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Sleep and Early Childhood Stressors in College Students: Examining Alcohol Use as a Moderator

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Abstract

Early childhood stressors (ECS) consist of certain emotional, physical, or sexual experiences that may have long term consequences including sleep problems. Previous research has also found that alcohol use can negatively affect sleep; however, few studies have investigated alcohol use as a moderator of the relationship between sleep and other variables. In the current study, we examined whether the relationship between a general measure of ECS and sleep in college students may be moderated by alcohol use, a common psychoactive substance among this age group. Additionally, we examined this model with emotional abuse and neglect as a measure of ECS. Seventy-three undergraduate students wore an Actiwatch for approximately one week to measure sleep quality (i.e., sleep latency and wake after sleep onset). Throughout this time, participants also completed daily diaries to assess sleep duration. Participants also responded to the Childhood Trauma Questionnaire (CTQ) and the Alcohol Use Disorder Identification Test (AUDIT). In contrast to our predictions, alcohol use did not moderate the relationship between general ECS and sleep, or the relationship between the combined emotional abuse and neglect scales and sleep. Future research on the moderating effect of alcohol use within the relationship between ECS and sleep should be done with a larger and more diverse sample. Additionally, future research should consider measuring use of alcohol as a coping strategy for ECS, and sleep outcomes that may be associated with this specific form of alcohol use.

Keywords: early childhood stressors, sleep, sleep quality, sleep duration, alcohol use

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Sleep and Early Childhood Stressors in College Students: Examining Alcohol Use as a Moderator

Early childhood stressors (ECS) expose individuals to an increased risk for behavioral problems beginning in childhood and continuing throughout their lifespan (Birn et al., 2017). ECS are characterized by the presence of various emotional, physical, or sexual experiences that may interfere with an individual's ability to think, act, and feel (American Psychiatric Association, 2022). While literature on ECS tends to emphasize adverse experiences such as abuse or neglect, it's important to note that some childhood stressors may be associated with other social factors such as poverty, socio-economic status, and race. These stressors may potentially lead individuals to learn maladaptive coping strategies, such as drinking or smoking, that may further inhibit their ability to face ordinary situations (Tavolacci et al., 2013). High prevalence rates of ECS, which can also be referred to as child maltreatment or early life stress, have been reported globally (Stoltenborgh et al., 2015). More precisely, about 1 in 7 children living in the United States report having experienced some form of abuse or neglect in the past year (Center for Disease Control and Prevention [CDC], 2022). Due to the high likelihood of experiencing ECS, it is important to continue studying the various psychological and physiological effects they may elicit in an individual's adult years.

Research investigating the effects of ECS have found that exposure to these adversities is associated with an increased likelihood of experiencing anxiety in adulthood (Norman et al., 2012). Additionally, ECS increases the potential for other problems, such as depression and substance use disorders (Norman et al., 2012). Research conducted by Johnson et al. reported that individuals who were exposed to childhood abuse or neglect were more likely to have personality disorders than those unabused (1999). In considering specific forms of ECS, research

has pointed to childhood emotional abuse as posing a greater risk for anxiety and other disorders compared to childhood physical abuse (Norman et al., 2012). Similarly, research has equally pointed to childhood emotional neglect as posing a greater risk for depressive disorders and comorbid anxiety compared to physical neglect (Hovens et al., 2012). In contrast to these findings, additional research has demonstrated that growing up in a stressful environment may actually prepare individuals to better cope with challenges and stressful environments in adulthood (Santarelli et al., 2017). Despite this, however, a wealth of research has supported the idea that early childhood stressors, and in particular emotional abuse or neglect, may increase an individual's vulnerability to future stress and psychological disorders.

One way that ECS may promote vulnerability to later disorders is through sleep. Disturbances in sleep are considered harmful as they may lead to negative long-term effects on health, human errors, and accidents (Kalmbach et al., 2019). Research shows that individuals experiencing sleep problems have had significant changes in their individual health, mood, and academic performance (Yang et al., 2003). Additionally, sleep disturbances are associated with deficits in social relationships, risk-taking behavior, and attention (Gaultney, 2010). Research conducted by Lund et al., aimed to study sleep patterns and explanations of poor sleep among college students (2010). Results revealed that over 60% of students were considered as poor sleepers and that stress and anxiety accounted for 24% of the variance (Lund et al., 2010).

