

REST, RISK, AND ROUTINE: UNDERSTANDING SLEEP HEALTH, TIME  
COMMITMENTS, AND OTHER HEALTH BEHAVIORS OF COMMUNITY  
COLLEGE STUDENTS ACROSS ALABAMA

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A DISSERTATION

Submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy  
in the Department of Psychology  
in the Graduate School of  
The University of Alabama

TUSCALOOSA, ALABAMA

2025

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## ABSTRACT

Emerging adulthood is associated with more autonomy and new responsibilities, which influence risky health behaviors and time commitments. Community college students are at an elevated risk of poor health habits, like insufficient sleep, and more risky health behaviors, like substance use. This, in part, could be due to increased financial instability, stress, and limited leisure time based on their time demands (i.e., employment, commuting, limited access to resources, and family caregiving or childrearing). Yet, despite this, community college students are often understudied compared to their four-year university peers. This study focused on understanding the sleep health, time commitments, and other health behaviors of community college students within Alabama. Students from two-year community colleges (N = 36) completed online self-report measures and individual semi-structured interviews via Zoom. Mixed-methods analyses were utilized. Descriptives, correlational analyses, and chi-square tests were run to examine the associations between demographics, sleep, substance use, and time commitments. Thematic analyses assessed the qualitative themes discussed during interviews. Findings indicate 57.2% of the sample endorsed poor sleep health, with 97.1% reporting poor global sleep quality, 62.7% reporting short sleep duration of less than 7 hours per night, and over 60% reported fair or poor sleep regularity. Most students (70.6%) endorsed mild alcohol use, 55.9% endorsed regular (weekly or daily) tobacco use, and 23.6% endorsed regular marijuana use. Students described using substances for relaxation, habit, or social engagement rather than sleep-related concerns; however, 33.3% of participants endorsed using substances for sleep onset

and 19.5% endorsed using substances to stay awake. Although multiple time demands outside of class were reported (i.e., work, school, childrearing), students also endorsed adequate leisure time of 5+ hours per day but described poor time management. Most students believed a hybrid behavioral sleep health intervention or seminar would be beneficial. Overall, students are limited in their knowledge about proper sleep and other health behaviors as well as available resources on campus. Thus, future studies should focus on offering psychoeducation about health behaviors and time management to community college students to improve overall success.

*Keywords:* Emerging adulthood, community college, sleep health, substance use, time commitments

## LIST OF ABBREVIATIONS AND SYMBOLS

AUDIT	The Alcohol Use Disorders Identification Test
BYAACQ	Brief Young Adult Alcohol Consumption Questionnaire
GAD-7	Generalized Anxiety Disorder, 7-item
LTS	Leisure Time Satisfaction
PHQ-8	Patient Health Questionnaire, 8-item
PSQI	Pittsburgh Sleep Quality Index
REQ	Recovery Experiences Questionnaire
RU-SATED	Sleep Health Measure Name
SCAR	Adapted Scale of College Students' Routines
SES	Socioeconomic Status
SBS	Sleep Beliefs Scale
TAPS	The Tobacco, Alcohol, Prescription medications, and other Substances Tool

## ACKNOWLEDGEMENTS

I dedicate this project to my loved ones and friends who have supported me through this long and arduous journey. It was your constant support, patience, and advice that helped me stay motivated to push on, even at the hardest of times. Thank you most importantly to my best friend, Leyla, who provided a listening ear and offered extensive patience. Also, the utmost appreciation to my loving parents, sister, aunts and uncles, and cousins who offered support, love, and warmth along my graduate school years. Finally, much gratitude to my friends who offered assistance and advice when warranted, made me laugh, and comforted me through all the stressful times. Most specifically, thank you to my graduate school friends, Candice, Tim, and Alex, cohort mates, Erika, Jin, Jim, Sarah, and Heather, and childhood friends, Suzanne, Kayla, Chrissy, Porsha, Mike, and Matt, who offered listening ears, continued support, and helpful advice throughout this journey. Finally, the highest gratitude to my advisor, Dr. Heather Gunn, who maintained the utmost patience, offered incredible guidance, and provided extensive support to guide me to be the researcher and clinician I am today. You significantly changed my life for the better by accepting me into this program and I am so grateful for this opportunity. Thank you so much to you all!

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## INTRODUCTION

### **Emerging Adulthood**

Emerging adulthood, a developmental stage between adolescence and adulthood, defined between the ages of 18 to 29 years old, can be both challenging and exhilarating. It is a time in one's life defined by increased independence, exploration of life's opportunities, changes in self-identity, formation of new social relationships, and an understanding of one's role in society. During this stage, neural development is reaching its final step in which the frontal lobe and prefrontal cortex are maturing, which is an area of the brain that is tied to executive functioning, such as decision making, planning, and goal setting (Steinberg, 2008) and social cognition (Taylor et al., 2015). Emerging adulthood also involves role experimentation that challenges many to reorganize their boundaries, values, and self-image and view of others in society.

According to the psychosocial theory of development by Erik Erikson (1950), an individual strives to find a sense of self in society throughout the lifespan while searching for balance and purpose within their external world. Throughout eight developmental stages, biological, psychological, and social systems combine to challenge individuals to reframe their view of self, their role in society, and how they relate to others (Newman & Newman, 2018; Whitbourne et al., 2009). Each stage presents a normative crisis, which can be viewed as either a tension between one's competencies or new expectations and demands from society (Erikson, 1950). A successful resolution of this psychological crisis enables a person to proceed to the next developmental stage; whereas, a negative resolution can lead to rigidity, impulsivity, withdrawal, and poor health outcomes. Societal conditions that undermine financial, physical, or emotional well-being of the individual present as potential risk factors. For example, poverty and prolonged

financial strain are major obstacles across development as there are less opportunities, fewer resources, less support, and an increased risk for malnutrition, poor-quality healthcare, and dangerous living situations (Newman & Newman, 2023). Fidelity to values enables successful resolution of psychological crisis, while rejection of values can lead to negative outcomes.

Amongst this transitional stage, many emerging adults choose to pursue higher education by attending college. The adjustment to a new living environment, more rigorous academic responsibilities and course schedule, financial maintenance, and social responsibilities while creating new social bonds with peers may influence students' attitudes, behaviors, and college outcomes (Arnett, 2000; Horn, 2006). The newfound independence and decreased supervision from parents enable students to freely make health-related behavioral changes that may align or disconnect with their values. Thus, emerging adulthood is an important time when many long-term health habits start to take root (DiLorenzo et al., 1998). While some students may continue to practice the habits they learned during childhood, others may prefer to challenge their childhood values to experience change, which could result in poor health outcomes (i.e., poor eating habits, less physical activity, poorer mental health, and worse sleep than the general population; Troxel et al., 2000; Buboltz et al., 2006; Hershner, 2020).

Environmental influences, such as peers and other social obligations, new class schedules, pervasive technology and social media use, novel ambient noises, and light exposure cause many first-year students to also alter their sleep habits and patterns to meet the demands of their new environment (Buboltz et al., 2006; Moore & Meltzer, 2008; Millman, 2005; Hershner & Chervin, 2014). In fact, sleep habits are often one of the first daily habits to change for students during their first year of college (Pilcher et al., 1997). Sleep patterns, such as bedtimes, also shift later as they develop more autonomy and make room for additional responsibilities (i.e., academic and social demands, employment, extracurricular activities; Nicholson et al.,

2023). In turn, poor sleep health can negatively influence quality of life, overall health, and academic success and may lead to more risky health behaviors.

*Sleep Health among College Students*

Insufficient sleep and poor sleep quality is common among college students, with many students reporting more sleep difficulties compared to the general population (Brown et al., 2001; Coren, 1994; Lack, 1986). Approximately 70% of college students report they are sleep deprived and approximately 50% endorse daytime sleepiness, an increase of 36% from adolescence (Lund et al., 2010; Oginska & Pokorski, 2006; Hershner & Chervin, 2014). With a circadian tendency toward later bedtimes (i.e., eveningness chronotype; Randler et al., 2017), many college students experience 1-to-2-hour fluctuations in their night-to-night sleep timing that results in sleep loss (Nicholson et al., 2020; Veeramacheni et al., 2019). Thus, many students (43-63%) report daytime napping at least once per week to accommodate the sleep debt (Ye et al., 2015; Duggan et al., 2018). Insufficient sleep leads to more frequent physical and psychological health problems (Bailey et al., 2015; Nicholson et al., 2020; Roane et al., 2015; Bernert et al., 2017) as well as increased emotional and academic stress (Lund et al., 2010; Veeramacheni et al., 2019). Short sleep also increases impulsivity, poor decision making, and reward sensitivity, which leads to risky health behaviors, such as substance use (Krause et al., 2017; Palmer & Alfano, 2017). As presented in the two-factor model of sleep health, this variability in their circadian process, defined by sleep timing, regularity, and alertness (process C), compared to their sleep-wake homeostasis, specified by sleep duration, efficiency, and satisfaction (process S) can lead to poor sleep health among students (Borbély, 1982; Achermann, 2004). In turn, this compromised sleep health contributes to other poor health behaviors during this developmental period (Wolfson, 2009; Lund et al., 2010).

Most of the literature on sleep health within emerging adults who are attending college occurs within four-year university institutions (Taylor et al., 2014). Universities are often targeted due to convenience sampling for research accessibility and academic requirements for students to receive research course credit (e.g., intro to psychology classes; Hanel & Vione, 2016; Peterson & Merunka, 2014; Wiegold et al., 2021). University students may also enhance research validity because of their apparent homogeneity for age, education, limited self-definitions, and a high need for peer approval (Sears, 1986), and thereby, justify the representation of different cultures and allow for more generalizability among the overall student population (Aaker & Sengupta, 2000). However, despite this, many emerging adults who might be attending other forms of college (i.e., community colleges, technical schools, online classes, etc.) or who might not be attending college at all are missed by excluding them from these studies. Also, since the average age of community college students is 28 years old, many emerging adults are being missed when generalizing college students in their research results (Zauderer, 2023). However, other groups of emerging adults, such as those who choose other forms of higher education (i.e., community college, trade school, online classes, etc.) or who work are understudied. Thus, there is a need to expand this research on sleep into these understudied and more vulnerable populations within this developmental stage.

### *Sleep among Community College Students*

Certain groups are more likely to have poor sleep health during college. For example, students who come from low socioeconomic households, are of an ethnic or racial minority, or identify with a marginalized group, are more likely to experience insufficient sleep, poor sleep quality, and more sleep disturbances (Kingsbury et al., 2013; Stamatakis et al., 2007; Hale & Do, 2009; Bixler et al., 2002). Community college students are likely more vulnerable to poor sleep health and shorter sleep duration than their university peers due to increased economic stress and

financial instability, occupational demands and time restraints, limited access to resources, and social factors, such as family responsibilities of caregiving and childrearing (Nelson et al., 2008; Pelletier & Laska, 2012; Vasquez et al., 2019; Wallace et al., 2017). Emerging adults, students of low income, and those who are racially diverse have increased perceived stress, which leads to more adverse health problems (Cohen & Williamson, 1988; Lee et al., 2012). In addition, due to these extra responsibilities, community college students are more vulnerable than university students, due to concomitant economic and social factors, such as having a part-time or full-time job, childrearing or caregiving responsibilities, or paying off financial debt. This could lead to poor resolutions for their psychological crisis within the late adolescence developmental stage as described by Erikson's psychosocial theory. Finally, most community college students commute to campus. In contrast, university students from four-year institutions live on campus, or within close proximity to campus, allowing for quick accessibility to resources offered on campus (i.e., more meals per week, mental health services, etc.; Nelson et al., 2009). Taken together, the environmental and social context of community college students differs across key domains that elevate risk for poor health behaviors (i.e., nutrition, mental health, etc.; Mullin, 2012; Goldrick-Rab & Han, 2011).

Consequently, due to a variety of time commitments and social responsibilities outside of academic demands, community college students may utilize their free time in different ways than their university peers. For what little time they do have for themselves, community college students may experience limited leisure time, or the time that is free from obligations such as jobs, chores, and daily routines (Stevens et al., 2002). Consequently, they may feel increased emotional burden and occupational stress as well as decreased life satisfaction from the free time they have to themselves or for leisure activities. Without having leisure time to relax and recover from the job stress, or detaching from work, students may be more likely to engage in poor

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health habits. Community college students tend to have less healthy diets and eating behaviors, are less physically active, and watch more television (Laska et al., 2011). For example, 66.8% of students do not meet the minimal requirement for 70 minutes of moderate to high intensity exercise per week (Sullivan et al., 2008). Community college students report higher rates of tobacco use (James et al., 2007; Lenk et al., 2012; VanKim et al., 2010; Sanem et al., 2009) compared to university students, and (Vankim et al., 2010; Arliss, 2007) a high rate of binge drinking (approximately 25%; Sheffield et al., 2005). Finally, they endorse more risky sexual health behaviors than their university counterparts (i.e., higher rates of sexual partners, higher rates of engaging in intercourse, lower rates of condom use, twice the rate of unintentional pregnancy, and 1.5 times the rate of reverting to emergency contraception after intercourse; Trieu et al., 2011).

Research on health behavior studies in community college students is limited to the above findings, and few studies have focused specifically on students in community colleges (Pokhrel et al., 2014; Chiauzzi et al., 2011). This presents a concern because approximately 41% of all college students within the United States, or 9 million people, were enrolled in a community college in 2023 (Zauderer, 2023). Additionally, students enrolled in community colleges are more representative of the general United States population, for community colleges provide access to education to nearly half of all minority college students and more than 40% of these students are living in poverty (Mullin, 2012). Thus, community colleges are comprised of more diversity, such as students of lower socioeconomic status, individuals with children or other dependents, part-time or full-time workers, and ethnic minorities (Bailey et al., 2005). Nearly 50% of community colleges comprise ethnic minority groups (American Association of Community Colleges, 2023), students of color (Snyder & Dillow, 2011; Snyder & Hoffman, 1992), and first-generation students (Lanaan, 2000). Furthermore, due to financial concerns,

roughly 80% of students are employed while attending school (Zauderer, 2023). Thus, studying community college students may be a more representative way to study this stage during emerging adulthood than compared to university students.

In turn, community colleges also attract a demographic that is overlooked in studies of college health behaviors. Individuals of minority or marginalized groups often experience poor health outcomes, such as difficulties with nutrition (i.e., less frequent meals and poorer dietary intake; Nelson et al., 2009), exercise (i.e., less likely to meet physical activity requirements; Young et al., 2015), risky sexual behaviors (i.e., less likely to use contraceptives, more sexually active and more likely to have casual sex; Trieu et al., 2011, Lyons et al., 2013), and substance use (i.e., smoking, drinking; James et al., 2007; Lenk et al., 2012; Fielder et al., 2012; Sheffield et al., 2005). Thus, this is a population that could benefit from health promotion programming.

Programming among *university students* demonstrates some success. Some researchers have focused their health behavior promotion programs to improving sleep health since there are many biological and social changes related to sleep among college students. Brown and colleagues (2006) offered a sleep treatment and education program for students (STEPS) within a four-year institution, which consisted of sleep hygiene and in-person group lectures sleep tracking, and they noted many improvements in sleep quality and sleep hygiene behaviors over six weeks. Tsai and Li (2004) conducted a similar study but included sleep education classroom lectures and discussions for a longer term of up to 18 weeks and demonstrated improved sleep quality and reduced nap time for women. Others have smart phone applications or online programs to intervene and found improved sleep behaviors (i.e., consistent wake times) knowledge about sleep health (Farias, 2012; Quan et al., 2013). Results from a combined in-person and online sleep health promotion program also demonstrated improved sleep knowledge among college students but also changes in sleep parameters (decreased sleep onset latency, less

time in bed, more total sleep time, and greater sleep efficiency; Levenson et al., 2016). Overall, online formatting, individualized feedback, and sleep health tips within a simple education format were most effective to improve sleep health behaviors among young adults enrolled in a four-year institution. To our knowledge, no studies on behavioral health interventions have included a community college population. Adapting and applying successful health behavior promotion programs within university settings may also show efficacy in decreasing the vulnerability of poor sleep health among community college students. Furthermore, improvement in sleep could have downstream benefits for other risky health behaviors (i.e., substance use, nutrition, physical activity).

### *Risky Health Behaviors*

#### *Sleep health is a mechanism for substance use risk.*

Poor sleep health is significantly associated with increased substance use risk. Among adolescents, short sleep duration and more sleep difficulties predicted later problems with alcohol and other substances (Wong & Brower, 2012; Wong et al., 2015). Decreased sleep duration on school nights, increased differences in sleep onset latency between weekdays and weekends, and poorer sleep quality are all associated with more substance use consequences (O'Brien & Mindell, 2005; Singleton & Wolfson, 2008). Students who prefer later bedtimes compared to earlier wake times often engage in more substance use and dependence, especially for alcohol and tobacco consumption (Arrona-Palacios et al., 2020). Furthermore, those who report insomnia are twice as likely to develop alcohol-related problems (Wallen et al., 2014). Thus, since many college students endorse sleep concerns, it is likely they revert to substances to assist their sleep onset.

*Substance Use and Sleep*

Nearly 50% of substance users use substances to self-medicate for their sleep problems (Mahfoud et al., 2009) to relieve subjective distress (Khantzian, 1985, 1997) or because of peer norms and past lived experiences (e.g., trauma, social learning, peer pressure; Maisto et al., 1999). Among college students, 20% opt to self-medicate their sleep with substances, such as alcohol, marijuana, and over-the-counter medications (Goodhines et al., 2019a). Lund and colleagues (2010) found that in a sample of 1,125 college students, 10% of poor-quality sleepers endorsed using alcohol and 33% reported taking over-the-counter medications to help them fall asleep. Similarly, Taylor and Bramoweth (2010) evaluated sleep in college students (N=1,039) and found that 11% of all students endorsed the use of alcohol as a sleep aid. Presleep arousal, inconsistent sleep timing, and evening chronotypes have been associated with poor sleep among college students and could be a rationale for sleep aid use. However, risky drinking patterns might also predispose students to sleep aid use since use of alcohol for sleep aid is associated with higher alcohol use (Lund et al., 2010) and more negative alcohol consequences (Goodhines et al., 2019b). Thus, self-medication of substances for sleep among college students is concerning due to the increased risky health behavior of substance use among this population.

With more health-related changes, emerging adults, and college students in particular, are at an elevated risk for increased substance use. In seeking peer support, increased extracurricular activities, academic stress, and other social demands, college students are at an increased risk for developing substance use concerns and subsequent health consequences. Thus, many interventions have been studied to decrease substance use within college students (Carey et al., 2007; Carey et al., 2009; Carey et al., 2012; Crouce & Larimer, 2011). These interventions focus on ways to improve motivation to abstain or decrease use, change one's drinking habits, and provide psychoeducation for strategies to reduce alcohol consumption and subsequent negative

consequences (Cronce & Larimer, 2011). Though these interventions have demonstrated efficacy, effect sizes were small (Carey et al., 2007; Cronce & Larimer, 2011) and their magnitudes diminish over time (Carey et al., 2007). Also, students who experience more severe or frequent substance use are less likely to seek treatment or assistance for their use, limiting past researched interventions to low-risk students. Due to varying social demands, occupational responsibilities, and commuting time, community college students have less access to resources, with those who use substances being even less privy to these available interventions.

Modest success rates of substance interventions may be due to reduced motivation to learn about ways to decrease their drinking (Black & Coster, 1996; Epler et al., 2009). However, on the other hand, many college students are eager to learn about ways to improve their health and participate in novel health interventions (Fucito et al., 2015; Orzech et al., 2011). Thus, since poor sleep health can increase substance use risk and many students use substances for sleep aids to improve sleep duration and quality, one potential avenue to decrease substance use in college students could be through a sleep health promotion program or behavioral health intervention.

Sleep is a modifiable health behavior that is linked to many health and cognitive outcomes. Thus, it is a reasonable target for improving downstream effects. For example, increased sleep duration among college students led to reduced sleepiness and fatigue, improved attention, reaction time, mood, and enhanced athletic performance (Kamdar et al., 2004; Mah et al., 2011). Improving sleep health has other potential benefits, such as improved social interactions, decreased loneliness, and increased social bonds with peers to help improve adjustment to college. Additionally, enhancing sleep health could reduce cravings and problematic substance use among college students (Bootzin & Stevens, 2005; Chakravorty et al., 2018). Students are often more likely to attend a health behavior program to improve their health, rather than address or admit to specific risky health behaviors (i.e., substance use; Fucito

et al., 2015) or poor college outcomes. Thus, a health promoting program or behavioral health intervention that focuses on improving sleep behaviors within a college population could not only improve sleep, but also other health behaviors (i.e., substance use, nutrition, physical activity) and college outcomes (i.e., academic performance and adjustment).

Several methods exist to assess health behaviors and provide important information to guide program planning and intervention development. In particular, behavioral health interventions utilize cognitive, affective, behavioral, or social processes to stimulate a change in an individuals' behavior to help promote health and well-being (National Institute of Health [NIH], 2022). Development of behavioral interventions comprises several stages and specifications on generalizability to different populations and settings. Varying approaches to behavioral intervention, such as the EPIS (Exploration, Preparation, Implementation, Sustainment; Aarons et al., 2011) or IDEAS (Integrate, Design, Assess, and Share; Mummah, 2016) frameworks, are similar in their focus for efficacy and effectiveness; however, they vary on the number of stages, relevance, importance, and theoretical foundation within their development, and their emphasis point for implementation (NIH, 2022).

