.112,  $p = 0.121$ ) and the interaction did not add any explained variance  $F(3, 175) = 7.245$ ,  $p = 0.000$ ,  $R^2 = 0.110$ .

A hierarchical regression analysis was conducted with subjective social class as the IV and the B-YAACQ Self-Perception subscale as the DV, moderated by subjective sleep quality. The overall model was significant when only social class and sleep quality were included  $F(2, 176) = 11.431$ ,  $p = 0.000$ ,  $R^2 = 0.115$ , but when the interaction was included into the model more variance was explained in predicting self-perception drinking consequences  $F(3, 175) = 11.946$ ,  $p = 0.000$ ,  $R^2 = 0.170$ . In Step 1, results indicated that social class ( $\beta = 0.321$ ,  $p = 0.000$ ) was a significant predictor of self-perception drinking consequences, while sleep quality was not ( $\beta = -0.101$ ,  $p = 0.157$ ). In Step 2, the interaction of social class and sleep quality on self-perception drinking consequences was significant ( $\beta = -0.237$ ,  $p = 0.001$ ). Analyses revealed a significant interaction between subjective social class and the Self-Perception subscale, moderated by subjective sleep, such that individuals of higher SES with poorer sleep reported higher levels of diminished self-perception (See Figure 2).

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Blackout Drinking subscale as the DV. The overall model was not significant  $F(2, 176) = 0.956$ ,  $p = 0.386$ ,  $R^2 = 0.011$ . In Step 1, results indicated that social class ( $\beta = 0.097$ ,  $p = 0.199$ ) was not a significant predictor of blackout drinking consequences, and neither was sleep quality ( $\beta = -0.035$ ,  $p = 0.642$ ). In Step 2, the interaction of social class and sleep quality on blackout drinking consequences was significant ( $\beta = -0.195$ ,  $p = 0.010$ ), and the interaction did add explained variance  $F(34, 175) = 2.941$ ,  $p = 0.035$ ,  $R^2 = 0.049$ .

A hierarchical regression analysis was conducted with subjective social class and sleep quality as the IV and the B-YAACQ Physiological Dependence subscale as the DV. The overall

model was significant  $F(2, 176) = 3.226, p = 0.042, R^2 = 0.035$ . In Step 1, results indicated that social class ( $\beta = 0.124, p = 0.096$ ) was not a significant predictor of physiological dependence consequences, and neither was sleep quality ( $\beta = -0.138, p = 0.064$ ). In Step 2, the interaction of social class and sleep quality on physiological dependence drinking consequences was not significant ( $\beta = -0.056, p = 0.453$ ), and the interaction did not add any explained variance  $F(34, 175) = 2.334, p = 0.076, R^2 = 0.038$ .

## **Discussion**

Poor mental health, coping motives, conformity motives, enhancement motives, and poor sleep quality have been found to concurrently predict negative alcohol consequences (Kenney et al., 2013). The current study reaffirmed previous literature in that participants who reported poorer sleep quality were more likely to endorse higher rates of drinking problems and drinking motivations. The current study found that socioeconomic status significantly predicted Conformity drinking motivations and this relationship was moderated by subjective sleep quality. Participants who identified as being of higher social class were more likely to endorse Conformity drinking motives and drinking to fit in. This relationship was moderated by poor sleep quality, such that individuals of higher socioeconomic status with poorer sleep were more likely to endorse Conformity drinking motives. Interventions such as the Brief Alcohol Screening and Intervention for College Students (BASICS) that educate participants about peer drinking habits would help mitigate the endorsement of Conformity drinking motives or drinking to fit in.

Subjective sleep quality significantly predicted social, enhancement, and coping drinking motives. However, social class did not significantly predict social, enhancement, or coping drinking motives independently or while interacting with subjective sleep quality.



Previous research suggests that those who experience poorer quality sleep in conjunction with low socioeconomic status are more likely to endorse alcohol-related drinking consequences (Kenney et al., 2012; Grandner et al., 2010; Patel et al., 2010; Karriker-jaffe, Roberts, & Bond, 2013). The current study found that socioeconomic status had a direct relationship with Self-Perception and Self-Care drinking consequences. These relationships were both moderated by subjective sleep quality. Potential treatments and interventions should focus on remedying health behaviors related to problematic alcohol use, for example, targeting students with poor sleep and reinforcing the importance of positive health behaviors such as exercise. Results contradict previous literature in that individuals with higher self-reported social class, instead of lower, experienced poorer sleep and endorsed more drinking-related consequences. However, it was noted that the overall sample reported socioeconomic status that was higher than average. There is some evidence to suggest that higher income individuals experience higher rates of binge drinking (Humensky, 2010). Casswell, Pledger, and Hooper (2003) found that participants with higher incomes drink with a higher frequency.

The study also found that the overall model for the Academic/Occupational, Risky Behavior, and Physiological Dependence was significant. However, there was added significant interaction between social status, sleep quality on the following drinking consequences: Social/Interpersonal, Risky Behavior, and Blackout Drinking. In the cases of the Risky Behavior subscale and Blackout Drinking subscale the interaction did explain added variance. Higher social class did significantly predict endorsement of Academic/Occupational drinking consequences as well as Risky Behavior drinking consequences.