Sleep problems can be viewed in various ways, such as through duration and quality. With regards to duration, good sleep is often considered as lasting around 7 hours or more, and sleep lasting less than such is termed as short sleep (Sheehan et al., 2019). Research has linked short sleep to numerous adverse health outcomes such as heart disease, diabetes, and mortality (Ayas et al., 2003; Cappuccio et al., 2010; Gallicchio & Kalesan, 2009).

While sleep duration is defined as the amount of sleep an individual gets at night, sleep quality can be looked at in multiple ways (St-Onge et al., 2016). For example, sleep quality can be considered in terms of the amount of rapid eye movement (REM) or slow wave sleep (SWS) an individual gets at night (St-Onge et al., 2016). Additionally, sleep quality can be examined through measures such as sleep latency, the amount of time it takes to fall asleep, and wakefulness after sleep onset (WASO), the number of periods of wakefulness experienced throughout the time spent asleep. Similar to the effects of less sleep, poor sleep quality has been linked to a decrease in academic performance and greater risk for various mental health disorders (Howell et al., 2004).

Interestingly, research indicates that exposure to stress and maltreatment during the childhood years may have long-lasting effects on subjective sleep (Pfaff & Schlarb, 2022). Specifically, individuals reporting experiences with all three types of childhood abuse, those being emotional, physical, and sexual, experience various sleep problems (Greenfield et al., 2011). A study conducted by Schäfer & Bader (2013), investigated 48 adult psychiatric outpatients to assess whether early life stressors were linked to actigraphic and subjective measures of sleep. Participants wore actigraphy wristbands and responded to daily diaries over the length of 7 days. Results concluded that high stress load in childhood was linked to shortened sleep, prolonged sleep onset latency, decreased sleep efficiency, and an increase in body movements while asleep (Schäfer & Bader, 2013). Schäfer & Bader's research is among the few studies investigating the relationship between early life stressors and sleep in adults, indicating the need for further research on the subject.

Additionally, research is required to study factors that may influence the relation between ECS and sleep. While research has yet to support the idea that ECS may specifically elicit the

use of alcohol to cope, studies have supported the self-medication hypothesis of alcohol which suggests individuals consume alcohol with the intention to relieve emotional stress and dysphoria (Miranda et al., 2002). Cross-sectional analyses have additionally depicted the decreased levels of nervousness that may result from the use of alcohol (Swendsen et al., 2000). While the use of alcohol in individuals with social anxiety disorder has been reported as a means to reduce anxiety, there remains little support suggesting that alcohol indeed reduces social anxiety and stress (Carrigan & Randall, 2003). In a particular study conducted by Luciano et al. (2022), self-medicating drinking behavior mediated the relationship between PTSD and alcohol abuse. Thus, alcohol use may be a behavior that individuals engage in as a way to regulate emotions or to cope with stress.

Numerous studies within the United States have been done to investigate drinking behaviors and incentives among college students. A prominent result of these studies is the increased prevalence of drinking alcohol and alcohol use disorders seen among those in college compared to noncollege individuals (Karam et al., 2007). Research conducted through a national survey revealed that around 53% of full-time college students between the ages of 18 and 22 drank alcohol in the past month, and that the rate of binge drinking during that period was around 33% (National Institute of Health [NIH], 2022). The survey defined binge drinking as the consumption of 4 or more drinks for females and 5 or more drinks for men; however, it should be noted that some students consume twice that amount, which is considered high-intensity drinking (Hingson et al., 2017). Factors leading to the use of alcohol among college students is varied, but may include peer pressure, gender and sexual identity, and emotional and psychological instability (Karem et al., 2007). Additionally, Park et al. (2004) demonstrated that students drank more alcohol and engaged in less problem-focused coping on days perceived as

more stressful. Based on this body of research, we can conclude that college students drink for a variety of reasons, with coping as one of those reasons.