### **Theoretical Framework**

As a guiding framework for this study, the NIH Stage Model for Behavioral Intervention Development will be used to identify the potency and importance of this behavioral sleep intervention within a community college sample. The NIH Stage Model was developed to identify, define, and clarify the necessary tasks within behavioral intervention development. It consists of six stages that are multidirectional and multi-influential and improve the potency and implementation of the health intervention (see Figure 1). This model starts by focusing on basic science research, then develops and adapts a plan for an intervention, leading to feasibility assessment and efficacy testing in both research lab and real-world settings, finally ending at the

dissemination and adoption in community settings. Much behavioral health intervention research focuses on the implementation of interventions within clinical or community settings, especially sleep health intervention studies within medical health care or clinical settings. However, it is important to examine the basic needs of the population or setting and establish the feasibility first, before moving forward to implement and adopt a new intervention. Thus, as the community college population is underserved and understudied, a necessary first step, or series of steps, before offering or testing an intervention among this population, is to assess their needs, environmental influences, time-commitments, and barriers that influence them regularly and could influence the efficacy of the proposed intervention.

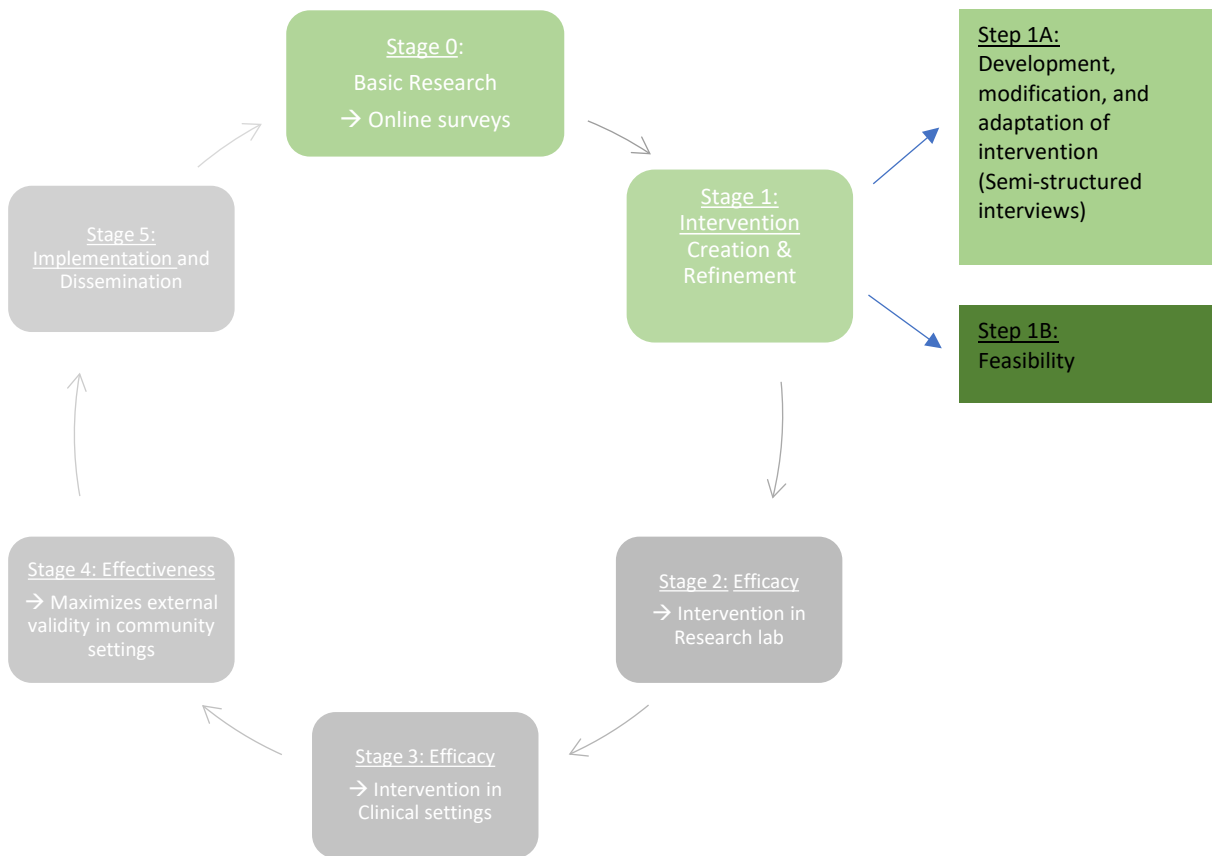
Then, to follow, it will also be important to create, modify, and adapt a possible intervention within this population by determining what is important, implementable, and cost-effective for this population through feasibility steps. Feasibility studies examine how the desired participant pool will respond to an intervention (Dobkin, 2009) and determine whether a proposed intervention is relevant or sustainable within the population or setting (Bowen et al., 2009). Health care professionals and practitioners call for more studies to be conducted in settings that maintain community constraints due to differing priorities and assessing feasibility could be helpful to fill gaps in the basic science research.

Yet, feasibility can be conceptualized in a variety of ways. For example, acceptability assesses how participants react to an intervention, determining approval or concern. Demand studies gather data on estimated use of selected intervention activities in a specific population or setting. Practicality explores how an intervention can be delivered and what resources, time, and commitment are available for success. Expansion examines the potential success of an already successful intervention within a new population or setting (Osmond & Cohn, 2015; Bowen et al., 2009). Thus, feasibility can assess the necessary aspects of a population and settings that will

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prepare researchers for better success in implementing an intervention, or it can be used to determine if the intervention is even suitable for this population or setting. Taken together, this study will focus on the *demand* of sleep health needs within a community college population, the *practicality* of available resources, time, and capacity available for this understudied and underserved population, and gather recommendations from participants to create a new potential health intervention and gauge the *acceptability* of one related to sleep among a new subgroup population of college students.

**Figure 1.** *Conceptual Model guided by the NIH Stage Model of Behavioral Health Intervention*



Many students are willing to learn about and improve their health behaviors, especially sleep health behaviors (e.g., Paterson et al., 2017; Brown et al., 2002). However, due to less funding, community colleges generally have less resources available for their students for psychoeducation and interventions for mental health (Bocchino, 2008; Conrad, 2010; Katz &

Davison, 2014). Thus, a focused study on sleep health and risky health behaviors within the community college system will further our understanding of health disparities within this underserved population and bridge the educational gap for students in community colleges compared to their university peers. This could provide proximal downstream effects, which may improve academic performance and promote career success. Finally, learning about and incorporating more health behavior changes could increase the overall health of community college students, thereby enhancing daytime functioning, improving mood and mental health, decreasing risky health behaviors, and improving college adjustment overall.

Few studies have focused on community college students as the targeted population, and even fewer have looked at community college students within the Deep South, a region of the United States that has increased risk for poor health outcomes (i.e., high rates of obesity, diabetes, hypertension, cognitive decline; Cafer and Rosenthal, 2020). In particular, colleges within the state of Alabama may be even more overlooked due to its unique socioeconomic and demographic context, such that Alabama has a higher poverty rate than many other states, which significantly impacts educational outcomes. Also, Alabama encompasses predominantly rural areas, which commonly face their own unique challenges related to access to resources and educational opportunities. Alabama has a complex history with educational institutions, such as issues of segregation and integration, that could further impact student outcomes and health resources. Furthermore, community colleges within the state of Alabama may represent more diversity in socioeconomic and demographic factors than four-year universities.

In examining students from a community college setting, information about differences in health behaviors and time-commitments could enrich the literature on ways to improve academic, behavioral, and clinical interventions within two-year colleges, settings that could offer more opportunities for knowledge-based health information and have the advantage of

being scalable, accessible, and cost effective due to variable formats (Kloss et al., 2011).

Including community college students within this research could provide information about differences in sleep health behaviors among students of diverse socioeconomic status, race, ethnic background, and family obligations. Furthermore, by better understanding these differences, potential interventions could offer college students an opportunity to improve their sleep and other health behaviors earlier on in college and potentially benefit them long-term. By targeting their sleep, this could bridge the disparity gap between two-year community college students and four-year university students and offer an equal opportunity for students from both education systems regarding their success later into college as well as their future careers and earning potential.

The purpose of this study is to understand the sleep health needs, other health behaviors, like substance use, and time commitments of community college students as well as their perceptions of a virtual behavioral sleep health psychoeducation intervention to guide future intervention development. In applying a mixed-methods design, using both quantitative data within an online survey to address the basic research stage of intervention development and online interviews to assess intervention development and components of feasibility through qualitative analysis, the study will aim to: i) examine recruitment capability and sample characteristics of this understudied population to determine need for intervention and answer questions about relevance to population, appropriateness of recruitment, enrollment rates, and obstacles to recruitment (themes: student characteristics of community college students, intervention format); ii) better understand the sleep health needs, other prevalent health behaviors, and time commitments of community college students in Alabama (themes: sleep health, substance use risk, poor health behaviors); iii) assess the suitability of the study procedures and intervention within this population, focusing on the assessment tools, time

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restraints and limited leisure time available, and emotional capacity and how they apply to the diverse needs of this population (themes: leisure time availability, social responsibilities, stress and emotional burden, psychological detachment); iv) evaluate what environmental factors (i.e., sociocultural factors) and daily activities (i.e., work, childrearing, caregiving) challenge the students' success and what resources (i.e., time, space, capacity) are available to community college students in assisting them with their health (themes: barriers, challenges, and leisure time satisfaction), and v) describe student's perceptions and reactions to a potential telehealth behavioral health seminar that could improve their overall sleep health and subsequent health behaviors (themes: behavioral sleep health intervention, sleep recommendations).

It is anticipated that most community college students will consist of a population of predominantly low-income, minority, and first-generation college students who are employed. For this reason, it is hypothesized that they will be more easily accessible (for time and place) through online platforms, or alternative intervention settings (i.e., classroom or workplace) due to busy schedules, transportation constraints, limited free time, and accessibility to a mobile device. It is also anticipated that community college students will describe poor health behaviors, especially poor sleep health and substance use due to economic stress, social demands, and limited free time for leisure activities. Environmental factors related to neighborhood, SES, and social relationships as well as time commitment barriers (i.e., jobs, caretaking, etc.) will challenge their success. Minimal resources will be indicated as avenues for help. The measures will be applicable and suitable within this population of community college students. Finally, it is estimated that community college students will provide helpful information and insight as to why and how a behavioral sleep health intervention could impact their health, lifestyles, and other college outcomes, as well as describing what strategies could be most helpful in preparing to implement an intervention.

## **Methods**

### **Recruitment**

Participants were recruited solely online through social media forums (i.e., Facebook, Instagram), research platforms, such as Prolific and Amazon Mechanical Turk (MTurk), and through email communications with staff at local community colleges in the state of Alabama. All recruitment started in March 2024 after receiving IRB approval and concluded in May 2025. All online recruitment identified the population of interest was students between the ages of 18 to 29 years old who attend two-year community colleges within the state of Alabama. Information was provided to describe that the purpose of the study was to conduct interviews with community college students online about their sleep habits, other health behaviors, and time commitments. The advertisements displayed a URL link to the interest screener survey and online and paper flyers displayed a QR code for interested students to scan to be directed to the brief online interest survey through Qualtrics. The survey provided detailed information about the purpose of the study, their expected time commitment and compensation, and questions about demographic information for eligibility purposes. The interest screening survey took participants on average 2-3 minutes to complete.

Eligibility criteria includes 1) current enrollment in at least one class at a two year community college in the state of Alabama (with proof of student identification), 2) being between the ages of 18-29 years old, 3) indicating sleep concerns (with a positive response of “yes” to the question, “Do you have current concerns about your sleep?”), and 4) accurately click

on the captcha question of “I’m not a robot” and select the response of “disagree” to the attention check question, “Show you are paying attention by selecting disagree below.”

### **Procedures**

After completing the interest survey, participants were sent an email to confirm initial eligibility and were requested to send a copy of student identification to confirm their student status at a two-year community college in Alabama. Accepted forms of identification included a student photo ID, a screenshot of their class schedule, or a copy of their unofficial student transcript, all of which would need to have their name and their college’s name displayed on it to confirm final eligibility criteria.

Participants who sent an appropriate form of identification and met all other inclusion criteria were deemed eligible and sent a digital copy of the informed consent and a link to the Part 1 survey. Participants were asked to review the consent form before they clicked on the Part 1 survey. They were informed that the survey would take approximately 15-30 minutes to complete and could be conducted on a phone, tablet, or computer. They were also reminded that their participation was completely voluntary and could withdraw at any point.

The Part 1 survey was completed on the online platform of Qualtrics. The average time to complete the surveys took 35-45 minutes ( $M=39$  minutes), and students were able to pause the survey and complete later. Survey questions covered the topics of sleep (i.e., total sleep per night on both weekdays and weekends, how long it takes to fall asleep each night on average, how many awakenings they have each night, as well as how they would rate the quality of their sleep), other health habits (i.e., physical activity, nutrition, substance use), mental health, daily activities, time commitments, and other demographic information to better understand the health needs and social and economic commitments within community college students across Alabama. Participants were compensated \$10 for their time in the Part 2 interviews.

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At the end of the Part 1 survey, participants were asked for their availability to schedule the Part 2 interview with the questions, “What days of the week are you most available?” with each day of the week available to select for options and “What time of the day are you most available?” with possible options being “Morning”, “Afternoon,” or “Evening.” Participants were also informed to allocate a 30-45 minute timeframe for the Part 2 interview or focus group via Zoom. Once a time was confirmed, participants were sent a confirmation email to note their interview time, a link to the Zoom call, and the passcode to enter the private Zoom call. Additionally, rules and expectations for the video interview were listed in the email, such that they were requested to have their camera on, attend the interview in a quiet place, and provided information related to troubleshooting tips for potential technological difficulties.

The Part 2 interview was originally offered as a 90-minute focus group; however, due to challenges with scheduling efforts for 8-12 students to be available all at same time, it was converted to an individual interview option for a brief 30-45 minute option instead. Participants reported being more willing to schedule the Part 2 interview with the shorter duration and individual format option. Furthermore, for the purpose of gaining insight into the various health behaviors and time commitments of community college students in Alabama, individual interviews could offer more time and space for rich, meaningful, and open conversations to add to the subjective, qualitative responses. Thus, all Part 2 interviews were conducted as individual semi-structured interviews via Zoom with one member of the research team within a couple weeks of completing the Part 1 survey. Each interview lasted approximately 15-60 minutes, with the average total duration being 23 minutes.

To begin the interview, participants were asked their name to confirm identity and technology concerns were troubleshooted to ensure minimal complications during the interview (i.e., audio or video issues, finishing up projects, moving to a private room). Next, after

informed consent was obtained, the interviewer started the recording. The Part 2 interview questions consisted of a semi-structured interview format that included three questions about sleep health, four questions about substance use, three questions about barriers to success at their community college related to academics, social life, and free time, and two questions about ideas for future health interventions on the topic of sleep for community college students. See Appendix A for the list of Part 2 interview questions. After receiving participant verbal consent, all interviews were audio-recorded and virtually transcribed by Zoom. Transcripts were de-identified, relistened to, and reviewed by research staff to confirm accurate transcription was conducted and appropriate revisions were made as necessary. Participants were compensated \$20 for their time in the Part 2 interviews.

## **Measures**

### ***General and Sociodemographic Information***

Personal information, such as date of birth, gender, sexual orientation, race, ethnicity, marital status, number of children, college name, field of study, grade point average (GPA), occupation status, past military service, social demands (i.e., childrearing, caregiving, etc.), time commitments and leisure time activities were collected. See Appendix A below for specific questions among these categories.

### ***Socioeconomic Status***

To assess subjective socioeconomic status (SES), participants completed the MacArthur Scale of Subjective Scale, Adult Version (Adler et al., 2000; see Appendix B). In this measure, a picture of a ladder with 10 steps is shown and respondents are asked to place an “X” (or click) on the rung that they feel best represents their social standing with income, education, and occupation within their community and in society, or the United States overall. Each step, or rung, on the ladder represents a number between one and ten, with higher numbers representing

higher perceived SES. For example, the top five rungs of the ladder represent high perceived SES, or those who identify as being of higher income households, higher education, and better paying jobs, whereas the lower rungs of the ladder signify those with the least amount of money, lowest education, and lowest paying jobs or those who are unemployed. Perception of one's status in their community or society is more predictive of their health outcomes (i.e., depression, obesity) and behavior compared to objective measures of SES (Cundiff & Matthews, 2017; Garza et al., 2017; Curhan et al., 2014; Quon & McGrath, 2014). Subjective SES also may shape a person's health and well-being (Lemeshow et al., 2018), thereby having a potential influence on sleep health and health behaviors as well. Finally, this scale includes cultural experiences for differences in one's adjustment to higher education (Adler et al., 2000; Garza et al., 2017).

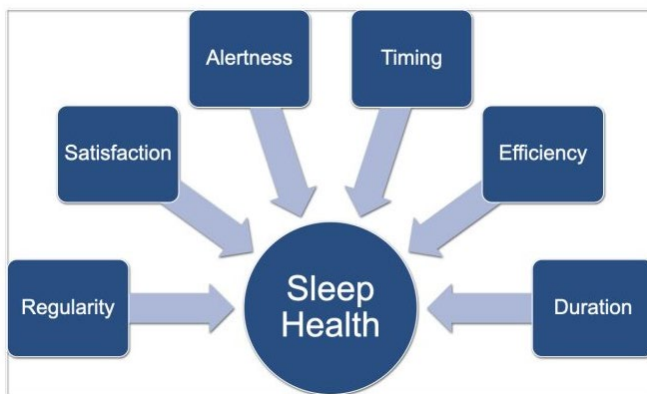
To assess objective SES, participants were asked to report their personal annual income, as well as their household income, including the number of people living within their household. Income will be offered in eight categories of \$25K range each, from \$0 to \$200K+ (i.e., under \$25K, \$25-50K, \$50-75K, etc.), to distinguish among poverty, low-income, middle, upper-middle, and wealthy income based on income-to-needs ratio.

### ***Sleep Health***

Sleep health is defined as a multidimensional pattern of sleep and wakefulness that enhances both overall physical well-being and mental health. It is characterized by six dimensions of sleep to capture different factors of sleep, including sleep duration, sleep quality and subjective satisfaction, timing of sleep, sleep efficiency, alertness during waking hours, and sleep regularity. See Figure 2 below to see a conceptual framework of the main dimensions of sleep health. To operationalize sleep health among community college students and examine how the sleep parameter variables above may relate to health outcomes, the RU-SATED scale was used (Buysse, 2014; See Appendix D). Participants were asked to rate their sleep on how

often they experience each dimension of sleep health on a three-point scale of rarely/never (0), sometimes (1), or usually/always (2). All six questions were totaled to create a sleep health score. Scores that were higher, or closer to 12 total points, signified a person with good sleep health. This short scale takes approximately one to two minutes to complete. This measure has been well validated in a variety of clinical settings and populations, translated into multiple languages (French, Portuguese, Japanese; Coelho et al., 2021; Becker et al., 2018; Furihata et al., 2022), and has strong psychometric properties (i.e., inter-rater correlation of .22; Ravyts et al., 2019). Within this sample, the measure held acceptable consistency with a Cronbach's alpha of 0.709.

**Figure 2.** *Conceptual Framework of Sleep Health (Buysse et al., 2014)*



To assess dimensions of current sleep parameters the Pittsburgh Sleep Quality Index (PSQI; Buysse, 1989; See Appendix C) was included. The PSQI is a 19-item measure that examines a variety of components of sleep health within the past month, such as sleep duration, sleep quality, sleep timing, and more. The PSQI assesses sleep quality and disturbances within the past month and it covers multiple sleep factors that could be influencing college students' sleep, while also asking about any sleep aid medications or substances that could be used to help with sleep. Previous studies assessing psychometric results indicate that the PSQI shows good internal consistency in a general population ( $\alpha = .83$ ) and a high test-retest reliability ( $r = .85$ ; Buysse et al., 1989). Within this sample, the internal consistency was also considered to be good

(Cronbach's  $\alpha = 0.721$ ). It has been validated among various populations, such as healthy college students (Dietch et al., 2022), trauma patients (Menza & Rosen, 1995), patients with cancer (Carpenter & Andrykowski, 1998), pregnant women in Peru (Zhong et al., 2015), community based older adults (Zhang et al., 2020), and patients with COVID-19 (Wang et al., 2022). It has also been translated into multiple languages, such as Italian, Spanish, French, Chinese, Portuguese, and more (Curcio et al., 2013; Hita-Contreras et al., 2014; Ait-Aoudia et al., 2013; Liu et al., 1996; Del Rio Joao et al., 2017).

To evaluate college students' beliefs about how certain daily lifestyle behaviors influence their sleep, the Sleep Beliefs Scale (SBS; See Appendix E) was given. The SBS is a revised version of the Sleep Hygiene Awareness and Practice Scale (SHAPS; Lacks & Rotert, 1986) and it consists of 20 items on beliefs about the effect of each behavior on sleep in general, not particular to their own experience, and asked to rate whether each item has a positive, negative, or neutral effect on sleep (Adan et al., 2006). Constructs assessed are "drinking alcohol in the evening", "studying or working intensely until late night", and "taking a long nap during the day". This measure showed good internal consistency in this sample (Cronbach  $\alpha = 0.824$ ).

### ***Substance Use***

To assess recent alcohol consumption, a modified version of the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992; Fleming et al., 1991; See Appendix F) was used. The AUDIT is a 10-item screening measure that identifies hazardous drinking or mild alcohol dependence (Bohn et al., 1995). Questions ask about alcohol use and drinking habits within the past year (i.e., "How often did you have a drink containing alcohol in the past year?"). Five-point responses range on a scale of 0 to 4. The sum of all scores indicates their level of hazardous or harmful alcohol use, with higher scores indicating more harmful alcohol use and more concern for their health and safety. For men, a score of 8 or higher, and for women, a score of 7 or higher

for women indicate hazardous or harmful drinking. For the purpose of this study, this measure will be modified to reflect a more recent timeframe, assessing current alcohol use within the past month. In this sample, the AUDIT held good internal consistency (Cronbach's  $\alpha = 0.880$ ).