Given the current prevalence of problematic alcohol use on college campuses, the development of specific, tailored interventions addressing the needs of college students at risk of

multiple health factors, specifically poor sleep and risky alcohol behaviors is an important pursuit. The current study found that poor sleep tended to be predictive of drinking motives and increased alcohol-related consequences. A limitation of the current study is restricted range as the sample trended towards participants of a higher social class, therefore results are not generalizable to the current population.

Future research should determine if the incorporation of a sleep psychoeducation component in an alcohol harm reduction program is beneficial in reducing problematic drinking for college students who report poor sleep. Additionally, research is needed to explore treatments targeting risky drinkers of higher socioeconomic status with special attention to those who endorse Conformity drinking motivations and Self-Care and Self-Perception alcohol-related drinking consequences.

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**CORRELATIONAL MATRICES**

Table 1. Correlations among Social Status, Sleep Quality, and the DMQ-R

	1	2	3	4	5
1. Social Status SES					
2. Subjective Sleep	-.024				
3. DMQ-R Social	.099	-.184*			
4. DMQ-R Coping	.119	-.268**	.631**		
5. DMQ-R Enhancement	.099	-.198**	.776**	.570**	
6. DMQ-R Conformity	.040	-.138	.383**	.448**	.289**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Table 2. Correlations among Social Status, Sleep Quality, and the B-YAACQ

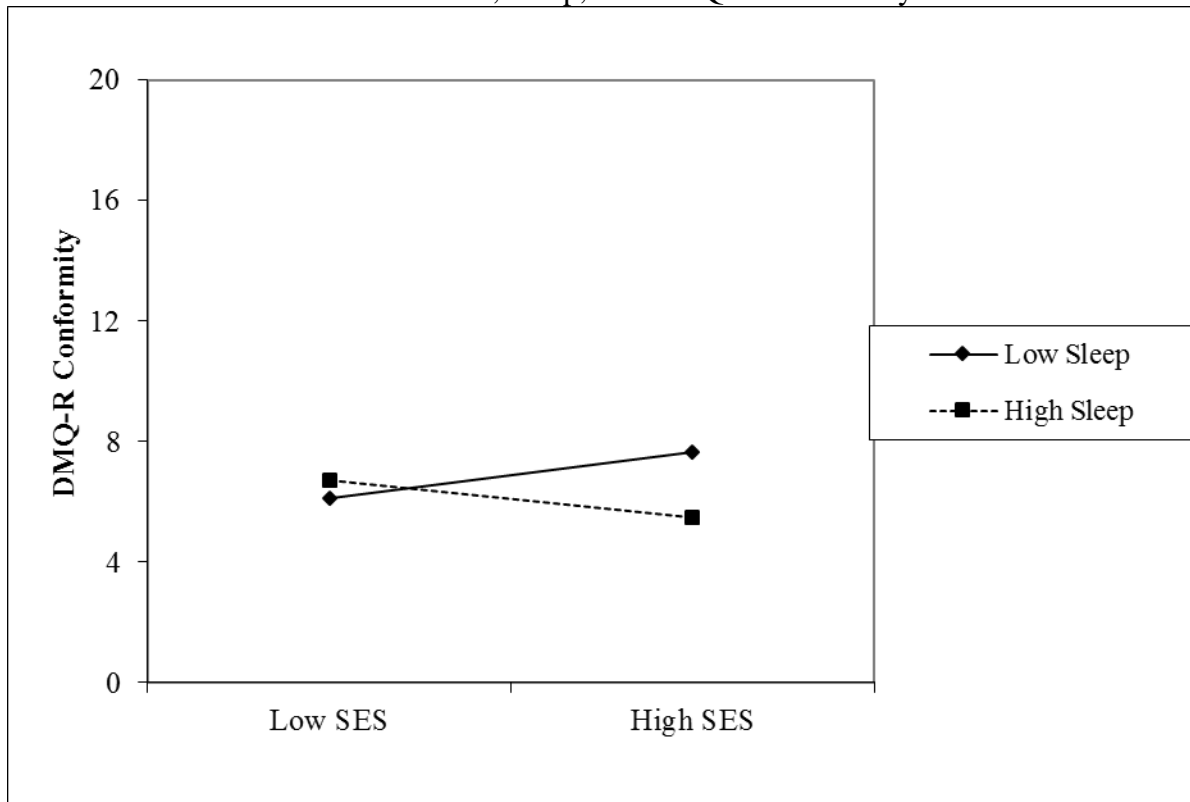
	1	2	3	4	5	6	7	8	9
1. Social Status SES									
2. Subjective Sleep	-.024								
3. B-YAACQ Social	.068	.006							
4. B-YAACQ Blackout	.106	-.041	.459**						
5. B-YAACQ Impair	.074	-.133	.500**	.410**					
6. B-YAACQ Risky	.199**	-.028	.540**	.510**	.552**				
7. B-YAACQ Physio	.126	-.129	.318**	.231**	.332**	.312**			
8. B-YAACQ Academic	.158*	-.112	.295**	.449**	.397**	.466**	.216**		
9. B-YAACQ Self-per	.307**	-.119	.371**	.398**	.324**	.427**	.275**	.373**	
10. B-YAACQ Self-care	.217**	-.247**	.404**	.458**	.493**	.484**	.230**	.540**	.408**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).



**FIGURE 1**  
Interaction Between SES, Sleep, and DMQ-R Conformity Subscale



**FIGURE 2**  
Interaction Between SES, Sleep, and B-YAACQ Self-Perception Subscale