Furthermore, alcohol use is linked to sleep disturbances. More precisely, when the use of alcohol by an individual is enough to meet the criteria for an alcohol use disorder, the initial engagement with sleep becomes increasingly difficult (Brooks et al., 2019). As alcohol remains one of the most widely used psychoactive substances, research on its effects on sleep and sleep disorders, such as insomnia, have become increasingly pertinent (He et al., 2019). Be that as it may, research on the relationship between alcohol use and sleep tends to focus on alcohol consumption as it becomes abusive or disorderly, rather than its casual use.

While research alludes to how early childhood stressors may lead to sleep problems, this may not be the case for everyone. As such, the present study seeks to learn more about the individuals whose sleep worsens in response to these childhood stressors. Because research has identified alcohol use as a potential influence on both sleep quality and duration (Kenney et al., 2014), the present study examined whether this alcohol use may moderate the relationship between ECS and sleep (see Figure 1). Adults who experienced childhood stressors may choose to use alcohol (Duffy et al., 2018), which may inadvertently affect the quality and duration of their sleep more, compared to those who abstain from alcohol. Thus, I hypothesize that if the level of alcohol use is high among individuals who experienced high levels of ECS, then individuals will experience worse sleep. Additionally, given previous research linking emotional abuse and neglect to sleep problems, we expect that if the use of alcohol is high in individuals with higher levels of emotional abuse and neglect, then the quality and duration of sleep experienced should be lower. Results of the present study may be used to inform future research that considers treatment options and plans for those suffering from ECS and poor sleep.

Method

Participants

The present sample consisted of 73 undergraduate students at William & Mary, a subset from a larger study consisting of 106 participants. Participants were included in the present study if they received Actiwatches as part of their participation in the larger study. Participants were compensated with course credit for their courses within the department of psychological sciences. Participants were between the ages of 18 and 22 (M = 18.92, SD = 1.26), and the overall sample was 54.79% female, 42.47% male, and 2.74% nonbinary. Additionally, 47.95% identified as White or Caucasian, 21.92% as Asian or Asian American, 10.96% as Black, African, or African American, 2.73% as Latino or Hispanic, and 16.44% as Multiracial. Three participants were not included in analyses for not responding to either the AUDIT, CTQ, or both.

Measures

Childhood Trauma Questionnaire (CTQ)

The Childhood Trauma Questionnaire (CTQ) was used to measure the frequency of physical, emotional, and sexual abuse, alongside physical and emotional neglect, that may have been experienced prior to the age of 18 (Bernstein et al., 1994). The CTQ scale consists of 28 items that are measured according to a five-point Likert scale and exhibits high test-retest reliability and convergent validity with other measures of ECS (Bernstein et al., 1997; Bernstein et al., 2003).

The questionnaire contains five subscales meant to measure the various forms of childhood adversity, and scores range from 5 to 25. Scores are then categorized for each scale in terms of trauma exposure ranging from: none to low, low to moderate, moderate to severe, and severe to extreme (Liebschutz et al., 2018). The present study used the total summed score as

well as the summed score of the emotional abuse and neglect subscales. This decision was made based on the long-term behavioral consequences seen to arise from emotional abuse and neglect throughout childhood (Spertus et al., 2003).

Alcohol Use Disorder Identification Test (AUDIT)

The Alcohol Use Disorder Identification Test (AUDIT) was used to measure the frequency of alcohol consumption among college students (Babor et al., 2001). The AUDIT is a 10-item questionnaire, developed as a World Health Organization (WHO) collaborative project, that addresses alcohol consumption, dependance, and consequences (O'Hare & Sherrer, 1999; Saunders et al., 1993). The AUDIT has additionally demonstrated high test-retest reliability (Selin, 2003). Scores for each question on the AUDIT are based on frequency and range from 0 to 4; the maximum score an individual can receive on the questionnaire is 40. Results on the AUDIT provide adequate information regarding the respondents drinking behavior and tendencies and has been used to detect early signs of harmful or hazardous drinking (Bohn et al., 1995). In our sample, the AUDIT demonstrated good reliability ($\alpha = .80$), which is consistent with previous illustrations of acceptable reliability (Babor et al., 2001).