To assess negative drinking consequences from alcohol consumption, the Brief Young Adult Alcohol Consumption Questionnaire (B-YAACQ; Kahler et al., 2005; See Appendix G) was utilized. This 24-item measure was developed from the original, longer measure of the Young Adult Alcohol Consumption Questionnaire (YAACQ; Read et al., 2006) that consists of 48 items that ask about a broad range of alcohol related consequences common within college students in the past month (i.e., driven a car, got in sexual activities they later regretted, spent too much money). Participants are asked to respond with a "yes" or "no" response. An endorsed "yes" response is appointed a score of 1, while a declined "no" response is given a 0 score. All items are summed together to create a total score. Higher scores indicate more clinical concern for severe alcohol consumption. This measure has internal consistency, unidimensionality, and additive properties as well as minimal item redundancy and floor or ceiling effects (Kahler et al., 2009). It also has been validated in many other languages (i.e., Spanish, Chinese, Portuguese) and among different cultures across the world and countries other than the United States (Gordon et al., 2012; Labhart et al., 2017; MacKinnon et al., 2017). The internal consistency within this sample was excellent (Cronbach's  $\alpha = .909$ ).

To assess other forms of substance use, a modified version of the Tobacco, Alcohol, Prescription Medications, and Other Substance Tool (TAPS; McNeely et al., 2016; See Appendix H) was used. The TAPS tool consists of two parts, with part one asking five questions that screen for tobacco use, alcohol use, prescription medication misuse, and illicit drug use in the past year. Questions ask for frequency (i.e., "How often have you...") and responses include varying timeframes of "Daily or Almost daily", "Weekly", "Monthly", "Less than Monthly" and

“Never”. Part two asks about substance use in the past three months, offering a dichotomous “yes” or “no” response initially, followed by two questions if the response is “yes”. The TAPS tool exhibited excellent validity for tobacco, alcohol, marijuana, and stimulant use identification ( $AUC \geq .80$ ) and fair validity for heroin drug use identification ( $AUC \geq .70$ ; McNeely et al., 2016; Carter et al., 2022). However, it showed poor discrimination validity between risk levels for prescription opioids, sedatives, and ADHD medication use (McNeely et al., 2016; Schwartz et al., 2017). The TAPS tool is brief and efficient to use within clinical settings and encompasses many different substances. Similar to the AUDIT above, questions from part two were repeated to ask participants about their recent and current use in the past month.

### ***Mental Health***

Measures of mental health and mood related symptoms were included among exploratory analyses. To assess mental health symptoms of depression and anxiety, the Patient Health Questionnaire-8 Item (PHQ-8) and the Generalized Anxiety Disorder-7 Item (GAD-7) was given to participants. The PHQ-8 is an 8-item instrument that assesses depressive symptoms and other mental health disorders over the past two weeks (Kroenke et al., 2008; See Appendix I). Responses are given on a four-point scale, ranging from 0 to 3, with lower numbers indicating minimal or no symptoms, and higher numbers indicating elevated concern for these symptoms. Upon completion, all scores were summed up to provide a total PHQ-8 score. A score of 10 or higher indicates a sensitivity of 83% and a specificity of 58% for major depressive disorder (Shin et al, 2019) and 95% for both values for any depressive disorder (Kroenke et al., 2008). The PHQ-8 has also shown excellent reliability and validity, showing a high internal consistency (Cronbach’s  $\alpha = .88$ ), and strong convergent validity ( $r = 0.614$ ; Shin et al, 2019). The PHQ-8 is effective in various settings and among diverse racial/ethnic groups (Huang et al., 2006),

older populations (Klapow et al., 2002) and patients with many other health conditions. The internal consistency within this sample was acceptable to good (Cronbach's alpha = .760).

Due to the frequency of anxiety symptoms in college students, the Generalized Anxiety Disorder, 7-Item (GAD-7) was also used to assess the severity and frequency of anxious distress. The GAD-7 is a seven-item measure that assesses the respondent's mental health status throughout the past two weeks (Spitzer et al., 2006; See Appendix J). Respondents rate their frequency of feeling nervous, anxious or on edge, trouble relaxing, restlessness, and level of worrying on a four-point scale, ranging from 0 to 3, with "0" indicating "not at all", "1" for "several days", and "2" for "more than half the days," and "3" for "nearly every day" (Williams, 2014). Scores are totaled and overall scores can range from 0 to 21. Scores from 5 to 10 indicate mild anxiety, from 11 to 15 represent moderate anxiety, and higher than 15 indicate severe anxiety, respectively. Using a threshold of 10 for anxiety concern, the GAD-7 has sensitivity of 69% and specificity of 82% for generalized anxiety disorder (Williams, 2014). It also is moderate at screening for social anxiety disorder with a sensitivity of 72% and specificity of 80% (Kroenke et al., 2009). The internal consistency within this sample was excellent with a Cronbach's alpha coefficient of .898.

### ***Leisure Time Activities***

To learn about what time commitments students participate in and how their daily schedules might affect their circadian rhythmicity, a series of questions related to their school, job, and how they spend their free time outside of academic course load and workdays were asked. Open-ended questions, such as, "How do you spend your free time outside of class? What activities do you participate in? How many hours a week do you spend working?" were asked and participants provided answers to how many hours or minutes they engaged in these activities

on a weekly basis within the past month. This measure maintained acceptable internal consistency (Cronbach's  $\alpha = .762$ ) within this sample.

Additionally, the timing, duration, and frequency of a variety of common daily activities were evaluated in a measure that was an adapted version of the Scale of Older Adults' Routine (SOAR; Zisberg et al., 2009; Appendix K). This proposed version was adapted to college students and the type of activities they may regularly engage in. Participants were asked to endorse which of the eleven activities they engage in on a regular basis (i.e., more days than not in a week). Then, if they endorsed the activity, they were asked to report the time they typically engage in these activities, how often they engaged in them in a typical week, as well as how long they conducted the activity. This measure provided further details as to how community college students spend their time throughout a typical day and how these activities may influence sleep.

To gauge the level of satisfaction that students experience regarding the amount of time spent in their free time leisure activities, a modified version of the Leisure Time Satisfaction measure (LTS; Schulz et al., 2003; Appendix L) was used. The original measure was a brief 6-item measure developed within a population of caretakers who experience immense emotional burden due to caregiving responsibilities. However, this presented version included modified activities that are relevant to the busy schedules and time demand experiences of community college students as well as two additional activities. Items assessed activities both in and out of the home as well as social and individual activities. The instructions ask, "Over the past month, how satisfied are you with the amount of time you have been able to spend..." prior to each activity prompt. The six specific items include 1) in quiet time by yourself; 2) attending church, going to meetings of groups or organizations; 3) taking part in hobbies or other interests; 4) going out for meals, entertainment, or other social activities; 5) doing fun things with other people; and 6) visiting family and friends. To offer additional leisure activities that are common

among college students, an additional two items were added to include: 1) engage in recreational sports or physical activity and 2) spending time on electronics (i.e., watch TV, play video games) or through social media platforms to converse with friends. Participants were asked to rate each item on a three-point scale of 0 to 2, or “not at all” (0), “a little” (1), and “a lot” (2). All items were added to create a total score, which could range from 0 to 16, with higher scores signifying greater satisfaction of the amount of time for leisure time. This measure has been well validated among several groups of diverse demographic differences and showed acceptable validity as a one-factor measure (Martinez-Rodriguez et al., 2015; Stevens et al., 2004). Within this sample, the measure held acceptable internal consistency (Cronbach’s alpha = .750).

Finally, to assess how students unwind and recuperate during leisure time from work or school, the Recovery Experience Questionnaire (REQ; Sonnetang & Fritz, 2007; Appendix M) was used. This 16-item measure is separated into four subscales with 4-items each to evaluate: i) psychological detachment, or to mentally switching off from thinking about work; ii) relaxation; or activities characterized by low activation and increased positive affect (Stone et al, 1995); iii) mastery, or activities that challenge experiences and learn new knowledge and competency; and iv) control, or a person’s ability to decide which activity to pursue during leisure time. Participants were asked to rate each item on a 5-point Likert scale (1=totally disagree, 5=totally agree). The four items from each subscale are added together, comprising the subscale score that could range from 4 to 20, with higher scores indicating higher stress recovery experience. The sum of all 16 items was then combined to create a global REQ score. This measure has been widely used internationally and has been translated into multiple languages (i.e., Japanese, Lithuanian, Swedish, and Nepalese; Shimazu et al., 2012; Kazlauskas et al., 2023; Almen et al., 2018; Panthee et al., 2020). The internal consistency was high for each of the subscales, ranging from 0.87 to 0.95 (Bakker et al., 2014). For this sample, the internal consistency was acceptable when including

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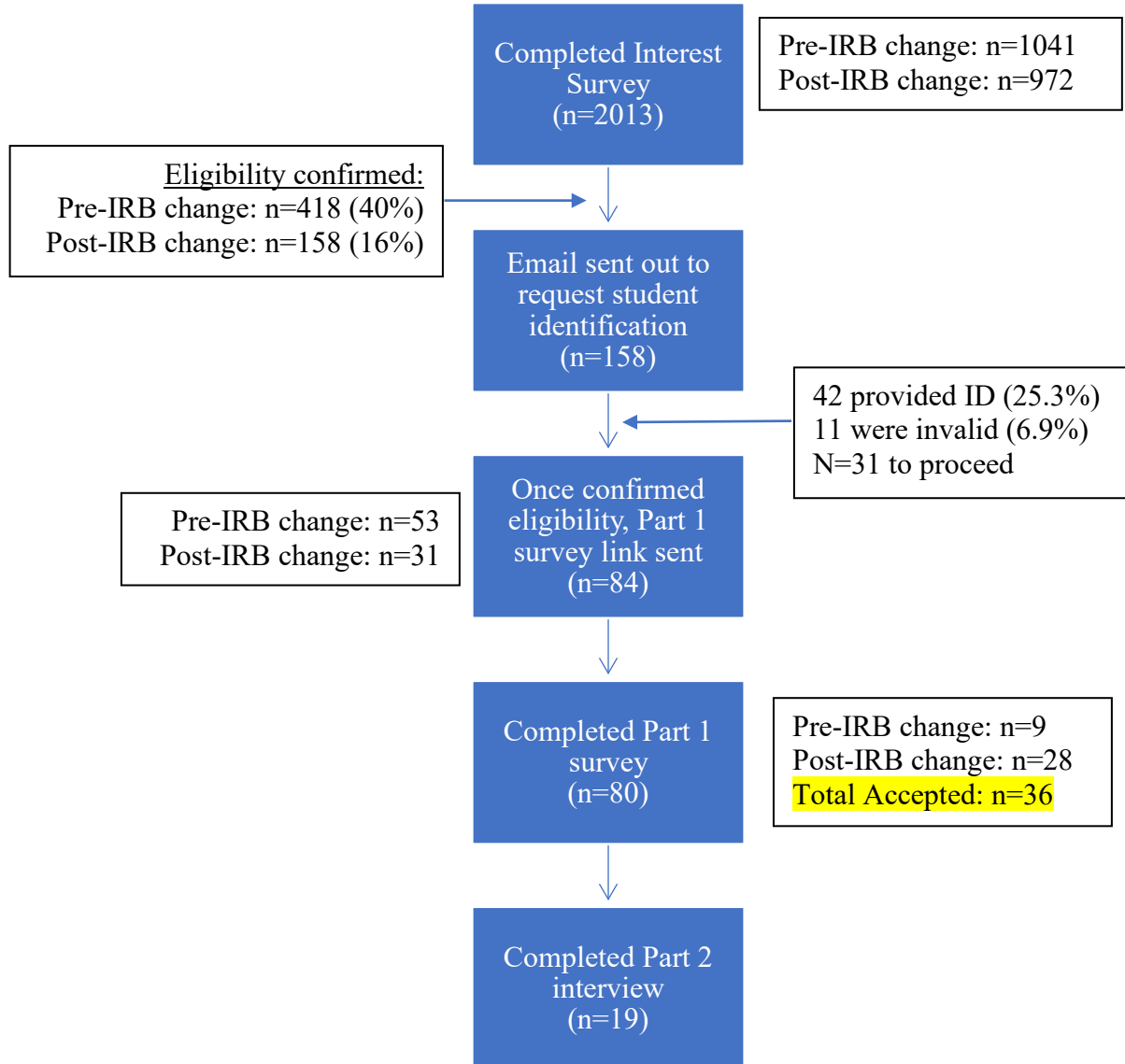
all items without the total score (Cronbach's alpha = .750) and either acceptable or good for the subscales (Psychological Detachment = .771; Relaxation = .817; Mastery = .837; Control = .816).

## Results

### Participants

Of the 2,013 participants who completed the initial screening survey, approximately 1,437 participants (71.4%) were excluded for not meeting eligibility criteria, either in not being within the age range of 18-29 years old, indicated they attend a four-year university, were not attending a community college in the state of Alabama, or did not have a complaint about their sleep. The remaining eligible participants were asked to send a form of identification to confirm student status before proceeding with the part one survey. Of note, for the first nine months of recruitment, participants could proceed in completing the part one survey without providing a form of student identification. However, with review of completed part one survey responses (n=53), it became apparent that the majority of responses (n=44) were invalid and would need to be excluded from data analyses due to concern of artificial intelligence responses. Thus, in December 2024, after IRB approval, participants were required to send a form of student identification to be considered eligible before completing the Part 1 survey. Of the 158 participants who were requested to provide student identification, approximately 42 participants (25.3%) provided one; however, 11 (6.9%) sent invalid forms of identification and were deemed ineligible to proceed. Of the 31 participants, three did not complete the part one survey, resulting in a final total of 28 participants within the second phase of recruitment. Combined with the 9 participants who were deemed valid and eligible from the first phase of recruitment, the final total sample size was 36 participants. See Figure 3 for recruitment flow diagram.

**Figure 3.** *Flow Diagram of Recruitment*



**Data Analyses**

*Quantitative Analyses*

Data from 44 participants was removed from analyses due to unusual or invalid responses or from concern about artificial intelligence responses. The main reasons for excluding these participants included: 1) answering the attention checks incorrectly, 2) providing the opposite gender from their first name, 3) having different geographical locations from where they answered the city, state, or country they lived in, or 4) provided different responses about their

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demographic information (i.e., date of birth, college name) from their interest survey to their part one survey. Additionally, three participants started to complete the part one survey and stopped after approximately 6-11% completion rates.

Variables with limited variance among groups, such as those with options that had no endorsed responses, were dummy coded to form binary variables (i.e., Race changed to White and Person of Color, Gender to be males and females, and Marital Status to be single/never married and married). Due to the small sample size, some continuous variables were changed into categorical variables to compile similar individuals into groups based on their experiences at work or school. For example, the number of work hours was converted from a continuous variable to three groups that consisted of short part-time hours (0-20 hours), longer part-time hours (21-40 hours), and full-time hours of 40+ hours to encompass overall work time commitment. Also, daily hours spent on campus were categorized into five separate groups to note different timeframes spent at school, separated into virtual only (0 hours), 1-3 hours to encompass those who take one or two classes on campus (i.e., 9 credit hours), 4-5 hours for those who have two or three classes on campus (i.e., 12-15 credits), 5-6 hours encompass students who have 3 or 4 classes on campus, and 7+ hours encompass students who attend multiple classes, engage in extracurricular activities, and/or study on campus. Lastly, commute time to campus was grouped into four separate categories to signify 15-minute time differences for transportation to campus.

Within the primary analyses, the sleep variables assessed included total sleep duration, global sleep quality from Global PSQI score, global sleep health from total RU-SATED score, and regularity from the RU-SATED measure. Secondary analyses will examine the For substance use, the main substances assessed were alcohol, tobacco/vaping, marijuana, and use of sleep medications. Finally, for free time activities and leisure time satisfaction, the number of

free days per week, LTS total score, and REQ total score were included. Secondary exploratory analyses examined the individual component scores on the PSQI as well as the total Sleep Beliefs Scale score for sleep, cigarette use and drug use for substance use, the two mental health variables of PHQ8 and GAD7 total scores, and the four individual component scores of REQ to assess for additional associations.

Descriptive statistics and frequencies run for each variable of interest are in Table 2 below. Statistical analyses for quantitative analyses were performed using Statistical Package for the Social Sciences (SPSS) Statistics (Version 29, IBM Corp., Armonk, NY, USA). Due to the small sample size, the Shapiro-Wilk test was run to assess for normality across all variables and those with a p-value above 0.05 were considered to be normally distributed. Additionally, histograms were created and viewed to visually determine normal distribution. For those that were determined to be normally distributed, point-biserial correlations were run for continuous outcome variables with the dichotomous independent sociodemographic variables of race, gender, marital status, and parent status. To confirm the assumption of equal variances, a Levene's Test was run for each dichotomous independent variable with the continuous dependent variable to confirm the two groups varied (see Supplemental Table 1). Tests with non-significant p-values (over 0.05) were considered as two different groups with equal variances, thus permitting permission to proceed with Pearson point-biserial correlational analyses.

Spearman's correlations were run to investigate the relationship between the continuous variables of age, sleep variables of Global PSQI, RU-SATED total, and total sleep duration to encompass the dimensions of sleep health that college students commonly report (Dautovich et al., 2021; Becker et al., 2018; Lund et al., 2010), and the time commitment variables of LTS total and REQ total, with the other categorical or ordinal variables among SES, sleep, substance use, and free time activities. Chi-square tests of independence evaluated statistically significant

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associations between categorical (binary, ordinal, or nominal) variables of race (white=1, person of color = 2), gender (male=1, female=2), marital status (yes=1, no=2), parental status (yes=1, no=2), and ordinal or categorical values of SES, substance use, and free-time activities. For SES, individual income was categorized by low (\$0-50K), middle (\$50-100K), and high income (over \$100K) and subjective SES was coded as low perceived status (rungs 1-5) and high perceived status (rungs 6-10). Job status was coded in categories as full-time job (1), part-time job (2), student only (3), and unemployed (4). Although many of the ordinal values from SES could be used as continuous variables due to their nature of hierarchical order, for small sample sizes, the assumption that the different hierarchical levels or categories are evenly spaced out may not be reliable, and thus, treating the variables as ordinal variables is more appropriate.

Although the sleep variables can commonly be categorized into separate groups to differentiate between good sleepers vs. poor sleepers, especially on the PSQI or RU-SATED measures, for this study, part of the inclusion criteria was to have poor sleep, so most of the participants were poor sleepers. Thus, it is more appropriate to identify the sleep variables as continuous variables to note differences across the spectrum of sleep concerns. Of note, the regularity variable was ranked to match the responses on the RU-SATED measure (0=rarely/never, 1=a little, 2=A lot).

For the substance use variables, the AUDIT was categorized into low risk (0-7), hazardous use/moderate risk (8-15), and alcohol dependence/severe risk (16+). Tobacco use was categorized based on responses on TAPS 1 regarding frequency of use (0=never/no use, 1=few days over past month, 2=weekly use, 3=daily or almost daily). Marijuana use was scored with categories based on responses on TAPS 2 regarding use and others' concern for use (0=never/no use, 1=urge to use, 2=others concerned about use). Use of sleep medications was scored in

categories similar to tobacco use but with different frequency response (0=not during the past month, 1=less than once a week, 2=1-2 times per week, 3=3+ times per week).

Finally, for the free time activities, the Leisure Time Satisfaction (LTS), Recovery Experiences (REQ), and number of free hours per week were scored as continuous variables. The number of free days per week was scored as ordinal based on day per week. Free time choice was scored as binary variable (yes=1, no=0) and free time satisfaction was scored in categories of not at all satisfied (0), a little satisfied (1), and a lot satisfied (2). Commute time was categorized in 15 minute increments with 0-15 minutes (0), 16-30 minutes (1), 31-45 minutes (2), 45-60 minutes (3), and over 60 minutes (4). For all analyses, all p-values below 0.05 were considered statistically significant.

### *Qualitative Analyses*

Using the Charmaz (2006) method of three phase coding, two research assistants reviewed each transcript line by line separately and found common keywords, statements, and themes to capture emerging concepts and important themes associated with each question (Harris & Harper, 2014). Then, for the second phase of focused coding, the research investigator assessed the initial coding to examine discrepancies, identify salient codes, and count frequencies of codes to designate common themes. Then, for the final phase of focused coding, the common themes were ranked in order of highest counts to lowest, with the top three to four themes being incorporated into the qualitative analyses. All thematic coding analyses were conducted in both Microsoft Excel and NVivo software (Version 15, Lumivero Co., Denver, CO, USA).

### *Mixed Methods Analyses*

For each aim of the study, quantitative analyses and qualitative thematic coding were completed separately. Results were compared and evaluated in response to the hypotheses being estimated for the study. For the mixed methods design, the demographic variables of age, race,

gender, individual income, subjective SES in United States, job status, and number of children were assessed to determine which were most commonly associated with sleep health by the RUSATED measure of good versus poor sleep health as well as with substance use measures from AUDIT and TAPS to determine mild versus severe substance users. Next, responses from questions asked during the interview about barriers related to sleep behaviors, substance use, and success in school, social life, and free time were incorporated into free-choice questions asked from the survey. Finally, time commitments were assessed to determine what time demands and external factors influenced their sleep, substance use, leisure time, and mental health. See Table 1 below for full details of the mixed-methods design plan. See Figure 3 below for conceptual data analytic plan for mixed-methods design.

### ***Aim 1: Sample Characteristics***

To evaluate associations between the sociodemographic variables within this sample, descriptives (see Table 2), correlational analyses (see Table 4) and chi-square tests (see Table 3) were run. The majority of the sample (55.8%) were in the younger age range of 18-21 compared to the overall age range of the sample being 18-29 years old. For gender status, approximately two-thirds (63.9%) of the sample identified as being female. For race, the sample consisted of 40% identifying as White and 60% identifying with races other than White (i.e., Black or African American, Asian, or Alaskan Native). Due to the small representation within the Asian and American Indian or Alaskan Native groups, a new variable of “People of Color” participants was created to encompass all three races that were not White.