Sleep Quality

Actigraphy. The present study measured sleep quality using sleep monitoring Actiwatches. Actiwatches were used for their ability to identify and analyze sleep patterns, such as wakefulness after sleep onset (WASO; Valerie et al., 2023). Participants wore a Phillips Respironics Actiwatch 2, which weighs 16-grams and measures 43mm x 23mm x 10mm. The device appears and functions as a wristband and can record accelerometry data. Participants received a fully charged Actiwatch 2 at the beginning of the study and were not required to remove the band for charging thanks to its approximate battery life of 22 days. While the

Actiwatch 2 can be immersed in water for up to 30 minutes, participants were asked to remove the bands when swimming or showering as a means of protecting the watches.

Wakefulness After Sleep Onset (WASO). Wakefulness after sleep onset was used as a measure of sleep quality as it reports periods of wakefulness occurring throughout the defined sleep period (Shrivastava et al., 2014). WASO is recorded in minutes and provides a close depiction of sleep fragmentation. As WASO represents the amount of time an individual is awake after having fallen asleep, higher levels are typically indicative of poorer sleep quality. The present study took averages across all days with participant data.

Sleep Latency. Sleep latency is one of the most widely used parameters of sleep quality. Sleep latency reports the amount of time passing between the moment the participant gets in bed and turns all lights off and when they fall asleep (Shrivastava et al., 2014). Sleep latency is recorded in minutes and provides a good image of whether participants had little or significant difficulty falling asleep. The present study measured sleep latency by taking averages from all days with participant data. Similar to WASO, higher levels are indicative or poorer sleep quality.

Sleep Duration

Daily Diaries. Data concerning sleep duration was collected through 7-10 days of daily diaries, and the current study took the last 5 to 7 days' worth of data to represent a typical week. These days were used within the present study to gain an estimated range of time spent asleep. Understanding some participants may estimate their time asleep as being 20 to 30 minutes longer or shorter, sleep duration was calculated by observing the self-reported time between the moment the participant reported trying to sleep and when they woke up (Matthews et al., 2018). As such, it was the number of hours and minutes passing between the periods marked as 'Time tried to sleep' and 'Time woke up' that was recorded. The decision to focus on the range of time

between these two markers was made based off previously conducted research using daily diaries to measure sleep (Becker et al., 2019). While different measures of sleep can yield different assessments, daily diaries were used in conjunction with actigraphy measures because previous studies have shown both to provide a reasonable depiction of overall sleep (Becker et al., 2019; Matthews et al., 2018). [1]

Procedure

Informed consent was received prior to the study's commencement. Participants were invited for a first session, where they received an Actiwatch 2 and were informed of the guidelines surrounding its use. The Actiwatch 2 was used to measure sleep quality between their first and second lab sessions and was removed only in situations involving potential damage and immersion in water. Participants additionally completed daily dairies between their first and second lab sessions. Time between lab sessions was 7 to 10 days, with the goal of obtaining one week of sleep data. On the day of their last daily dairy, participants returned their Actiwatch 2. Additionally, participants were contacted two days before their second lab session and were asked to respond to a survey containing the Childhood Trauma Questionnaire (CTQ) and the Alcohol Use Disorder Identification Test (AUDIT).

Statistical Analyses

Statistical analyses were performed within IBM SPSS (Version 28), as well as Google Sheets (Alphabet, Inc.). Google sheets allowed for the compilation of survey and actigraphy data and for the identification of correlations across the various scales. SPSS was used to conduct moderation analyses on whether the relationship between ECS and sleep quality and duration was moderated by alcohol use. For each of the two CTQ measures, there were three models, one

for each measure of sleep. In each model, CTQ, AUDIT, and the interaction between CTQ and AUDIT were predictors.