**Table 1.** *Mixed Methods Design Question Analysis Plan & Qualitative Theme Conceptualization*

<b>Aims &amp; Hypotheses</b>	<b>Quantitative - Survey Questions</b>	<b>Qualitative – Interview Questions</b>	<b>Themes</b>
<p><b><u>Aim 1:</u></b> Examine recruitment capability and sample characteristics of community college students to determine need for intervention.</p> <p><b>Hypothesis:</b> Community college students will consist of low-income, minority race/ethnicity, employed and first-generation students. They will be more easily accessible through online platforms and in nontraditional, alternative intervention locations (i.e., classrooms, workplace).</p>	<p>Descriptive statistics for and bivariate correlations between demographic questions (gender, race, ethnicity, education, SES, marital status, etc.)</p> <p>Accounts of qualitative free responses for “What format is most suitable to connect with students in community colleges?”</p>	<ul style="list-style-type: none"> <li>• What is the best way to reach out to and interact with community college students? What format would be most successful and helpful?</li> </ul>	<p>Community College Student Characteristics</p> <p>Intervention Format</p>
<p><b><u>Aim 2:</u></b> Understand sleep health needs and substance use of community college students in Alabama.</p> <p><b>Hypothesis:</b> Community college students will describe poor health behaviors, especially poor sleep health (RU-SATED) and substance use (AUDIT, TAPS).</p>	<p>Descriptive statistics for sleep parameter variables, global PSQI score, RU-SATED score, and Sleep Beliefs Scale, as well as frequency of substance use from AUDIT and TAPS will be run.</p> <p>Bivariate correlations between sleep measures and substance use measures to assess relationship between sleep (PSQI, RU-SATED) and substance use (AUDIT, TAPS) among community college students.</p> <p>Accounts of qualitative free responses for “What are common sleep difficulties of students attending community college?”</p>	<ul style="list-style-type: none"> <li>• What are common sleep complaints among your peers or other students attending community college?</li> <li>• What patterns/types of substances do you see among community college students? What types of substances are used to help sleep?</li> <li>• If you could change one thing about your sleep, what would you pick? What would you need?</li> <li>• What are some common reasons why community college students use substances?</li> </ul>	<p>Sleep Concerns</p> <p>Poor Health Behaviors</p> <p>Substance Use Risk</p>

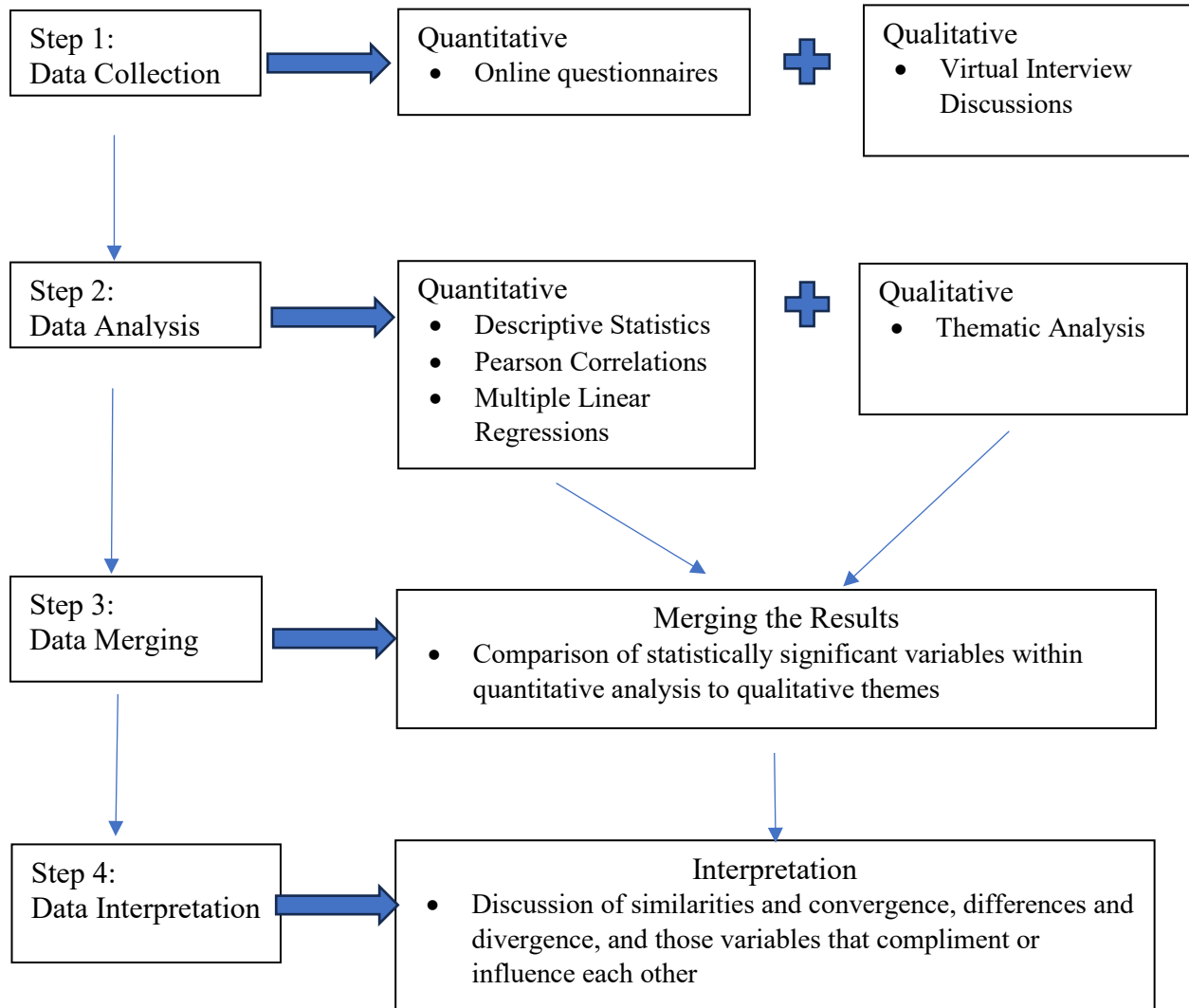
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<p><b><u>Aim 3:</u></b> Assess the suitability of the study procedures and practicality of the intervention within this population, including time availability, space, and assessment tools.</p> <p><b>Hypothesis:</b> Community college students will describe challenges to their success based on regular time commitments and limited free leisure time. The measures will be applicable and suitable within this population of community college students.</p>	<p>Bivariate Correlations between time commitments and leisure time stress/satisfaction (SCAR, LTS, REQ)</p>	<ul style="list-style-type: none"> <li>• What time commitments or social responsibilities impact your free-time activities?</li> </ul>	<p>Leisure Time Availability</p> <p>Social Responsibilities</p> <p>Stress and Emotional Burden</p> <p>Psychological Detachment</p>
<p><b><u>Aim 4:</u></b> Evaluate what environmental factors and barriers challenge the students’ success and what resources are available to community college students.</p> <p><b>Hypothesis:</b> Environmental factors related to neighborhood, SES, and social relationships as well as time commitment barriers (i.e., jobs, caretaking, etc.) will challenge their success. Minimal resources will be indicated.</p>	<p>Descriptive Statistics and Bivariate Correlations between sociodemographic variables (i.e., SES, marital status, children, single parent)</p> <p>Bivariate correlations between sociodemographic variables and time-commitment questions and proposed SCAR as well as leisure time satisfaction by LTS and REQ</p>	<ul style="list-style-type: none"> <li>• What prevents you from getting enough sleep during the week (i.e., daytime activities, other time commitments, sleep/bedroom environment, etc.)?</li> <li>• What are the barriers to get help for substance use among community college students?</li> <li>• What do you find are some common barriers to being successful in college? What about in your social life?</li> <li>• How have you tried to overcome these barriers? What are some possible solutions?</li> </ul>	<p>Barriers</p> <p>Challenges</p> <p>Leisure Time Satisfaction</p>

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<p><b><u>Aim 5:</u></b> Describe student’s perceptions of a proposal telehealth behavioral health intervention and what recommendations are given.</p> <p><b>Hypothesis:</b> Students will describe a need for a possible intervention and will offer suggestions on what should be included and how it can be implemented.</p>	<p>Account responses to: - “What sleep recommendations would be helpful to learn more about?” “What format would you like to see the intervention offered in?”</p>	<ul style="list-style-type: none"> <li>• If a health intervention or educational class was offered to community college students on sleep, what would you suggest should be included? What information, resources, &amp; methods?</li> <li>• What sleep recommendations would be most helpful or interesting to include within a health intervention related to sleep improvement among community college students?</li> <li>• If you could promote a behavioral health intervention at your campus or to your peers, what would you say to sell it and entice them to try it?</li> </ul>	<p>Behavioral Health Intervention</p> <p>Sleep Tips and Recommendations</p>
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**Figure 4.** *Conceptual Data Analytic Plan for Mixed-Methods Design*

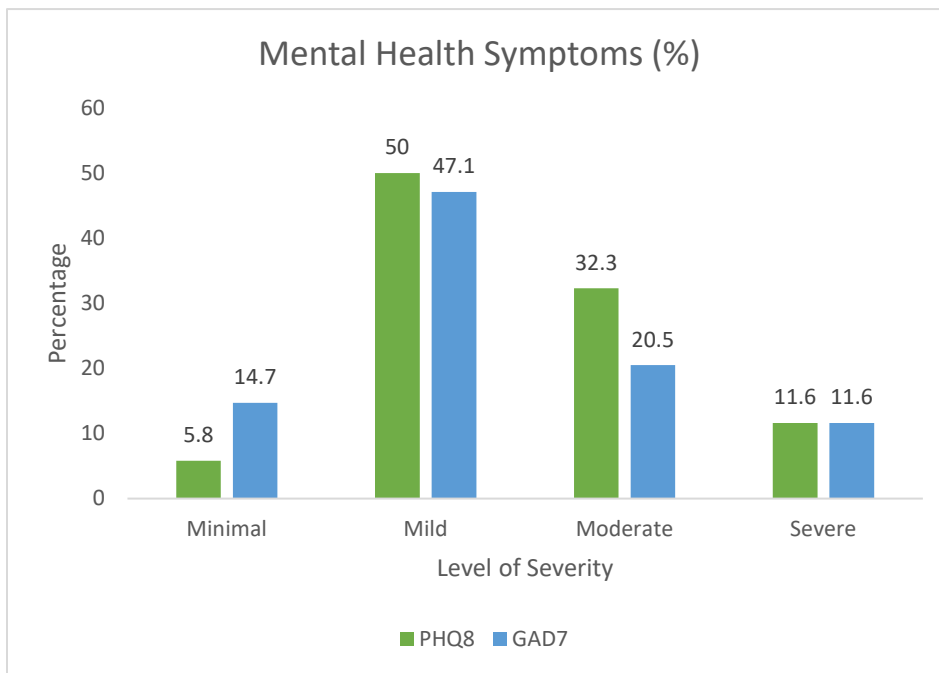


For socioeconomic status, the majority of the sample (55.6%) identified as having significantly low individual annual income (i.e., \$0-25K) and less than one-fifth (19.5%) identified as high annual income (i.e., more than \$100K). For household income, less than a fifth (13.9%) of the sample identified as significantly low annual income, while 41.6% of the sample identified as high annual income. The majority of participants (58.4%) reported their household size was 3-4 individuals. Lastly, despite many falling in the low-income bracket, for perception of their social status as indicated on the MacArthur Scale of Subjective Status, the majority of the sample identified as high SES, or top half of the socioeconomic ladder, among both the

United States (64.6%) and within their community (62.8%). For job status, approximately two thirds (63.9%) of the sample reported having a job, either full-time or part-time, while balancing their academic courseload. For other sociodemographic variables, the majority identified as being single or never married, while approximately 13.9% (n=5) reported being married and one reported being engaged during the part two interview. Approximately 11.1% of the sample (n=4) reported being a parent or co-parent.

For mental health, approximately half the participants reported mild symptoms of both depression (50%) and anxiety (47.1%), with almost one third reporting moderate depressive symptoms (32.3%) and one-fifth endorsing moderate anxiety symptoms (20.5%). See Figure 4 above for additional visual representation of the mental health statistics.

**Figure 5.** *Frequencies of mental parameters from GAD-7 and PHQ-8 among sample (N=36)*



**Table 2.** *Descriptive Statistics of the Sample (N = 36)*

	<i>N (%)</i>
<b>Age</b>	22.67 (SD = 3.39)
<b>Gender</b>	
Female	23 (63.9)
Male	13 (36.1)
<b>Race</b>	
White	14 (38.9)
Participants of Color	21 (58.4)
Black/African American	19 (52.8)
Asian	1 (2.8)
American Indian	1 (2.8)
Prefer not to Respond	1 (2.8)
<b>Individual Income</b>	
\$0-24,999	20 (55.6)
\$25-49,999	3 (8.3)
\$50-74,999	2 (5.6)
\$75-99,999	2 (5.6)
\$100-124,999	2 (5.6)
\$125-149,999	4 (11.1)
\$150-174,999	1 (2.8)
\$175-200,000	1 (2.8)
Prefer not to respond	1 (2.8)
<b>Household Income</b>	
\$0-24,999	5 (13.9)
\$25-49,999	6 (16.7)
\$50-74,999	5 (13.9)
\$75-99,999	1 (2.8)
\$100-124,999	3 (8.3)
\$125-149,999	2 (5.6)
\$150-174,999	4 (11.1)
\$175-200,000	3 (8.3)
Over \$200,000	3 (8.3)
Prefer not to respond	4 (11.1)
<b>First Generation Student</b>	
Yes	16 (44.4)
No	20 (55.6)
<b>Marital Status</b>	
Single/Never Married	31 (86.1)
Married	5 (13.9)
<b>Parental Status</b>	
Yes	4 (11.1)
No	32 (88.9)
<b>Number of Children</b>	
0	32 (88.9)
1	1 (2.8)
2	2 (5.6)
5	1 (2.8)

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<b>Job Status</b>	11 (30.6)
Full-Time Job	12 (33.3)
Part-Time Job	11 (30.6)
Student Only	2 (5.6)
Unemployed	
<b>Shift Work***</b>	12 (41.4)
Yes	17 (58.6)
No	
<b>Number of Work Hours Per Week*</b>	21 (63.7)
0-20	5 (15.2)
21-39	7 (21.2)
40+	
<b>Number of Free Days Per Week**</b>	
No Days	1 (2.9)
One Day	9 (26.5)
Two Days	16 (47.1)
Three Days	5 (14.7)
Four Days	2 (5.6)
Seven Days	1 (2.9)
<b>Number of Free Hours on Work Days**</b>	
0-4 hours	18 (52.8)
5-8 hours	13 (38.2)
9-12 hours	1 (2.9)
20-24 hours	2 (5.8)
<b>Number of Free Hours on Free Days**</b>	
0-4 hours	4 (11.7)
5-8 hours	8 (23.5)
9-12 hours	9 (26.3)
13-16 hours	1 (2.9)
17-20 hours	1 (2.9)
21-24 hours	11 (32.3)
<b>Free Day Choice**</b>	
Yes	28 (82.4)
No	6 (17.6)
<b>Free Time Satisfaction**</b>	
Not at all	5 (14.7)
A little	17 (50.0)
A lot	12 (35.3)
<b>Daily Hours at School</b>	$M=4.08$ ( $SD=3.06$ )
0-2 hours	13 (36.1)
3-5 hours	10 (27.9)
6-8 hours	10 (27.9)
8+ hours	3 (8.3)
<b>Commute Time to School</b>	$M=39$ ( $SD=36.4$ )
0-15 minutes	6 (18.7)
16-30 minutes	12 (37.5)
31-45 minutes	6 (18.7)
46-60 minutes	4 (12.5)
60+ minutes	4 (12.5)

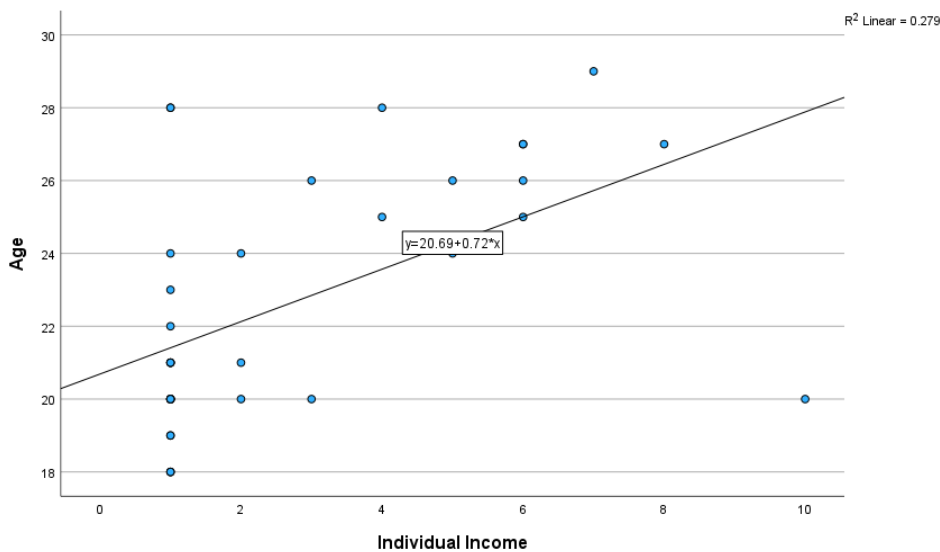
**Transportation Method**

Driving personal car	21 (58.3)
Carpooling or taking Lyft/Uber/Taxi	4 (11.1)
Bus/Shuttle	9 (25.0)
Bike/Scooter	3 (8.3)
Walk	5 (13.9)

\* $n=33$ , \*\* $n=34$ , \*\*\* $n=29$ ; Sample sizes were different based on participant responses and/or willingness to respond.

Associations between age and other demographic variables were assessed through spearman correlations (see Table 4). Age was significantly negatively associated with gender but not related to race, such that younger participants were more likely to be female, and since the mean age was 22.67 and more than half were female, the sample comprised predominantly younger females. Age was significantly positively related to individual income and subjective SES in the United States, such that as age increased, SES income factors also increased (see Figure 6 below). Lastly, age was not associated with job status but was negatively associated with parent status (coded as yes=1, no=2), indicating that as age increased, there was a higher likelihood of being a parent.

**Figure 6.** Scatterplot Graph of Association between Age and Individual Income



**Table 3.** Correlation Matrix of Age and Sleep Variables with Demographics, SES, and Substance Use Variables

	Age <sup>a</sup>	Sleep Duration	Global PSQI <sup>b</sup>	RU-SATED <sup>b</sup>	Regularity	PHQ8	Descriptives <i>M (SD)</i>
Descriptives <i>M (SD)</i>	22.67 (3.39)	5.99 (1.47)	10.69 (3.67)	6.26 (2.24)	1.23 (0.60)	9.65 (5.36)	--
<b>Demographics</b>							
Age <sup>a</sup>	--	-.021	--	--	-.089	-.018	22.67 (3.39)
Gender <sup>a</sup>	<b>-.490**</b>	-.057	--	--	<b>.008**</b>	.171	1.64 (0.49)
Race <sup>a</sup>	.111	.110	--	--	.090	<b>-.371*</b>	1.60 (0.50)
Parent Status <sup>a</sup>	<b>-.573**</b>	.083			.619	.019	1.58 (0.50)
<b>SES Variables</b>							
Indiv. Income <sup>b</sup>	<b>.554**</b>	.027	<b>.554**</b>	.163	.240	-.131	2.75 (2.49)
US Ladder <sup>b</sup>	<b>.463**</b>	.090	<b>.463**</b>	.100	.887	.043	5.10 (2.09)
Job Status <sup>b</sup>	.032	.185	.032	.134	.542	.109	2.53 (1.48)
<b>Sleep Variables</b>							
Sleep Duration <sup>a</sup>	-.021	--	--	--	--	--	5.99 (1.47)
Global PSQI <sup>a</sup>	.017	<b>-.674**</b>	--	--	--	--	10.69 (3.67)
RU-SATED <sup>a</sup>	.071	<b>.606**</b>	<b>-.574**</b>	--	--	--	6.26 (2.24)
Regularity <sup>b</sup>	-.089	.171	-.201	<b>.470**</b>	--	--	1.23 (0.60)
<b>SUD Variables</b>							
AUDIT <sup>b</sup>	<b>.440**</b>	-.172	.072	-.078	.989	-.112	5.41 (6.66)
Tobacco Use <sup>b</sup>	<b>-.359*</b>	.029	<b>-.348*</b>	.115	.567	-.062	2.29 (1.87)
Marijuana Use <sup>b</sup>	.148	-.048	.226	.193	.645	-.167	0.62 (1.10)
Sleep Med Use <sup>b</sup>	.045	.108	<b>.362*</b>	.200	<b>.050*</b>	-.081	0.97 (1.07)

a= Pearson Zero-order correlation; b=Spearman correlation; \* $p \leq .05$ . \*\* $p \leq .01$

Chi-square tests of independence were run to assess the associations between all other demographic variables. Individual income was significantly associated with gender, job status, and parental status, but was not associated with race or perception of social status in the United States (see Tables 4-6). This suggests that women, those who were employed, and parents were more likely to have higher individual incomes. Gender and race were not associated with any other demographic variables. Subjective SES in the United States, parental status, and job status were also not associated with any other demographic variables.

**Table 4.** *Chi-Square Test Results for Associations between Demographic and SES Variables*

	1	2	3	4	5	6
	$x^2$ (df)	$x^2$ (df)	$x^2$ (df)	$x^2$ (df)	$x^2$ (df)	$x^2$ (df)
1 Race	--	0.33 (1)	1.94 (1)	5.47 (8)	13.26 (9)	0.34 (3)
2 Gender		--	3.31 (1)	<b>16.71 (8)*</b>	12.33 (9)	3.95 (3)
3 Parental Status			--	<b>18.03 (8)*</b>	13.48 (9)	5.39 (3)
4 Individual Income				--	80.10 (63)	<b>43.66 (24)**</b>
5 Subjective SES in US					--	29.81 (27)
6 Job Status						--

\* $p \leq .05$ , \*\* $p \leq .01$

### ***Aim 2: Sleep Health and Substance Use of Community College Students***

As described above, sleep health is characterized by six dimensions of sleep: duration, quality or subjective satisfaction, timing, efficiency, alertness during waking hours, and regularity, or the consistency of a regular sleep schedule. For this study, the primary sleep variables incorporated into analyses were sleep duration (Component 3 of PSQI; coded as continuous variable by total hours of sleep), sleep quality (Global PSQI score; coded as a continuous variable from total score), sleep timing (Regularity from RU-SATED measure; coded

as categorical variable with higher scores indicating more endorsement or 0=rarely/never, 1=a little, 2=a lot), and global sleep health (RU-SATED total score; coded as a continuous variable). The majority of the sample (97.1%) reported having poor sleep quality, as defined by Global PSQI scores over 5 (Buysse et al., 1989). Approximately 85.7% of the sample signified never, rarely, or sometimes feeling satisfied with their sleep. One-fifth (20%) of the sample identified as having normal sleep onset latency, or 30 minutes or less to fall asleep, whereas 14.3% identified as having moderate sleep onset latency (31-60 minutes to fall asleep), leaving approximately two-thirds of the sample (65.5%) to report severe or long sleep onset latency. Almost two thirds (62.7%) of the sample reported short sleep duration per night, or less than the recommended 7 hours of sleep per night. More than half the current sample (57.2%) endorsed poor sleep health (RU-SATED scores from 0 to 6). Finally, over 63% endorsed more positive and realistic beliefs about sleep (score over 10), and a quarter of the overall sample (25.9%) meeting the cutoff score of 15 or higher to identify potential risk for clinical insomnia. See Table 2 for descriptives of sleep variables. Also, see Figures 7 and 8 for visual representation of sleep parameter frequencies among the sample.

### *Demographics and Sleep Health*

Sleep duration was not statistically associated with any demographic or SES variables. Global sleep quality was positively associated with individual income and subjective SES in the United States (see Table 4) but not associated with the other demographics or job status (see Figure 9 below), such that better sleep quality is associated with higher perceived social status and higher individual income. Global sleep quality was also negatively associated with both sleep duration and global sleep health, such that better sleep quality is associated with longer sleep duration and better global sleep health (See Figure 10 below).

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**Table 5.** *Chi-Square Test Results for Associations of Sociodemographic, SES, Sleep, and Substance Use Variables by Gender*

	Gender						$X^2 (df) = p$
	Total N=35		Male n = 13		Female n = 22		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
By Race							
White	14	40.0	6	46.2	8	36.4	.326 (1) = .568
Person of Color	21	60.0	7	53.8	14	63.6	
By Parental Status							
Yes	4	11.1	1	7.7	3	13.0	.241 (1) = .624
No	32	88.9	12	92.3	20	87.0	
By Individual Income							
Low income (\$0-50K)	23	63.9	4	30.8	19	82.6	<b>16.71 (2) = .033*</b>
Middle Income (\$50-100K)	4	11.2	1	7.7	3	13.0	
High Income (\$100K+)	8	22.3	7	53.9	1	4.3	
By Subjective Status							
Low Perceived Status (0-5)	21	58.8	5	41.6	15	68.2	12.33 (1) = .195
High Perceived Status (6-10)	14	41.2	7	58.4	7	31.7	
By Job Status							
Full-Time Job	11	30.6	4	30.8	7	30.4	3.95 (3) = .267
Part-Time job	12	33.3	4	30.8	8	34.8	
Student Only	11	30.6	3	23.1	8	34.8	
Employed	2	5.6	2	15.4	0	0	
By Sleep Regularity							
Rarely/Never	3	8.6	2	15.4	1	4.5	<b>9.71 (2) = .008**</b>
A little	21	60	11	84.6	10	45.5	
A lot	11	31.4	0	0.0	11	50.0	
By AUDIT							
Low Risk (1-7)	25	73.5	6	50.0	19	86.4	5.49 (2) = 0.064
Moderate Risk (8-15)	5	14.7	3	25.0	2	9.1	
Severe Risk (16+)	4	11.8	3	25.0	1	4.5	
By Tobacco Use							
Never	11	32.4	5	41.7	6	27.3	2.10 (3) = .553
Few Days	4	11.8	2	16.7	2	9.1	
Weekly	2	5.9	1	8.3	1	4.5	
Daily or Almost Daily	17	50.0	4	33.3	13	59.1	
By Marijuana Use							
No use	25	73.5	9	75.0	16	72.7	4.40 (3) = .221
Moderate risk	1	2.9	1	8.3	0	0.0	
High risk	4	11.8	0	0.0	4	18.2	
Problematic risk	4	11.8	2	16.7	2	9.1	
By Use of Sleep Medications							
No use in past month	15	42.9	3	23.1	12	54.5	<b>10.61 (3) = .014*</b>
Less than once per week	11	31.4	7	53.8	4	18.2	
1-2 times per week	4	11.4	3	23.1	1	4.5	
3+ times per week	5	14.3	0	0.0	5	22.7	

\*p ≤ .05, \*\*p ≤ .01

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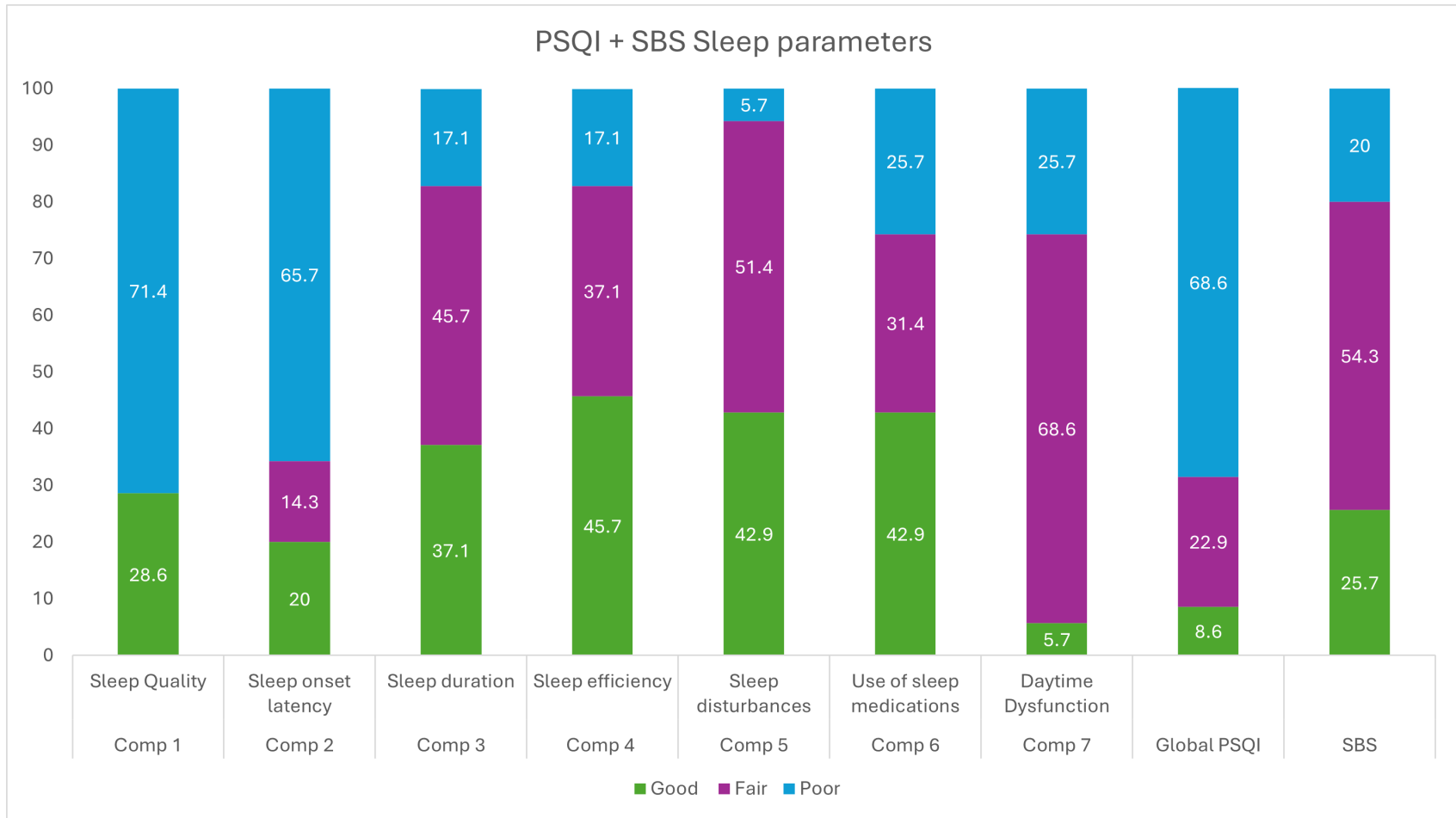
**Table 6.** Chi-Square Test Results for Associations of Demographic, SES, Sleep, and Substance Use Variables by Race

	Race						$X^2 (df) = p$
	Total N = 35		White n = 14		Person of Color n = 21		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
<b>By Gender</b>							
Male	13	37.1	6	42.9	8	57.1	.326 (1) = .568
Female	22	62.9	7	33.3	14	66.7	
<b>By Parental Status</b>							
Yes	4	11.4	0	0.0	4	19.0	.301 (1) = .083
No	31	88.6	14	100.0	17	81.0	
<b>By Individual Income</b>							
Low income (\$0-50K)	22	62.9	8	57.2	14	71.3	5.47 (2) = .707
Middle Income (\$50-100K)	4	11.4	3	21.4	1	4.8	
High Income (\$100K+)	8	22.9	3	21.4	5	23.9	
<b>By Subjective Status</b>							
Low Perceived Status (0-5)	21	57.5	10	71.5	9	47.5	13.53 (9) = .140
High Perceived Status (6-10)	14	42.5	4	28.5	10	52.5	
<b>By Job Status</b>							
Full-Time Job	11	31.4	5	35.7	6	28.6	.341 (3) = .952
Part-Time job	11	31.4	4	28.6	7	33.3	
Student Only	11	31.4	4	28.6	7	33.3	
Unemployed	2	5.7	1	7.1	1	4.8	
<b>By Sleep Regularity</b>							
Rarely/Never	3	8.8	3	21.4	0	0.0	4.83 (2) = .090
A little	21	61.8	7	50.0	14	70.0	
A lot	10	29.4	4	28.6	6	30.0	
<b>By AUDIT</b>							
Low Risk (1-7)	24	72.7	11	84.6	13	65.0	1.55 (2) = .460
Moderate Risk (8-15)	5	15.2	1	7.7	4	20.0	
Severe Risk (16+)	4	12.1	1	7.7	3	15.0	
<b>By Tobacco Use</b>							
Never	11	33.3	3	23.1	8	40.0	1.87 (3) = .599
Few Days	4	12.1	1	7.7	3	15.0	
Weekly	2	6.1	1	7.7	1	5.0	
Daily or Almost Daily	16	48.5	8	61.5	8	40.0	
<b>By Marijuana Use</b>							
No use	24	72.7	10	76.9	14	70.0	4.38 (3) = .223
Moderate risk	1	3.0	1	7.7	0	0.0	
High risk	4	12.1	2	15.4	2	10.0	
Problematic risk	4	12.1	0	0.0	4	20.0	
<b>By Use of Sleep Medications</b>							
No use in past month	14	41.2	5	35.7	9	45.0	0.39 (3) = .943
Less than once per week	11	32.4	5	35.7	6	30.0	
1-2 times per week	4	11.8	2	14.3	2	10.0	
3+ times per week	5	14.7	2	14.3	3	15.0	

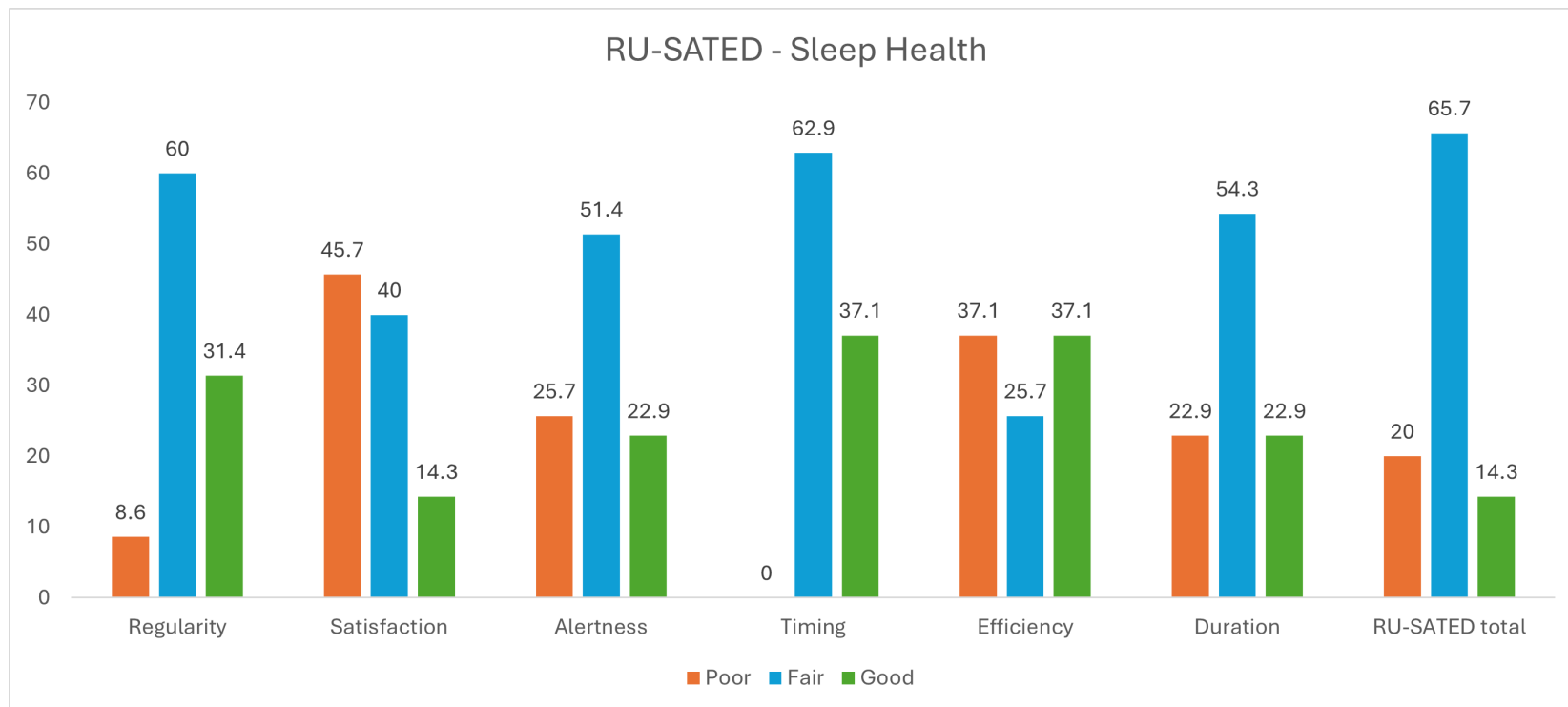
\*p ≤ .05, \*\*p ≤ .01

SLEEP, TIME, & HEALTH IN COMMUNITY COLLEGE STUDENTS

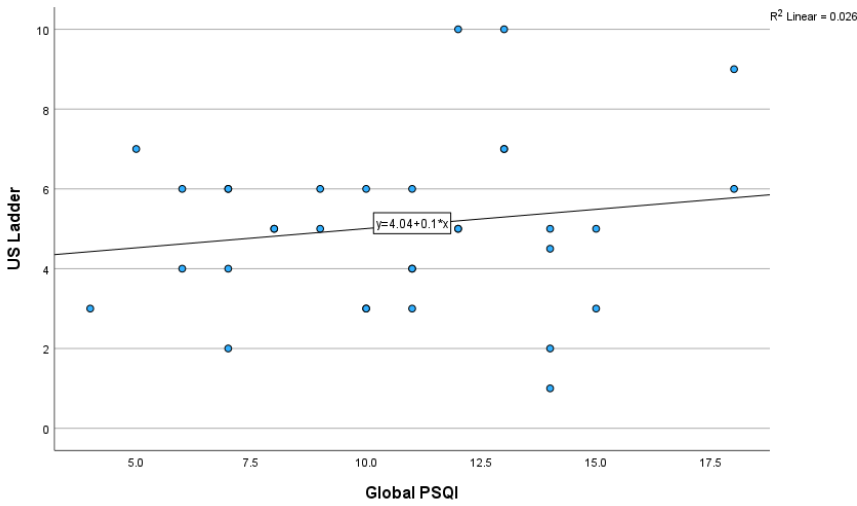
**Figure 7.** Frequencies of sleep parameters from PSQI and SBS measures among sample (N=35)



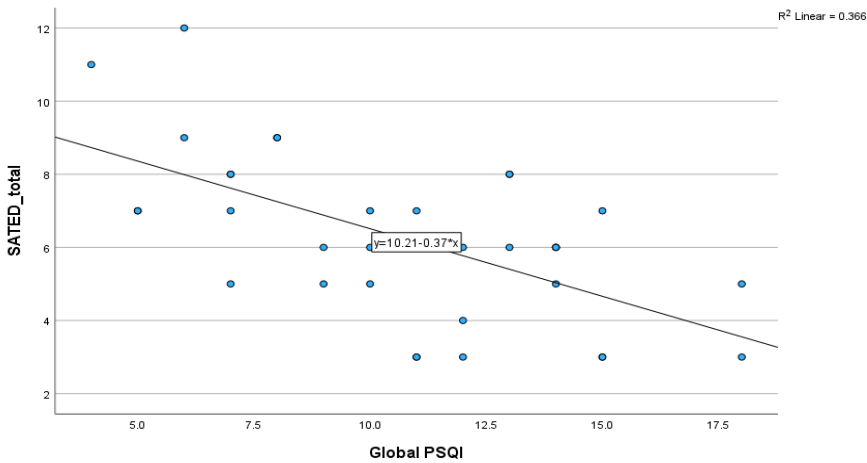
**Figure 8.** *Frequencies of sleep parameters from RU-SATED among sample (N=35)*



**Figure 9.** Scatterplot Graph of Association between Subjective SES and Global PSQI score



**Figure 10.** Scatterplot Graph of Association between Global Sleep Quality and Global Sleep Health



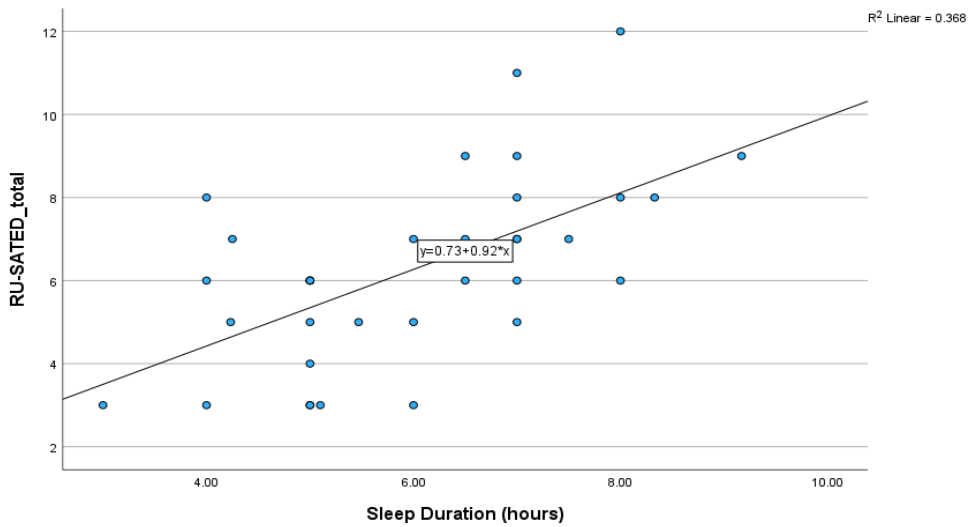
Sleep regularity, or maintaining a consistent sleep schedule, was positively associated with gender but not statistically associated with any other demographic or SES variables, or women were more likely than men to have a more consistent sleep schedule (see Tables 5-7). Sleep duration was positively associated with global sleep health, such that longer sleep duration was associated with better sleep health (see Figure 11 below). Similarly, sleep regularity was associated with global sleep health, or those who have a more consistent sleep schedule (better sleep regularity) were more likely to endorse better sleep health.