Results

Descriptive Statistics and Bivariate Correlations

Table 1 displays the correlations between all study variables among college students. Scores on the Alcohol Use Disorder Identification Test (AUDIT) showed an overwhelming tendency for participants to consume alcohol at a level posing low-risk (M = 3.45, SD = 3.87), according to World Health Organization (WHO) guidelines. Responses on the AUDIT revealed that 76.71% of participants consumed alcohol sometime prior to taking the survey. Additionally, scores on the Childhood Trauma Questionnaire (CTQ) revealed generally low levels of childhood trauma among the participant pool (M = 38.00, SD = 11.82).

Moderation Analyses Set 1

A set of moderation analyses were generated to examine the moderating effect of alcohol use on the relation between early childhood stressors and sleep (see Table 2). Results indicate that alcohol use did not moderate the relation between early childhood stressors and sleep duration, sleep latency, or WASO. Results from the first set of moderation analyses failed to support the moderation model proposed (see Figure 1) for our first hypothesis.

Moderation Analyses Set 2

A second set of moderation analyses were computed to examine the moderating effect of alcohol use on the relation between emotional abuse and neglect specifically and sleep (see Table 3). Results indicate that alcohol use did not moderate the relation between emotional abuse and neglect (combined) and sleep duration, sleep latency, or WASO. Results from the second set of moderation analyses were unsuccessful in supporting our second hypothesis, suggesting that

higher levels of alcohol use among college students with higher levels of emotional abuse and neglect did not in fact experience lower sleep quality and duration.

Sleep and Alcohol Use

Additional exploratory simple linear regressions were calculated to observe whether either alcohol use or ECS were individually related to sleep quality and duration (see Tables 4 & 5). Results revealed that alcohol use was not related to sleep duration within the present study and explained .4% of the variance, R^2=.004, F (1, 73) = .253, p = .617. There was not a statistically significant association between alcohol use and sleep latency, R^2=.024, F (1, 73) = 1.700, p = .197. Lastly, when considering wake after sleep onset, results revealed that alcohol did not significantly predict the number of wakefulness periods experienced throughout sleep, R^2=.013, F (1, 73) = .914, p = .342.

Sleep and Early Childhood Stressors

ECS was not significantly related to sleep duration, explaining only 1.2% of the variance, R^2=.012, F (1, 73) = .849, p = .360. With regards to sleep latency, ECS showed no statistically significant relation, R^2=.003, F (1, 73) = .233, p = .631. Finally, there was no statistically significant relationship between ECS and WASO, R^2=.003, F (1, 73) = .178, p = .675.

Discussion

The present study examined the moderating effects of alcohol use on the relationship between a general measure of ECS and sleep. Additionally, we specifically looked at whether alcohol use moderated the relationship between a measure of emotional abuse and neglect and sleep. Contrary to our hypotheses, no significant interactions were observed when predicting either measure of sleep quality (i.e., wake after sleep onset or sleep latency) or a measure of

sleep duration. Additional analyses revealed no significant bivariate relations between ECS and sleep or alcohol and sleep.

While surprising and contradictory to prior research, results from the present study may be interpreted in several ways. Lack of statistical significance for the moderating effect of alcohol use may be explained in light of results from Ben Salah et al. (2020), which found moderating effects of tobacco use on the relationship between ECS and depression mediated by sleep. The moderating effects of alcohol may be dependent on frequency of use. Within Salah et al.'s study, effects of tobacco use were measured by comparing participants who were chronic smokers to non-smokers (2020). In contrast, in the present sample, few participants reported alcohol use that was consistent, which may have made it more difficult to discern a moderating effect. Future research should examine the same potential moderating effects of alcohol use on ECS and sleep, but this time focusing on a sample that includes participants with a better range of levels with regards to alcohol use; specifically, one that includes more at the higher end of use than in our sample.

Along with our moderation analyses, we ran simple linear regressions to examine the relationship between ECS and sleep. No statistically significant relationships were identified between the variables. This contrasts with previous research which has shown lower levels of sleep quality and duration in adulthood in individuals with exposure to ECS (Chapman et al., 2011; Koskenvuo et al., 2010). For example, a systematic review composed of 25 retrospective studies conducted by Kajeepeta et al. (2015), identified an association between sleep problems, such as shorter and more fragmented sleep, and exposure to ECS.