**Table 7.** Chi-Square Results for Association between Sleep Regularity, SES, and SUD Variables

	Regularity	
	$X^2$ (df)	<i>p</i>
Parent Status	.958 (2)	.619
Individual Income	19.57 (16)	.240
US Ladder	11.17 (18)	.887
Job Status	5.01 (6)	.542
AUDIT	12.35 (26)	.989
Tobacco Use	4.82 (6)	.567
Marijuana Use	4.23 (6)	.645
Sleep Medication Use	<b>12.60 (6)</b>	<b>.050*</b>
Descriptives - <i>M</i> ( <i>SD</i> )	1.23 (0.60)	

\* $p \leq .05$ . \*\* $p \leq .01$

**Figure 11.** Scatterplot Graph of Association between Sleep Duration and Global Sleep Health



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Semi-structured interviews also exemplified difficulties with sleep parameters as noted from the responses to the question, “What are some common sleep difficulties of students attending your community college?” The most common responses were “stay up later than desired” and “difficulty falling asleep,” which both relate to previously endorsed long sleep onset latency, as well as “difficulty waking up, feeling lethargic, oversleeping,” potentially pointing to short sleep duration and poor sleep quality to lead to feeling excessive daytime sleepiness and daytime fatigue. To assess for what might be impacting these sleep difficulties, participants were asked “What influences your overall sleep or prevents you from getting a good night sleep?” Many students described electronics use or screen time, late-night work for school or job, and increased cognitive arousal related to anxiety and stress being the main factors that influence their delayed bedtime and short sleep duration. One student stated, “Sometimes [I am] on the phone too much and don’t get to sleep [soon] enough because of that,” and another remarked, “Phones are my biggest problem, like TikTok and stuff like that. I just get so stuck on it. You know I never go to bed because I’m always on it.” A few students also indicated other electronics, like TV or video games, impact their total sleep time, with one student stating, “A lot of guys that I’m friends with all play video games. It’s like, ‘One more game, one more game’ and then they’ll go to bed with only two to three hours to sleep,” and another stating, “I’ll stay up all night watching TV shows and stuff like that on YouTube.” Multiple students reported increased worry or overthinking prior to sleep, such that one stated, “Sometimes if you are going through stress, personal issues, [or] academic pressures might contribute to you not being able to sleep,” and another remarked, “I guess a lot of nights I end up thinking too much. Overthinking, I have a problem with that.” Finally, some students described having difficulty with waking up in the morning, stating, “I would love to get up earlier in the mornings, and like I would love to be

able to wake up without feeling like such a pain” or another stating, “I wake up and I’m tired. I’m groggy.” Lastly, when asked about changing one thing about their sleep, many indicated they would want to maintain a more consistent sleep schedule or routine, go to bed earlier so that they could increase their total sleep time, and limit electronic devices prior to sleep. See Table 8 below for additional information about qualitative themes in semi-structured interviews.

**Table 8.** *Qualitative Themes for Sleep Health Identified in Transcripts of Semi-structured Interviews*

Theme	Cases	Code	Paraphrased Representative Quote
<b>Sleep Complaints</b>	17	28	“I hear that a lot of people don’t, well they fall asleep a lot later than usually, because of working on assignments and they don’t get as much sleep as they want.”
Difficulties falling asleep	9	10	
Difficulty staying asleep	6	9	
Short sleep duration	6	6	
Feeling lethargic, fatigued	6	6	
Irregular sleep schedule	4	5	“I have difficulty waking up due to feeling lethargic and oversleeping,”
<b>External Impacts on Sleep</b>	14	33	
Cognitive Arousal	11	16	“Sometimes if you are going through stress, personal issues, [or] academic pressures might contribute to you not being able to sleep”
Light/Environment	11	15	
Electronic Devices	7	12	
Substances	6	7	
School/Work	5	7	
Social Activities	3	4	
Physiological Arousal	2	3	
Homelife Responsibilities	2	2	
Bed Partner/Roommates	2	2	
Bathroom Use	2	2	
<b>Desired Change to Sleep</b>	17	25	“I would definitely try my best to stay away from all my electronics. I’ll definitely shut them off and like move them away from my bed as far as possible.”
Limit electronic devices	5	5	
Fall asleep faster	4	4	“If I had to pick one, I would choose to fall asleep faster and easier. And not having anxiety.”
Consistent sleep schedule	3	5	
Less awakenings	3	4	
Decrease cognitive arousal	3	3	
Sleep longer	3	3	
Bed partner or environment	3	3	
Wake up earlier	2	2	
			“I would love to get up earlier in the mornings”

#### *Substance Use Variables*

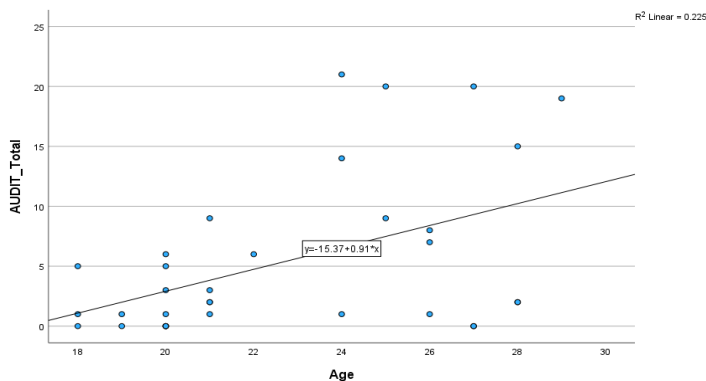
A majority of the sample (70.6%) endorsed mild alcohol use on the AUDIT, whereas 11.7% reported hazardous use of alcohol, and 14.6% reported alcohol dependence, which is

indicative of a moderate to severe alcohol use disorder. Similarly, a majority of the sample (88.3%) endorsed responses on the BYAACQ that indicate low risk for alcohol use disorder, or a total score of 7 or lower. For tobacco use, approximately one third of the sample (32.4%) reported never using tobacco, while more than half (55.9%) reported using tobacco weekly or daily. When focusing specifically on cigarette use, endorsement was lower than the preliminary, broader tobacco question, with approximately 14.7% endorsing smoking a cigarette in the past month. For marijuana use, more than two-thirds of the sample (73.5%) denied smoking marijuana in the past month, while 23.6% endorsed significant use with an urge to use and others expressing concerns about their use. Finally, for drug use (i.e., heroin, cocaine, or other illicit drugs), more than three quarters of the sample (76.5%) denied using drugs in the past month, with approximately 11.8% using drugs on a weekly or daily basis. See Table 9 for all descriptives of substance use.

*Associations between Demographics and Substance Use*

As presented in Table 3, age was positively associated with AUDIT total score, such that older age was associated with more alcohol use (see Figure 12). Age was negatively associated with tobacco use, signifying that younger participants were more likely to be vaping or engaging in tobacco use. Age was not statistically associated with marijuana use or sleep medication use.

**Figure 12.** Scatterplot Graph of Associations between Age and AUDIT scores



**Table 9.** *Descriptives and Frequencies of Substance Use among the Sample (N=36)*

	<i>N (%)</i>
<b>AUDIT</b>	
Mild Risk (0-7)	25 (73.5)
Hazardous Use (8-15)	5 (14.6)
Dependence (16+)	4 (11.7)
<b>BYAACQ</b>	
Low Risk (0-5)	26 (76.5)
Moderate/High Risk (6+)	8 (23.4)
<b>Tobacco Use</b>	
Never/No use in past month	11 (32.4)
Few days over past month	4 (11.8)
Weekly use	2 (5.9)
Daily or almost daily use	17 (50)
<b>Cigarette Use</b>	
Never/No use	29 (85.3)
10+ Cigarettes/day	2 (5.9)
Smoked within 30 minutes of waking	2 (5.9)
<b>Marijuana Use</b>	
Never/No use	26 (73.5)
Urge to Use	4 (11.8)
Others concerned about use	4 (11.8)
<b>Drug Use</b>	
Never/No use	26 (76.5)
Few days in past month	2 (5.9)
Less than weekly	2 (5.9)
Weekly	2 (5.9)
Daily or almost daily	2 (5.9)
<b>Use of Sleep Medications</b>	
Not during the past month	15 (42.9)
Less than once a week	11 (31.4)
1-2 times per week	4 (11.4)
3+ times per week	5 (14.3)

*Note:* Total counts for substance use questions were 34 due to two participants choosing not to complete these questions specifically. Only the sleep question had n=35.

Chi-square tests were run between the substance use variables and other demographic (race, gender; see Tables 5 and 6) and SES variables (see Table 10). AUDIT total score was statistically significantly associated with individual income and subjective SES in United States but was not statistically associated with any other SES variable. This suggests that those who have a higher income or higher perception of their social status may be more likely to drink

alcohol. Tobacco use was statistically associated with parental status but none of the other SES variables, suggesting that participants who are parents may be more likely to engage in tobacco use. Marijuana use and drug use were both statistically associated with subjective SES in United States but not any of the other SES variables, indicating that those who engaged in marijuana use and drug use were more likely to perceive their social status as higher than others in the United States. Finally, use of sleep medications was statistically associated with both gender and subjective SES in United States but none of the other SES variables. Thus, women were more likely than men to use sleep medications and those with a higher perceived social status were more likely to use sleep medications than those with a lower perceived social status. Race was not statistically significantly associated with any of the substance use variables.

**Table 10.** *Chi-Square Test Results for Associations between SES and SUD Variables*

SES	AUDIT		Tobacco Use		Marijuana Use		Use of Sleep Meds	
	$X^2$ (df)	<i>p</i>	$X^2$ (df)	<i>p</i>	$X^2$ (df)	<i>p</i>	$X^2$ (df)	<i>p</i>
Individual Income	<b>156.86 (104)**</b>	<b>&lt;.001</b>	34.59 (24)	.075	24.35 (24)	.442	33.72 (24)	.090
US Ladder	<b>143.53 (108)*</b>	<b>.013</b>	34.20 (27)	.159	<b>48.58 (27)**</b>	<b>.007</b>	<b>47.58 (27)**</b>	<b>.009</b>
Parental Status	12.37 (13)	.498	<b>10.61 (3)*</b>	<b>.014</b>	2.61 (3)	.457	3.92 (3)	.270

\* $p \leq .05$ . \*\* $p \leq .01$

When queried about the common reason for substance use during interviews, most students reported their use was to help with relaxation, stress-relief, or sleep related concerns (i.e., falling or staying asleep or waking up). Related to relaxation, one student stated, “I know that a lot of people use it (alcohol) to relax or kind of just forget about everything that’s going on for a minute,” and another remarked, “Weed, they all think it’s cool and the biggest relaxer.” Some spoke of the impact of substances on sleep, stating for alcohol, “They have to take some small portion of alcohol so they can have a peaceful sleep,” or for marijuana, “When it comes to

sleep, I would say weed is mostly used to try and get to sleep,” or for vaping, while others commented on the stress-relief benefits, stating “I feel like people just do it because it calms their nerves.” See Table 11 below for additional details of substance use themes.

**Table 11.** *Qualitative Themes for Substance Use Identified in Transcripts of Semi-structured Interviews*

Theme	Cases	Code	Paraphrased Representative Quote
<b>Common Substances Used</b>	14	23	
Caffeine	9	9	“I definitely know people that are addicted to caffeine...like they really need it to like, stay awake. So I know caffeine's a big one.”
Vaping	7	9	
Marijuana	7	8	“I feel like everybody vapes at some point, those little like
Alcohol	6	7	disposables you get at the gas station. I very rarely see
Sleep Meds	6	6	anybody without one of those in their hands at this point.”
<b>Reason for Substance Use</b>	12	20	
Relaxation	6	9	“I think it gives them a calming effect, but also it's peer
Help to sleep	6	6	pressure.”
Peer pressure	5	6	
Help to stay awake	4	4	“Well if they are tired and falling asleep in class, they probably want to drink some coffee to keep them awake.”

#### *Association between Sleep and Substance Use*

Associations between substance use and sleep variables (duration, global sleep quality, global sleep health, and regularity) are described with Spearman correlations (see Table 4). More regularity, or the ability to maintain a consistent sleep schedule, was associated with more sleep medication use, suggesting that those who use sleep medications were more likely to maintain a consistent sleep schedule than those who do not. One-third (33.3%) of participants endorsed using substances for sleep onset and approximately one-fifth (19.5%) endorsed using substances to stay awake in response to the questions, “Do you use substances to help you fall asleep?” and “Do you use any substances to help you stay awake?” Response options were either “yes” or “no” and if answered “yes”, then a follow-up question asked them “If so, which ones?” to prompt a free-form response.

*Post-Hoc Analyses for Aim 2*

Exploratory analyses of spearman correlations and chi-square tests were run to explore the association of the additional components of the PSQI (sleep onset latency, sleep efficiency, daytime dysfunction, sleep disturbances) and the Sleep Beliefs Scale with the demographic and substance use variables to determine if significant associations continued based on individual sleep parameters or were only due to a global combination of the sleep dimensions (see Supplemental Table 2). Subjective sleep quality (component 1 of PSQI) was associated with individual income, suggesting that those with higher incomes were more likely to report better subjective sleep quality. Sleep efficiency, daytime alertness, and daytime dysfunction were not associated with any demographic or SES variables. Students' beliefs about sleep were negatively associated with age, individual income and subjective SES within United States but was not associated with other sociodemographic variables, such that as older age, higher income, and higher perceived social status were associated with more negative beliefs about the negative effects to sleep. Lastly, their beliefs about sleep were negatively associated with alcohol use only, not other substance use variables, such that more alcohol use was associated with more negative beliefs on the effects of sleep .

Associations between the mental health variables, sleep, and substance use variables were also explored with Spearman correlations and chi-square tests (see Supplemental Tables 2 and 4). PHQ8 was negatively associated with race, such that White participants had higher depressive symptoms and participants of color endorsed less depressive symptoms. GAD7 and PHQ8 were positively correlated with each other, indicating that more depressive symptoms were associated with more anxiety symptoms. There were no other significant associations between mental health and demographic, SES, sleep, or substance use variables.

Since the TAPS tobacco variable encompasses all forms of tobacco use, including cigarettes, e-cigarettes, cigars, pipes, and smokeless tobacco, exploratory analyses were run with the cigarette use only variable. Additionally, drug use was explored to see if there were any associations between drug use, demographics, and sleep variables (see Supplemental Table 4). Cigarette use was positively associated with age and statistically associated with individual income, suggesting that older participants and those of higher income were more likely to smoke cigarettes than younger participants and those with lower income. Short sleep duration and poor sleep quality were both associated with more cigarette use. Drug use was only associated with subjective SES in the United States.

### *Mixed Method Integration*

Overall, there were similarities and differences between the qualitative and quantitative findings for understanding sleep health and substance use among this sample. During the semi-structured interviews, many students reported difficulty with falling asleep, which also was reflected on the PSQI with approximately two-thirds of the sample (65.7%) endorsing long sleep onset latencies. Additionally, many students described feeling lethargic and tired throughout the day, which was also displayed on their PSQI and RU-SATED total scores, with approximately 25.7% endorsing poor daytime dysfunction and alertness, 51.4% endorsing fair alertness, and 68.6% endorsing fair daytime dysfunction. Lastly, one additional sleep complaint frequently reported during the interviews that was not directly assessed on the survey was the use of electronic devices, which many students indicated negatively impacted their sleep.

For substance use, many students reported alcohol, marijuana, vaping, and caffeine were frequently used among community college students; however, the amount of endorsed substance use responses on the survey were limited, potentially due to students minimizing their overall use or due to fear of being penalized. Furthermore, on the survey, students could report frequency or

others' concern for use, but the interview offered the space for additional impacts to substance use and barriers to receiving help.

***Aim 3: Study Procedures, Intervention Practicality, and Time Availability of Sample***

Descriptive statistics and frequencies were run for the time commitments (i.e., number of free days per week, job status, number of work hours per week), leisure time availability and satisfaction measures (i.e., free time choice, free time/days per week, leisure alone time satisfaction, LTS total). See Table 2 for detailed descriptives. Frequencies of student activity engagement responses on SCAR were also run (see Figure 14). Associations between age, leisure time satisfaction, and recovery experiences were run with Pearson correlations (see Table 12). Spearman correlations were run between age and the other time commitment and leisure time variables (see Table 13). Chi-square tests were run to examine associations of sociodemographic variables (marital status, parental status, number of children, and job status) with time commitment and leisure time variables (See Table 14). Due to the nature of responses, the SCAR was excluded from correlational analyses and reviewed through frequencies only, as some questions were incorrectly asked due to researcher error or many participants appeared to be uncertain or guarded in their responses. Responses to the interview question, "What time commitments or social responsibilities impact your free-time activities?" were incorporated into the mixed-methods design to provide additional context to quantitative survey responses.

The majority of participants (63.7%) reported working a job 20 hours or less per week. Approximately half of participants (47.1%) endorsed having two free days per week, with the number of free hours varying but most commonly reported as between 8-12 hours per day. Further, the majority of the sample (82.4%) endorsed having free days where they were able to decide how to spend their time. Lastly, when asked about their overall satisfaction with their free

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time to be alone, most participants (85.3%) reported having a little to a lot of satisfaction with the amount of free time they have to themselves.

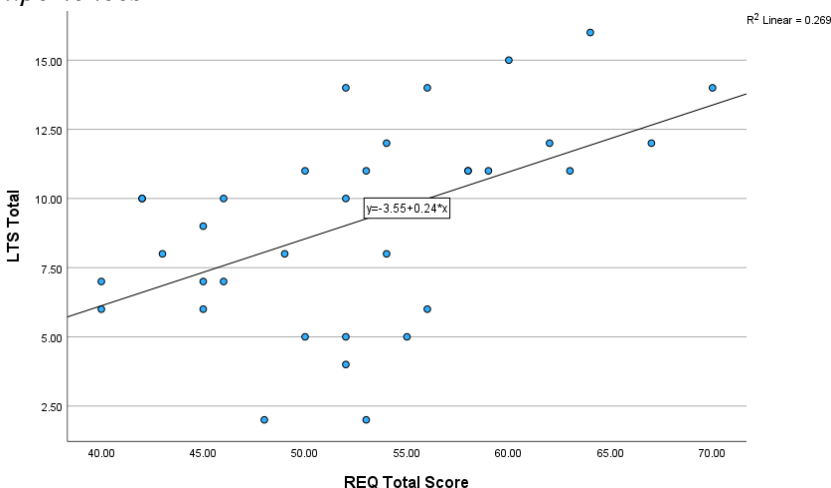
Age, race, and gender were not statistically significantly correlated with free time choice or the total score on either the LTS or REQ (see Tables 12 and 13). Leisure time satisfaction total score was positively correlated with both free time choice and REQ total score (see Table 12), such that more freedom of choice for free time activities and more recovery from free time after work was associated with more leisure time satisfaction (see Figure 13 below). There were no statistically significant associations between leisure time satisfaction, recovery experiences, free time or days per week with SES. Job status was associated with the number of hours at work and on campus (see Table 14).

**Table 12.** *Pearson Zero-Order Correlation Matrix of Variables with Descriptives*

	1	2	3	4
1 Age	--	-.009	.093	-.174
2 Free Time Choice		--	<b>.451**</b>	-.104
3 LTS Total			--	<b>.519**</b>
4 REQ Total				--
Mean	22.67	0.82	9.12	52.38
Standard Deviation	3.39	0.39	3.60	7.72

\* $p \leq .05$ , \*\* $p \leq .01$

**Figure 13.** *Scatterplot Graph of Association between Leisure Time Satisfaction and Recovery Experiences*



**Table 13.** *Correlation Matrix of SES and Leisure Time Variables with Descriptives*

	Free Days per Week	Time on Free Days	LTS Total	REQ Total
Gender <sup>a</sup>	.104	.337	-.305	-.165
Race <sup>a</sup>	-.091	-.082	.145	-.010
Parent Status <sup>a</sup>	.176	.288	.063	.294
Individual Income <sup>a</sup>	.187	-.223	.168	-.111
Subjective SES in US <sup>a</sup>	-.019	-.161	.226	-.079
Number of Children <sup>b</sup>			<b>-.373*</b>	-.280
Job Status <sup>b</sup>	.042	-.262	.154	-.002
Number of Work Hours <sup>b</sup>	<b>.385*</b>	--	-.035	.022
Number of Hours on Campus <sup>b</sup>	-.050	--	.000	-.103
Commute Time (in minutes) <sup>b</sup>	<b>-.450**</b>	--	<b>-.359*</b>	-.314

a= Pearson correlation; b=Spearman correlation; \* $p \leq .05$ . \*\* $p \leq .01$

**Table 14.** *Chi-Square Test Results for Associations between Sociodemographic and Time Commitment Variables*

	1	2	3	4	5	6	7
1 Marital Status	--	<b>4.91 (1)*</b>	<b>9.09 (3)*</b>	0.97 (3)	5.22 (2)	3.21 (3)	2.92 (4)
2 Parent Status		--	<b>36.00 (3)**</b>	2.89 (3)	0.76 (2)	2.71 (3)	2.29 (4)
3 Number of Children			--	6.14 (9)	6.70 (6)	9.11 (9)	9.62 (12)
4 Job Status				--	<b>27.19 (6)**</b>	<b>18.32 (9)*</b>	17.55 (12)
5 Number of Work Hours					--	9.97 (6)	13.95 (8)
6 Number of Hours on Campus						--	19.72 (12)
7 Commute Time (in minutes)							--

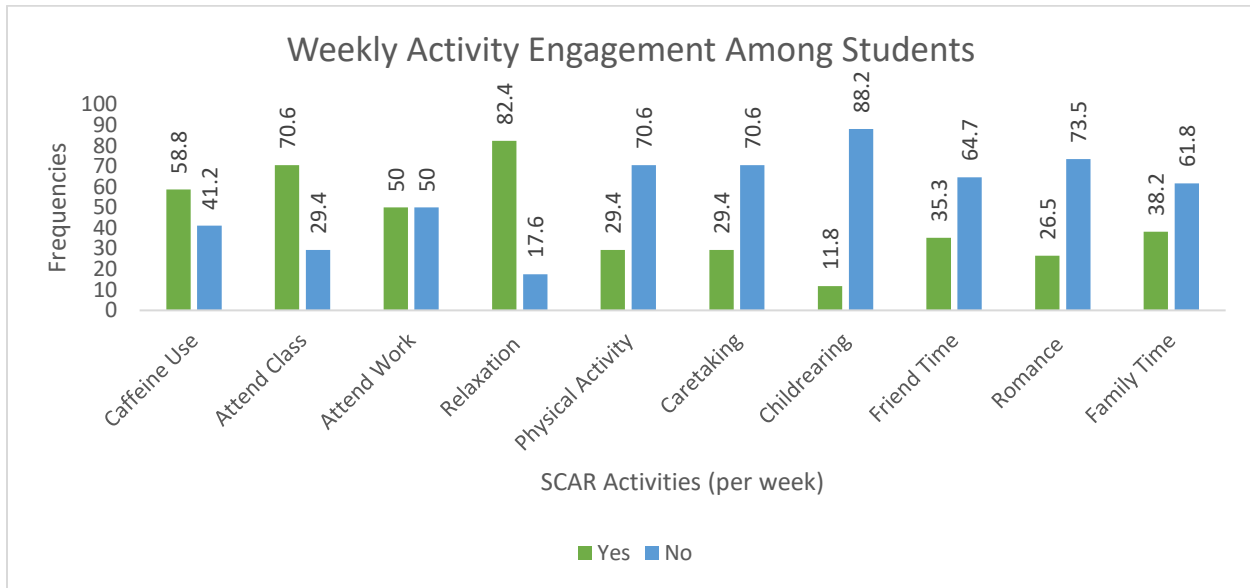
\* $p \leq .05$ . \*\* $p \leq .01$

More than half of students (58.8%) endorsed drinking caffeine within the past week.