While examining the relationship between alcohol use and sleep, we failed to observe a statistically significant relationship. The results came as a surprise as previous research has

supported the association between alcohol use and sleep (Zheng et al., 2021). Specifically, prior research has found that moderate and high use of alcohol are related to a reduction of total night sleep (i.e., shorter duration) when compared to alcohol used in low doses (Ebrahim et al., 2013). In another study, 393 individuals were surveyed and responded to the Korean version of the AUDIT and Pittsburgh Sleep Quality Index (PSQI) questionnaires (2015). Results revealed a negative association between scores on the AUDIT and subjective sleep quality and duration (Park et al., 2015).

One potential explanation for the difference in outcomes between the current study and that of Park et al.'s, could be the sample of participants responding to the AUDIT. While the current study had college students respond to the AUDIT, Park et al.'s study consisted of adults out of college. As the AUDIT only measures the frequency and intensity of alcohol use, and people use alcohol for many different reasons, studies using this measure cannot know the reasons for alcohol use in their samples. This is of interest as college students use alcohol for various reasons, such as in response to social settings (Williams & Clark, 1998), peer pressure (Borsari & Carey, 2001), and college-related alcohol beliefs (Bravo et al., 2017). While some of these factors may remain after college, many play a stronger role during the college years (Patrick et al., 2017). This could suggest that the reason for alcohol use impacts the extent to which alcohol may influence sleep. While research has yet to observe the influence of alcohol use motives on sleep, research has found a correlation between sleep problems and alcohol use motives (Nishith et al., 2001). Although the direction of this relation is unknown, it is possible that certain alcohol use motives may influence sleep differently.

Limitations and Future Research

Outcomes from the present study may also be explained by the limitations faced. The first, and most notable, limitation of the study was the sample itself. The sample was both small and not as diverse as those utilized in previous studies, which may have made it difficult to observe effects. Participants within the sample lacked variability in their drinking behaviors, as measured by the AUDIT, and exposure to trauma throughout childhood, as measured by the CTQ. In effect, there was less diversity to be seen within the sample making it more difficult to detect statistically significant relationships. Future research should aim to collect data from a more representative sample and perhaps replicate the study in various environments outside of college campuses.

For example, future research may benefit from including participants coming from all sorts of economic backgrounds. With regards to the current sample, household income may serve as an explanation for the lack of variety in CTQ scores. The current study was conducted on a predominantly white college campus with undergraduate students who can afford an advanced education, the average student's annual household income being between $150,000 and $200,000. These same opportunities may not be available for those who come from other economic backgrounds, specifically low-income households. Additionally, low-income families have been shown to exhibit greater conflict, hostile tendencies, and overall child abuse (Evans & Kim, 2013; Hampton & Newberger, 1985). As such, having a sample with a high average income may result in less ECS variability in the present study, and reduce the generalizability of the study. As such, better economic representation is needed.

The second limitation faced by the current study was lack of control for current stress. Generally speaking, high levels of stress are linked to sleep problems, such as shorter sleep (Lee et al., 2013). The years spent in college contain a vast and unique amount of stress that may not

be existent or as prominent in other environments (Bhujade, 2017). Additionally, research conducted by Valerio et al. demonstrates how sleep quality worsens with increasing levels of stress or alcohol use (2016). As such, there may have been a variety of concurrent stressors influencing participants, and thus potentially impacting their sleep and alcohol use, within the present study. Furthermore, it is worth noting that current stress may have been equally responsible for the way participants perceived previous stressors when responding to the CTQ. By this, participants may have had an increased tendency to attribute stress to what they're currently facing rather than what they faced throughout childhood. In these ways, current stress may have obscured the true relation between ECS and sleep. Future research would do well to control for current stress levels and assess any potential influence current stress may exert over the perception of past stress.

Additionally, while not a limitation, the current study did not measure the likelihood of individuals using alcohol as a means to cope with ECS. Considering the research conducted on the self-medication hypothesis of alcohol, future research should investigate whether alcohol is used by college students to cope, and whether this specific form of alcohol use may be related to sleep. Furthermore, future research should consider other potential maladaptive behaviors, such as marijuana use, employed by individuals with ECS as a way to cope and the potential effects on sleep they may elicit.

Conclusions

Our findings revealed that alcohol use did not moderate the relationship between ECS and sleep. This remained true when analyses included either a general or emotion-specific measure of ECS, as well as measures of sleep quality or duration. Additional analyses revealed no statistically significant relationships between sleep and both ECS and alcohol use, a contrast

to previous research. Based on the contrast between these null results and previous research, as well as limitations of the present sample and study, further research is warranted to determine whether alcohol use may moderate the relationship between ECS and sleep.

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Endnotes

[1] Data concerning sleep duration were measured using both the daily diaries and Actiwatches. The overall data acquired from each duration measure was similar, and the Pearson Correlation coefficient between both measures is 0.89. Moderation analyses were computed with duration data recorded through the Actiwatches and the pattern of results was the same as the analyses computed with the daily dairy data. In recognizing their similarities, the present study chose to use the sleep duration data from the daily diaries based on previous research and curiosity.

Appendix

Table 1. *Bivariate correlations of all observed variables among college students*

Variable	AUDIT	CTQ	Emotional Abuse and Neglect	Sleep Duration	Sleep Latency	WASO	*M*	*SD*
AUDIT	-						3.450	3.873
CTQ	.068	-					38.00	11.823
Emotional Abuse and Neglect	.148	.940**	-				18.85	7.232
Sleep Duration	.060	-.109	-.160	-			7.743	1.128
Sleep Latency	.154	-.058	.051	.066	-		31.768	23.216
WASO	.114	.050	.009	.337**	-.134	-	34.422	12.750

Note. AUDIT = Alcohol Use Disorder Identification Test. CTQ = Childhood Trauma Questionnaire. WASO = Wake After Sleep Onset. ** Correlation is significant at the 0.01 level (2-tailed).

Table 2. *Interactions Between Alcohol Use and Early Childhood Stressors predicting sleep*

Dependent Variable	Predictor	Unstandardized B	Coefficient Std. Error	Standardized Coefficient Beta	t	Sig.	95% CI Lower Bound	95% CI Upper Bound
Sleep Duration	CTQ	-.110	.140	-.095	-.785	.435	-.389	.169
	AUDIT	-.011	.011	-.110	-.926	.358	-.033	.012
	INT	.024	.035	.082	.679	.500	-.046	.094
Sleep Latency	CTQ	1.474	2.869	.062	.514	.609	-4.251	7.200
	AUDIT	-.138	.234	-.070	-.589	.558	-.605	.329
	INT	.888	.721	.149	1.232	.222	-.550	2.326
WASO	CTQ	-1.573	1.578	-.121	-.996	.323	-4.722	1.577
	AUDIT	.050	.129	.046	.385	.702	-.207	.306
	INT	.422	.396	.129	1.066	.290	-.369	1.213

Note. INT = interaction between CTQ and AUDIT. The interaction between alcohol use and early childhood stressors did not statistically influence sleep quality or duration. $p > .05$.

Table 3. *Interactions Between Alcohol Use and Emotional Abuse & Neglect predicting sleep*

Dependent Variable	Predictor	Unstandardized B	Coefficient Std. Error	Std. Coefficient Beta	t	Sig.	95% CI Lower Bound	95% CI Upper Bound
Sleep Duration	Emotional abuse and neglect	-.075	.133	-.069	-.562	.576	-.340	.191
	AUDIT	-.026	.019	-.166	-1.381	.172	-.063	.011
	INT	.029	.036	.100	.817	.417	-.042	.100
Sleep Latency	Emotional abuse and neglect	1.036	2.754	.046	.376	.708	-4.459	6.532
	AUDIT	.078	.388	.025	.202	.841	-.696	.853
	INT	.831	.738	.140	1.126	.264	-.642	2.303
WASO	Emotional abuse and neglect	-2.288	1.498	-.187	-1.528	.131	-5.276	.700
	AUDIT	.016	.211	.009	.077	.939	-.405	.437
	INT	.508	.401	.156	1.267	.209	-.292	1.309

Note. INT = interaction between emotional abuse and neglect subscales and AUDIT. The interaction between alcohol and emotional abuse and neglect (combined) did not statistically influence sleep quality or duration. $p > .05$.