Approximately 70.6% of students endorsed attending class and 50% endorsed going to work in the past week. Although over 82% of students endorsed having relaxation time over the past week, almost two thirds of students (64.7%) denied having social time, over 61% denied having

family time, and almost three-fourths (73.5%) denied having time to spend with their romantic partners. See Figure 14 below for additional frequencies.

**Figure 14.** *Frequency Statistics of Student Engagement in Weekly Activities on SCAR (n=34)*



Additional frequencies were run on the survey questions that asked about free time activities and their potential effects on the participant, such as “What is your main purpose to attend social activities?”, “What are the negative effects of attending these social activities?”, and “How do you feel after attending social activities?” (see Table 15 below). More than half the sample (51.9%) reported attending social activities for fun or entertainment with a close second response (41.4%) being to engage in social time. Most participants reported feeling either satisfied (34.3%) or tired (25.7%) after attending social activities. Similarly, when asked about the negative effects of attending social activities, more than one third endorsed subsequent feeling of being tired or exhausted (37.1%) or they take away from study time (31.4%). Future studies should assess the relationship between attendance of social activities and sleep parameters, especially sleep quality and satisfaction.

**Table 15.** *Frequency Statistics of Social Activities for the Sample (N=36)*

	<i>N (%)</i>
<b>Main Purpose of Attendance</b>	
Stress reduction	9 (31)
Social time	12 (41.4)
Broaden your knowledge	5 (19.2)
For fun/entertainment	14 (51.9)
Earn some form of reward/payment	2 (8)
<b>Negative Effects of Attendance</b>	
Take away from study time	11 (31.4)
High psychological pressure/mood changes	6 (17.1)
Make you tired and exhausted	13 (37.1)
Some activities have little value	7 (20.0)
<b>Feeling After Attendance</b>	
Satisfied	12 (34.3)
Relaxed	6 (17.1)
Tired	9 (25.7)
Nothing	1 (2.9)

Lastly, the length of time that it took participants to complete both the part one survey and the part two interview was reviewed. For the part one quantitative survey, it took participants anywhere from 8 minutes to 1 hour and 29 minutes to complete the survey, with the average time being around 31 minutes to complete the online survey. In reviewing the responses to the online survey, most of the questionnaires were completed accurately, with the exception of the SCAR, as noted earlier. Additionally, the free form responses, especially those specific to time, created more variability and ambiguity. For example, when participants were asked how many hours per workday they have for free time, some responded with long answers, such as “9 hours in class, 2 hours doing homework, some hours going on a walk, and then otherwise varies,” thereby not answering the original question. Others responded with answers that were not logically possible, such as having 24 hours of free time on a day that they work their full or part-time job. Future studies should consider setting responses that could be answered and then leaving a free-form option after to describe further if they would so choose.

For part two, the original format was proposed to be conducted as a 90-minute focus group. However, after a few weeks of recruitment difficulties to accrue the group size and find availability for all participants, some participants (n=5) were lost to follow-up or decided to end their participation before completing Part two. Thus, the part two focus group was modified to 30–60-minute interviews with same questions to accommodate availability for the sample, and scheduling became easier to accommodate, especially due to shorter time window. Many students were available on the weekend mornings or in the weekday late afternoons between 4-6pm. The individual interviews varied in length based on participants' responses, ranging from 15 minutes to 70 minutes, with the average time being approximately 23 minutes.

### *Mixed Method Integration*

Overall, there were similarities and differences between the qualitative and quantitative findings for time availability and suitability of intervention for this sample. Although the majority of the sample (63.9%) reported being employed, either full-time (30.6%) or part-time (33.3%), many (61.7%) reported having one to two free days available throughout the week, with approximately half (46.9%) having over five hours of free time on work days and 87.9% reported having over five hours of free time on their free days. Furthermore, 82.4% of the sample reported having a choice in what activities they engaged in on their free days. One main difference seen between the survey and the interviews was that students included their sleep hours into their overall free time on the survey, but during the interviews, students described school or work obligations as their main impact and did not consider sleep in their responses. Further, many described having ample free time they could choose to do with. The responses given during the semi-structured interviews offered additional information to the ease of utilizing various measures among community college students, as well as the possibility of offering a

future behavioral sleep health intervention and what extracurriculars are available to students that were not otherwise mentioned on the part one survey.

***Aim 4: Barriers to Students' Success and Available Resources***

Descriptive statistics and frequencies of sociodemographic variables are included in Table 2. Pearson point biserial correlations and spearman correlations were run to test the association between leisure time satisfaction (LTS total score) and recovery satisfaction (REQ total score) with these sociodemographic variables (see Table 10). Associations between the SES and other sociodemographic variables were run with chi-square tests (See Table 13). Thematic codes from the interview questions that assess for barriers to adequate sleep health, substance use help, academic success, social life success, free time success, and solutions to barriers were also incorporated to enhance understanding. Secondary exploratory analyses were run later to explore the alone time satisfaction (LTS question 1) and the four REQ component scores individually (Relaxation, Psychological Detachment, Mastery, and Control; see Supplemental Table 5).

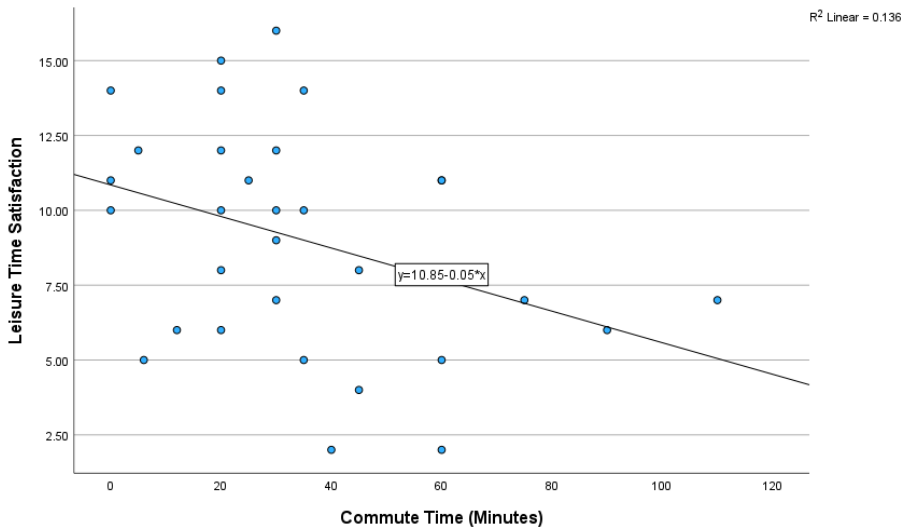
As previously identified, a majority of the sample identified as being single or never married (86.1%) and did not endorse having parental responsibilities (88.9%). Additionally, approximately two-thirds (63.9%) of the sample reported being employed with either a full-time or part-time job and over 30% identified being a student only. This indicates that most of the work time commitments for community college students within this sample are related to employment or school obligations. Upon further review, the average number of daily hours spent at school from the sample was approximately four hours, with the most common response being zero to two hours on campus (36.1%), potentially encompassing the solely online students. When considering transportation and commute time into limiting free time, the average commute time to school was 39 minutes, with over 43% taking longer than 30 minutes to commute to campus. The average type of transportation used by community college students within this sample was

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driving their personal car (58.3%) or a quarter (25%) taking the bus or shuttle, which could mean duration may vary due to potential traffic or weather conditions.

Parental status and marital status were not statistically significantly associated with leisure time satisfaction or recovery experiences. Leisure time satisfaction was negatively associated with the number of children and commute time, such that shorter commute time and more children were associated with more leisure time satisfaction (see Figure 15).

**Figure 15.** Scatterplot Graph of Association between Commute Time and Leisure Time Satisfaction

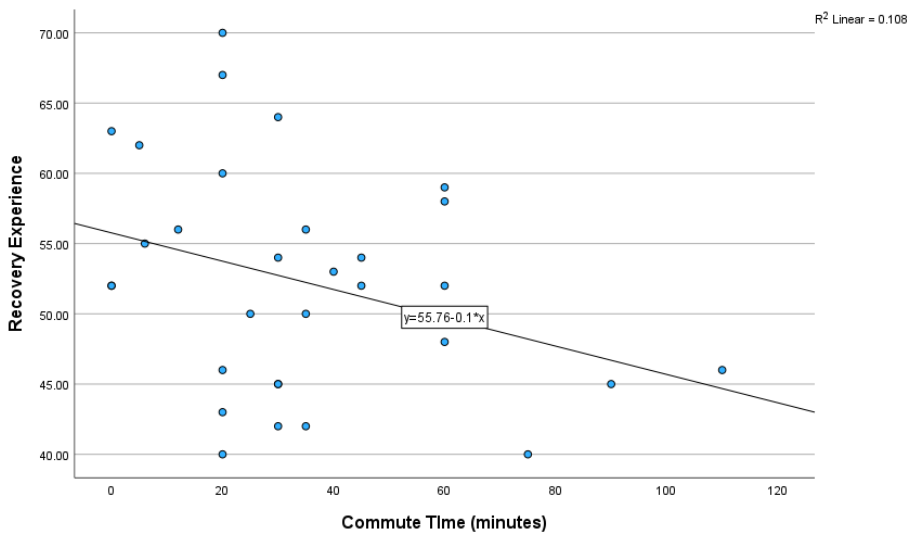


Marital status was statistically associated with parental status, suggesting that those who were married were more likely to be a parent than those who were single or never married. Number of children was statistically correlated with marital status and parental status, suggesting that those who were married and a parent were more likely to have children than those who were not married or not a parent. Job status was statistically associated with the number of weekly hours spent at work and number of daily hours spent on campus, indicating that those who were employed were more likely to spend more time at work and on campus than those who were unemployed. Commute time was not statistically associated with any sociodemographic variable.

*Post-Hoc Exploratory Analyses*

Parental status and marital status were not associated with relaxation or psychological detachment from the REQ measure. Number of children was statistically correlated with alone time satisfaction, suggesting that those with children were more likely to feel satisfied with their alone time than those without children. The REQ Mastery score, or learning new skills off work was negatively associated with commute time, such that a longer commute to campus is associated with less time to learn a new skill during off-work activities (see Figure 16).

**Figure 16.** Scatterplot Graph of Association between Commute Time and Recovery Experiences



*Substance Use Resources and Common Barriers to Help*

When students were asked, “What resources are available for substance use help among community colleges?” the majority of students did not have an answer or were uncertain of what was available. For those that provided an answer, the common themes discussed were attending counseling or therapy, calling or texting a hotline number, or seeing posters, flyers, or pamphlets around campus (see Table 16). Some were more hesitant in their responses, stating, “I’m not sure but I’m assuming they have some counseling services. I want to say I’ve had at least seen some type of counseling services on my syllabus” or “I think I’ve seen a couple like pamphlets and

stuff. I think there's a pamphlet little showcase that they have. I think there is like a flyer or something on the wall. But even, I think like through our emails, they'll send out a number you can text if you are going through anything or feel like you need any type of help." While others evoked more confidence by saying, "I know I've definitely seen little like pamphlets around. I know every once in awhile they'll have tables set up about organizations that help out. I'm pretty sure there are flyers somewhere about organizations that help with that sort of stuff. And I know there's like an online therapy organization that might delve with that." Some indicated that they do not really pay attention to the flyers or the emails when sent out though so were unfamiliar or unsure if those resources were available.

When queried about if there were any barriers to obtaining substance use help, the common themes that were expressed included receiving judgment from others, the stigma about getting substance use help, and the embarrassment or fear of getting help. Some offered further descriptions about these themes by stating, "The whole process is somewhat secretive. Like sometimes when I want help from alcohol, I don't want like the other people to know. I don't want you to know that I'm having trouble with alcohol or marijuana or nicotine. So the therapy sessions, they are secretive," or "Maybe like shame in having to ask for help. And just like the stigma around that sort of stuff." Another student commented on how others might judge a student for seeking therapy, stating, "Well there are people who don't believe in therapy and would heavily judge somebody who went to therapy or who went to get that kind of help." Overall, the common consensus was the concern of receiving therapy even if the resources were available out of embarrassment, shame, or concern of judgment from others for receiving help.

#### *Barriers to Academic Success*

The most common themes that were discussed for barriers to academic success were fear of asking for help, their busy schedules with work and maintaining consistent routine, and

professors' communication (see Table 16). Related to fear of asking for help, some students reported, "Students oftentimes do not seek out help from the professors and from the school staff, because they're oftentimes scared of reaching out to them that much," or "Personal barriers within your own mind can prevent you from getting out and getting help if you need it. And sometimes I just don't know what they are talking about" or "Like feeling scared to talk to a teacher because it's different from high school. But you're so lost. But you're scared to speak up, and then you never know (the answer)." They also acknowledge the difficulties with obtaining tutoring if they are night school or online students, alluding to how the tutoring hours are specific to students during day and will close before night class students arrive to campus, indicating another barrier to academic success if they were to ask for help.

Additionally, for those students who were not fearful of asking questions, they reported a main barrier to their academic success was lack of communication from their professor. For example, one student provided a story about her friend who did not hear back from his professor, stating, "Some professors don't even care. One guy I know emailed his professor I don't know how many times, and she just never even responded for months on end, and I don't know if my friend even passed the class or dropped out, because she wouldn't communicate with him." With one more student providing a similar personal experience, stating, "I emailed this professor three weeks ago and he just responds this morning. The assignment has been passed and due, and he emails me back this morning!" One student even described how certain professors will not communicate with students online when they have questions, stating, "Some professors will not offer you any help by like messages to Canvas or email. It has to be a phone call or a Zoom meeting or meeting in person, but I live like 45 minutes to an hour and a half from campus, which is just unrealistic for me." Many of the online students reported difficulties with academic

success due to this continued lack of communication from professors to their students.

Furthermore, another student described how her professors' communication with her caused her to leave a class, stating, "Every professor I've talked to, so like four or five, is very condescending. And it doesn't matter how many times he is reported, nothing [happens], no change whatsoever. I don't think it's like that at bigger colleges around here, but I think in these smaller community ones, they just kind of figure out they can get away with it. I had to drop out of that class because I wasn't getting anywhere." Although this appeared to be one of the most common complaints from the sample, some students did include positive feedback about certain professors who have helped guide them in their career planning, class schedule, and assisting them with finding jobs or extracurricular activities. One student even remarked how a professor would be willing to talk with her over the phone when she called for as long as she needed to understand the material. Another student noted that a Facebook page was created to ask for help with questions or certain classes to take, which became an opportunity for camaraderie with her schoolmates, which may not have been as readily available at a larger academic institution. So, although the majority described continued difficulties with professor communication, some students found and provided solutions to these barriers to obtain academic success.

### *Barriers to Social Life*

The most common themes discussed for barriers to social life were social anxiety and being a solely virtual student (see Table 16). One person acknowledged having difficulties with socializing with others, stating, "I'm not a very social person. I struggle with social anxiety. I struggle to interact with people that gets in the middle of my social life, so I end up interacting with very few people in school," and another stated, "As a commuter school, just by like the nature, I feel like it's harder to form connections, especially if you are more introverted like I am." Others described the difficulties to having a social life due to being either a solely virtual

student. One student remarked, “Being a fully online student definitely poses a barrier to meet people and make friends at [my school].”

Although some described the difficulty with having a social life on campus, many provided solutions to the barriers of their social life by stating, “I definitely think [attending class] in person helps a lot more with actually being face to face with somebody and talking with them. Having actual conversation is a good thing.” Another stated, “Being a fully online student, you would have to have that extracurricular in order to make the friends and build the social life.” And yet others described that spending time with their family was more important to them for social activities than making new friends on campus, with one student stating, “I like to visit my family on the weekends since they live close.”

#### *Barriers to Free Time*

The most common themes discussed during the interviews about barriers to having adequate free time were work, school, and social time activities (see Table 16). Many students described having a part-time or full-time job that took up a majority of their day outside of class time. They also detailed their work hours, class schedule, and homework assignment time commitments that limited them from having free time to themselves. Finally, other students described that when they have free time outside of work or class, they would often spend it with friends or family, which limited them from alone time for themselves. One student remarked, “Sometimes I find myself that my working, like my schedule, it’s again hurting me, like I can’t do everything I want.” Others described how if they had free time, they would spend it on social media, which would cause them to have difficulties catching up with everything else happening in their life. For example, one student stated, “Even if I have some like available time maybe going to a class or going to work, and I could take advantage of it to do classwork, I actually don’t want to use that time to do that. And then I’ll have my me time of just like being on social

media, or maybe watching a show or whatever. And then that kind of leaves me scrambling to actually use my time wisely for myself later.”

A solution that was commonly provided during the interviews to having more free time to oneself was time management, setting a schedule throughout the day, or prioritizing tasks. For time management and schedule setting, one student confidently stated, “You definitely need to have a well-balanced discipline and schedule regarding, like all your daily routine activities, including studies, hanging out with friends, and going out on the weekends, every single one of these things. If you have a very well balanced schedule and timetable for all these activities, then I personally believe it should not stop you from achieving your goals.” Another commented, “I feel like scheduling your day ...to a T. It really makes for no wasted time.” Finally, a few students remarked about prioritizing what is most important within your schedule first could offer more space for free time later, such as, “Try to crack down on what I need to get done now, so I can have more free time” or another student stating, “I try to complete my assignments earlier in the week so I can have the rest of the week available for free time or other activities.”

#### *Mixed Method Integration*

Overall, there were similarities and differences between the qualitative and quantitative findings for barriers to success in academics, social life, and free time activities among community college students. For the part one survey, time commitment questions were asked related to hours per week at work, school, or for free time, as well as how the participants feel after social activities. However, the semi-structured interviews asked probing questions about barriers to academics, social life, free time, and substance use to expand these topics further. Thus, although the survey responses may have posed that students had ample free time per week (majority indicated having over 5 hours of free time per day), most of the students who participated in the Part 2 interviews offered many barriers to being successful in their classes,

social life, or leisure time. Furthermore, the interview responses also offered additional information about personalities that hinder social engagement, such as being introverted or having social anxiety. Finally, although the part one survey asked about frequency of substance use, the interview offered space for participants to share barriers, either internal or environmental, that hinder students from seeking help for substance use, such as embarrassment, shame, stigma or judgment from others, and distance to resources.

***Aim 5: Perceptions and Recommendations for a Behavioral Sleep Health Intervention***

To assess for and describe students' perceptions of a potential future behavioral sleep health intervention or seminar and what sleep recommendations to use if administered, frequency statistics were run for the survey question of "What sleep recommendations would be helpful to learn more about?" Multiple options were available to select and an "other" option was available for a free-form response for participants to offer additional suggestions (See Table 18). Over three quarters of the participants (77.8%) endorsed a preference for learning about how to establish a consistent sleep schedule, with a close second response (72.2%) being a desire to learn about how to set a bedtime routine. Approximately half the participants wanted to learn more about naps, as in when they are appropriate to take and for how long, as well as tips on how to make sleep a priority, and how to limit blue light from electronic devices, caffeine, and alcohol prior to bedtime. Nobody selected the "other" option to offer additional suggestions.

Throughout the interviews, participants offered similar topic ideas with some additional format suggestions as well, including being more interactive, using personal examples, and observing real-life situations related to sleep, such as at a local hospital or sleep lab. See Table 17 for further codes and paraphrased representative quotes.