Table 4. *Relationship Between Alcohol Use and Sleep*

Dependent Variable	Predictor	Unstandardized B	Coefficient Std. Error	Standardized Coefficient Beta	t	Sig.	95% CI Lower Bound	95% CI Upper Bound
Sleep Duration	Alcohol use	.017	.035	.060	.503	.617	-.051	.086
Sleep Latency	Alcohol use	.917	.703	.154	1.304	.197	-.485	2.319
WASO	Alcohol use	.371	.388	.114	.956	.342	-.403	1.145

Note. Alcohol use did not statistically influence sleep quality or duration. $p > .05$.

Table 5. *Relationship Between Early Childhood Stressors and Sleep*

Dependent Variable	Predictor	Unstandardized B	Coefficient Std. Error	Standardized Coefficient Beta	t	Sig.	95% CI Lower Bound	95% CI Upper Bound
Sleep Duration	CTQ	-.010	.011	-.109	-.921	.360	-.033	.012
Sleep Latency	CTQ	-.113	.233	-.058	-.483	.631	-.578	.353
WASO	CTQ	.054	.128	.050	.421	.675	-.202	.310

Note. CTQ = Childhood Trauma Questionnaire. Early childhood stressors did not statistically influence sleep quality or duration. $p > .05$.

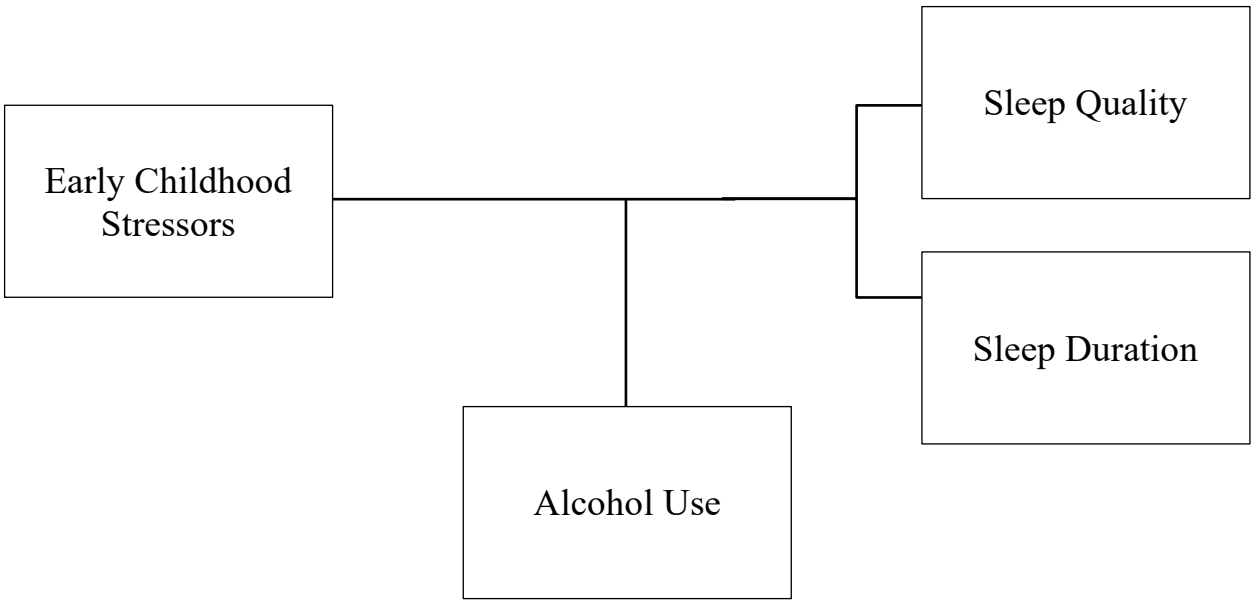

Figure 1. Conceptual model of the proposed moderation.