**Table 16.** *Qualitative Themes for Barriers to Success Identified in Transcripts of Semi-structured Interviews*

Theme	Cases	Code	Paraphrased Representative Quote
<b>Barriers to SUD Help</b>	14	20	
Embarrassment	7	7	“Maybe like shame in having to ask for help. And just like the stigma around that sort of stuff.”
Stigma/Judgment	4	4	
Guarded or Unwilling	3	5	“Even if you wanted to stop, do you think you’re going to want to talk to somebody that you don’t know about something you did to yourself?”
Resources (Location/Cost)	3	3	
<b>Barriers to Academics</b>	15	32	
Fear to ask for help	5	7	
Professor Behavior/Communication	3	9	“I have a couple of professors that refuse to answer questions. I emailed this one professor three weeks ago and he just responds this morning. The assignment has been passed and due. And he emails me back this morning!”
Apathy	5	5	
Lack of Resources (books, cost, etc.)	4	5	
Poor Health Behaviors	3	3	
Concentration difficulties	2	2	
Other Time Demands (work, school)	2	2	“It’s not fair to work on top of going to school. If I need a tutor, I have to figure it out myself.”
<b>Barriers to Social Life</b>	14	18	
Social Anxiety	7	7	“I’m not a very social person. I struggle with social anxiety. I struggle to interact with people.”
Virtual student only	4	4	
Prejudice or Judgment	3	3	
Other Time Demands (Work, home)	3	3	“The two biggest things that get in way for me are working full time and being a fully online student.”
<b>Barriers to Free Time</b>	12	15	
School (Classes, Homework)	8	8	
Work	8	8	“If I’m not working, I’m at school. At school, I’m hanging out with friends, so there’s never really any time for myself.”
Social Time	3	3	
Family Obligations	5	6	
<b>Solutions to Barriers</b>	14	21	
Maintain Balanced Schedule/Routine	7	8	“Trying to be more disciplined. Try to crack down on what I need to get done now, so I can have more free time later.”
Social Support (Peers, Social Media)	4	4	
Prioritize important tasks first	3	3	“There is a Facebook page full of students...Being able to share, like common experiences and figure out what other people did to get through their issues....so like the camaraderie helps a lot.”
Self Care or Alone Time	3	3	
Relaxation Strategies	3	3	
Academic Help (Professors, Tutoring)	3	3	

### *Intervention Topic Recommendations*

When asked about what should be included within the intervention topic, the most common themes discussed were time management, the effects of poor sleep, psychoeducation on the different sleep stages and cycles, as well as electronic device effects on sleep (see Table 17). For time management, one student stated, “I think if you were to talk about sleep, things that should be talked about are like planning, ways to manage your time, like sleep tips and also like figuring out the sleep schedule,” and another remarked, “Definitely stuff about time management, because I feel like that always feeds into sleep in some way, shape, or form,” with finally a third stating, “I definitely believe having irregular sleep schedule for college students is a topic or an agenda item that is oftentimes overlooked.” Next, many students recommended including information about the effects of poor sleep and what may negatively impact sleep, such as electronic devices, caffeine, and other substances. One student indicated she would like to learn more about, “what are some things that definitely won’t help you go to sleep, like drinking a ton of coffee or keeping all the lights on, blasting music, or looking at your phone thirty minutes before bed. All those would be very informative and good for students.” Another student suggested “talking about the disadvantages or the bad side effects of the stuff they use to try and manage their sleep, like the games, the weed, the coffee.” One student even specifically asked for a topic focused on how to eliminate technology at night, stating, “Maybe the biggest thing I’d want them to focus on is technology, you know, eliminating technology at night. I mean, that just plays a big role in everybody’s life now, phones, TV, games, and stuff.”

### *Intervention Format Recommendations*

When asked about what format would be best for a potential behavioral sleep health intervention or seminar to be conducted among community college students, the most common response was in a hybrid format, such that it could be held both in-person and virtually to be

available to all students (see Table 17). Since some students are solely online or only attend classes on campus in the evenings, they might miss out on an intervention or seminar class that is offered during the day if only in-person. Some students suggested the option of holding it in-person but videotaping it so that it could be available to watch online at a later time for those who missed it. One student remarked, “I think hybrid could be good, because one thing I have seen at [my school] is that it’s kind of hard to find a time where everybody could go because classes are at different times. If you offered it in person, and then maybe have a recorded Zoom or something going on that could then be like access for other students.” Whereas others recommended the option of holding it in person and virtually at the same time to accommodate both those in person and at home who do not regularly come to campus or who do not have the means to come in person, stating, “Have it in person for those who can come in person and like video for those who might not have the means to meet in person.”

### *Intervention Promotion Recommendations*

Finally, students were asked to offer suggestions or tips of how to promote this potential behavioral sleep health intervention to community college students and what they might say to their fellow peers to entice them to attend. The most common themes that arose included the benefits of how sleep could help them and what the risks of getting poor sleep might be (see Table 17). Some examples of statements that students offered were, “Just talking about mainly it’s benefits of how it really could help people, and not only feel better during the day, but just to get better sleep that is healthier. It’s been proven, at least, that the better your sleep is, the longer you live and the healthier you are because you can. It damages you a lot if you don’t have good sleep” or “Maybe some benefits of actually getting proper sleep, and specifically the things that it leaves and the detriment of it. And if you could connect the lack of proper sleep to that detriment, and then point out the solutions for each thing,” and even, “I would be talking about

the positive sides of this talk and what could come out of it. Like something to do with hope.”

Others recommended to take the opposite approach and to describe the negative benefits of sleep and how this intervention could provide solutions to these difficulties, stating, “I would put in the health risks for not getting enough sleep, which a lot of people don’t realize that mental health plays a huge part in keeping us awake at night and not getting the things done. I think it would draw them in knowing how to manage it properly” or “It damages you a lot if you don’t have good sleep. And I think it’s one of the most important things as humans that we need.”

Some students offered clever and unique ideas to entice their peers to attend, such as “You should offer a stipend,” or “The free food also attracts people. If I hear free food, I’ll sit and listen to whatever you’re telling me,” or “I would probably tell them it’s a free elective. It will be an easy boost to your GPA.” One student offered a helpful marketing recommendation that would bypass the difficulties of recruitment and promotion to this population, stating, “First of all, you have to figure out how to get it to them, because a lot of kids don’t pay attention to their email whether they say they do or not. I would recommend some kind of video for a marketing tactic that is shown in class or made as an assignment to watch the video and get 100.”

### *Mixed Methods Integration*

Overall, the quantitative Part 1 survey and qualitative Part 2 interview offered similar responses, with most students (77.8%) endorsing one or more sleep recommendation to include within a future behavioral sleep health intervention. However, the interview queried for further details about perceptions and recommendations of format, topics, and marketing tips. Overall, students are eager and open to the idea of conducting a behavioral sleep health seminar at their community college and believe focused information on maintaining a consistent sleep schedule, discussing importance and effects of sleep, and reviewing sleep hygiene tips for action-oriented solutions within a hybrid format would be useful and beneficial to their sleep health and success.

**Table 17.** *Qualitative Themes for Possible Behavioral Sleep Health Intervention Identified in Transcripts of Semi-structured Interviews*

Theme	Cases	Code	Paraphrased Representative Quote
<b>Intervention Topic</b>	15	22	“Tips on how to figure out the sleep schedule”
Time Management/Sleep Schedule	7	9	
Sleep “Hygiene” Tips	8	8	“Talking about the disadvantages or bad side effects of stuff they use to manage sleep, the games, the weed, the coffee.”
Importance of Sleep/Sleep Stages	6	6	
Impact of Substances on Sleep	3	3	
Relaxation Strategies	3	3	“Like in person for those who can come in person and like video for those who might not have the means to meet in person.”
<b>Intervention Format</b>	15	25	
Hybrid	8	8	
In-Person Only/Interactive	6	8	
Virtual - Videos Available Later	4	4	“Just talking about mainly its benefits of how it really could help people, and not only feel better during the day, but just get better sleep. That's healthier. It's been somewhat proven, at least, that the better your sleep is, at least not the longer you live, but the healthier you are because it can.”
<b>Intervention Promotion</b>	16	22	
Review benefits of sleep	5	5	
Offer incentives (food, money, etc.	4	4	
Mention costs of poor sleep	3	3	
Words of Encouragement	3	3	

**Table 18.** *Frequency Statistics of Sleep Recommendations to Include in Intervention (N=36)*

	<i>N (%)</i>
Tips on how to make sleep a priority	18 (50.0)
Keep “sleep stealers” out of bedroom	14 (38.9)
How to set a bedtime routine	26 (72.2)
Limit blue light from electronic devices	18 (50.0)
Establish consistent sleep schedule	28 (77.8)
Naps (when to have them and how long)	20 (55.6)
Limit caffeine and alcohol	18 (50.0)

## **Discussion**

Emerging adulthood is a developmental stage that offers both independence and new responsibilities, which inevitably pose challenges to social life, academic success, leisure time, and health behaviors. College students are vulnerable to poor decision making in these areas due to peer pressure, improper time management, and maladaptive coping behaviors. Community college students are at an elevated risk due to financial instability, stress, and less free time from other necessary time commitments, like work and family obligations. These associations are not new to the higher education literature; however, few studies have assessed the relationship of these stressors with health behaviors within community college students independently. To our knowledge, this is the first study to examine the relationship of sociodemographic factors, sleep, substance use and time commitments of community college students.

The first aim of this study was to examine the recruitment capability and sample characteristics of community college students to determine a possible need for intervention. Recruitment strategies presented difficulties and many challenges for the first 9-12 months of the study. Due to technology and the rise of artificial intelligence robots, the participation interest survey peaked over 2,000 responses in total; however, only 183 were eligible. Of those deemed eligible, only 36 participated in Part 1 of the study and 19 participated in Part 2 interview. Artificial intelligence robots created additional time burden to the research staff and posed a concern of validity to responses and a continual concern for obtaining human being participants from online recruitment. Thus, additional identification was requested and attention check questions were incorporated into each survey for the last four months of recruitment. Lastly,

receiving approval to recruit within community colleges required an additional institutional review that delayed recruitment on campuses for a few months and posed limitations in recruitment guidelines and permissions to external researchers. For example, many colleges would not be able or willing to share the study's flyer upon request through individual classes or emails unless approved by college administration. The colleges who approved recruitment assistance sent out the flyer through a mass email to the student body, thereby only those students who read those emails would know to participate. Thus, recruitment within this population poses many difficulties if conducted online. For future researchers, it is recommended to require identity validations prior to participation and incorporate multiple attention checks within all surveys. Additionally, it is encouraged to establish working relationships with the community college administrators and professors prior to recruitment begins and plan consistent face-to-face interactions at the college to enhance recruitment methodology.

For the sample, approximately two-thirds of the students (63.9%) were females and more than half (58.4%) were people of color. Most students were employed either in a full-time or part-time job (83%) and almost two thirds (63.9%) endorsed being within lower socioeconomic status with individual income less than \$50K per year. Slightly less than half the sample (44.4%) endorsed being first generation students. Most of the sample (86.1%) of the sample were single or never married and 88.9% of the students denied having children. Finally, multiple students reported being either solely online students or attending night classes due to distance from campus or working a full-time job. Thus, many students recommended to have any future intervention in the form of either virtual or hybrid format to allow for students who cannot make it to campus or at a specific time for the class to be able to watch it online. Thus, due to these demographics and sample characteristics, it appears that students would be amenable and

interested in an intervention or seminar and that a suitable means to conduct it would be through a hybrid or virtual format to ensure its success and spread of information.

The second aim of this study was to better understand the sleep health and other health behavior needs, like substance use, of community college students across Alabama. Regarding sleep health, a majority of the community college students within this sample reported difficulty falling asleep and short sleep duration, with the average sleep onset latency being over 60 minutes and total sleep time less than six hours per night for two-thirds of the sample. Global sleep quality was positively associated with individual income and subjective SES in the United States and was negatively associated with global sleep health, but was not associated with age, race, parent status, or job status. Thus, as income increases and one's subjective view of their SES increases, their sleep quality may also improve. The mean Global PSQI score was 10.69 (SD=3.67), which is significantly higher than previous findings among university students, whose Global PSQI mean score was 5.64 (SD=2.74) in one sample (Dietch et al., 2016) and another study having a slightly higher mean score of 7.9 (SD=2.83) among college students in Indonesia (Hapsari et al., 2024). In fact, the mean Global PSQI score within this sample is more similar to previous findings among individuals with insomnia who had mean Global PSQI scores of 10.65 (SD=2.79; Dietch et al., 2016), which could be due, in part, to the inclusion criteria.

For overall sleep health, most students (57.2%) identified as having poor sleep health. Within this sample, the mean RU-SATED total score was 6.26, which was slightly lower than previous studies who found a mean score of 6.82 among university populations (Dautovich et al., 2021), suggesting community college students have slightly less overall sleep health than university students. Additionally, approximately two-thirds of the sample (65.7%) reported fair

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sleep health and 20% endorsed poor sleep health, suggesting that a majority of students who attend community colleges experience difficulties with their sleep health.

Regularity, or consistency in sleep timing was positive associated with gender, suggesting that females may have a higher likelihood of maintaining a consistent sleep schedule than males. Community college students described that electronic devices, anxiety and stress, as well as late night work from school or a job impact their ability to maintain a consistent sleep schedule. In turn, the most common changes they wanted to see to their sleep were to go to bed earlier, maintain a more balanced sleep schedule, and limit electronics prior to bed.

For substance use, the majority of students within this sample endorsed mild alcohol use and low cigarette use. More than half reported vaping tobacco regularly, one quarter endorsed significant marijuana use, and only 12% endorsed regular drug use. These findings were slightly different than previous results among university students that found elevated alcohol use in university students and less marijuana, cigarettes, or cocaine use (O'Malley, 2002). However, a recent study that encompassed emerging adults other than only university students within their larger sample (n=11,700), discovered a similar proportion of approximately 53.2% of adults between ages 18-29 across the United States used e-cigarettes in 2021 (Brandi et al., 2023). Current findings suggest that vaping may be more prevalent among community college students in Alabama than their peers within the same age group. During the interview, the common reason that students reported using these substances was for relaxation, stress relief, or sleep-related concerns to either help them fall asleep or stay asleep. Age was negatively associated with tobacco use, suggesting that the younger students are more likely to engage in vaping and the older students are more likely to drink. Furthermore, alcohol use was associated with income,

tobacco use was associated with parental status, and marijuana use was associated with perception of social status in the United States.

When comparing the health behaviors, overall sleep quality was negatively associated with tobacco use and positively associated with the use of sleep medications. This suggests that as vaping tobacco use increases, sleep quality decreases and as the more you use sleep medications, then your sleep quality may also increase. However, alcohol and marijuana use were not associated with any of the sleep parameters. These results are similar to previous findings among university samples that indicated PSQI had low correlations with AUDIT scores or marijuana use, suggesting substance use is not highly related to sleep complaints as measured by the PSQI (Dietch et al., 2016). This, in part, could be due to limited sample size or different priorities of community college students to their university counterparts due to not living on campus and/or having additional time demands that limit consistent use or interest in substances.

The third aim of this study was to assess the suitability of the study procedures and potential intervention within community college students, including their time availability, space, and practicality of the use of the assessment tools. In reviewing time commitments of community college students, the majority of the sample reported being employed with either a part-time or full-time job and spent on average four hours per day on campus for those who attended class in-person. The average commute time for community college students in this sample was 39 minutes and commonly transportation method was by personal car. Most of the students endorsed having a little to a lot of satisfaction with their free time when they have it and endorsed having a choice as to how they spend their free time. In attending social activities, most students reported they would attend for fun or entertainment and feel satisfied with their engagement; however, some also endorsed feeling tired or exhausted. Overall, although some

students did not appear to have much free time, most felt satisfied with the amount they had and could be available for an intervention if started. Some students acknowledged their difficulty with time management and reported they would like to learn ways of how to adequately manage their time more effectively to increase self-care and alone time for themselves. Thus, although recruitment presented many challenges in obtaining a large enough sample within this population of interest, findings suggest that a behavioral health intervention could be plausible for time availability for community college students.

The fourth aim of the study was to evaluate the common barriers that challenge students' success and what solutions or resources are available to overcome those barriers. Students reported that lack of timely communication by the professors, a fear of asking questions, and maintaining a consistent routine and balanced schedule were the three common barriers to their academic success. For social life, common barriers described were social anxiety, being solely virtual students, and having limited time on campus to meet or engage with their peers. Barriers to free time activities included having a job, multiple school assignments, and social time. Finally, barriers to seeking help for substance use were being unfamiliar with what resources were available, the stigma behind receiving therapy, and the shame or embarrassment of asking for substance use help. Common solutions that were offered to overcome these barriers included becoming involved in extracurricular activities, joining a community college student social media group for camaraderie, and maintaining a consistent and well-balanced schedule to allot free time for self. Overall, work, school, and family obligations were the main time commitment barriers to community college students that impacted their health behaviors (i.e., sleep, substance use) and challenged their success in academics, social life, and obtaining adequate leisure time for themselves. Further, students had limited knowledge about resources available for substance

use help but offered many recommendations for ways to overcome the challenges of academics, social life, and free time activities during the semi-structured interviews.

Finally, the fifth aim of the study was to describe students' perceptions of a proposed behavioral sleep health intervention and what recommendations should be incorporated within it. When discussing a potential behavioral sleep health intervention or seminar, students offered suggestions of topics, format, and marketing tips. Students recommended to i) discuss how to set a bedtime routine and maintain a consistent sleep schedule, ii) provide tips on how to make sleep a priority, iii) provide information about the benefits of good sleep and negative effects of poor sleep, and iv) tips on how to limit electronic devices and substances that impact sleep (i.e., caffeine, alcohol, etc.). The majority of students suggested the intervention be held in a hybrid format where students on campus could attend in-person but those who were virtual students at home could watch virtually. They also recommended for the intervention or class be videotaped so that students who might miss it could watch it later. Lastly, for marketing or promoting the intervention, students suggested to include incentives, like food or money, to entice students to attend as well as incorporate attention-grabbing statements about the positive effects of sleep and how attending the seminar could be beneficial to their overall health and wellbeing. The consensus was that many students were eager to hear more about this topic and would attend the seminar themselves if it were offered at their campus.

Overall, when integrating the results from the Part 1 survey to the Part 2 interviews, there were many similarities and also unique differences between the participants' responses. For sleep health, more than half the sample (57.2%) endorsed poor sleep health, as displayed in low scores under 6 on the RU-SATED total score. This was further endorsed throughout the interviews, with many students detailing difficulties with falling asleep, feeling fatigued throughout the day,

and having difficulty to maintain a consistent sleep schedule. The interviews also offered additional time and space for participants to describe what impacts their sleep health and what they would hope to change about their sleep if they could.

For substance use, many students reported alcohol, marijuana, vaping, and caffeine were frequently used among community college students; however, the amount of endorsed substance use responses on the survey were limited, potentially due to students minimizing their overall use or due to fear of being penalized. However, during the interviews, students were able to discuss resources available to seeking help for substance use concerns and the barriers that often limit students from pursuing help for substance use, such as stigma, embarrassment, or lack of knowledge about available resources.

For time demands, although the majority of the sample (63.9%) reported being employed, approximately half (46.9%) reported having five or more hours of free time per day on their workdays and even more (87.9%) reported five or more hours of free time on their free days. Thus, although community college students may have more occupation obligations and time demands than their university counterparts, they find that they have enough leisure time. Yet, during the interviews, students were able to offer barriers to their free time, academics, and social life to provide additional environmental factors that limit success to their peers. These barriers included employment demands, professor communication, and fear of asking for help for academics, social anxiety and being a virtual student for social life, and poor time management and other necessary time demands that influence free time.

Finally, in considering the feasibility of a virtual behavioral sleep health intervention among this population, students were able to select suggestions of information to include within it on the Part 1 survey, but then provided additional suggestions for topic, format, and marketing

to limit difficulties and enhance success within their population. Overall, most students believed that if the information was presented as a psychoeducational seminar that was interactive and conducted in a hybrid format, both in-person and with video recording options for later viewing, they indicated it would be a very useful and helpful experience for them.

To summarize, community college students face multiple health disparities to their university peers, such as poor sleep health and increased vaping use, and they would benefit from additional education and resources to improve their overall wellbeing. Additionally, students described embarrassment, anxiety, and stigma related to seeking help and indicated limited knowledge of available resources offered within their college or community. Thus, there is a need to improve information, education, and resources available to community college students on different health topics. More importantly, by providing information to students on sleep health, there could be many downstream benefits related to academic success, social life, and available free time. Future studies and educators should aim to provide psychoeducation and helpful resources to community college students across Alabama.

### **Limitations of Current Research**

Although the research design is robust and results offer new insight, several limitations should be considered when interpreting the findings. First, the sample size is smaller than anticipated due to recruitment challenges. Of note, recruitment was completed solely online via social media advertisements and posts (i.e., Facebook, Instagram), research platforms (i.e., Prolific, Amazon MTurk), and email communication with staff at community colleges. There are many risks that come with solely online recruitment due to the nature of distance and lack of identity confirmation. Thus, although recruitment spanned 14 months of data collection and approximately 2,000 interest surveys were completed, a majority of them (98%) had responded to the survey from other states or countries (i.e., New York, California, Illinois, Nairobi, China,

etc.), and only approximately 42 responses were deemed eligible to participate through the inclusion criteria. Furthermore, despite artificial intelligence (AI) bot captcha and attention check questions being placed in the surveys to deter bots, some respondents were still able to answer multiple surveys, potentially through mass survey responses with different names all within the same geolocation. Thus, online recruitment offered limited data that was valid to use for analyses and ultimately increased time burden and resources for the research team. Overall, many recruitment hurdles were experienced throughout the data collection of this study. Future researchers who intend to recruit online should anticipate these recruitment hurdles prior to starting data collection.

The main source of valid data came from email communication with the community colleges. However, it should also be noted that community colleges in the state of Alabama have to follow certain guidelines and research approvals from their own internal review board, which prolongs the recruitment approval. For this particular study, it took approximately one year for one community college and 4-6 months for the others to receive final approval. Additionally, it is possible that the students who responded to the interest survey were those who may check their emails more regularly and who actively engage in school activities or research studies offered. Thus, this sample could be more proactive students who seek these type of opportunities, thereby limiting generalizability to students who may not respond to or read mass emails from their colleges. Although the research team reached out to individual professors at various colleges, many responded to say that there were limitations for what type of information they could share in class and these types of emails were sent through the main email channel.

Second, the results may not be generalizable to all community college campuses given the recruitment methods. Of the 22 total two-year community college campuses in the state of

Alabama, only four were represented with the sample. Although the four colleges who responded were in different areas of the state to capture a broad range of schools, it still limits generalizability to students who attend community colleges within the state of Alabama.

Third, due to the small sample size, there was limited diversity in demographic information. The majority of the sample was single with no children, which limits variability in responses for the Part 2 interviews. Specifically, responses were limited in variation for social responsibilities or home obligations as well as barriers to success within time commitments. Similarly, the interview questions asked were generalizable to both the individual's experiences as well as what they have heard or seen of other students at their college. Thus, many of the responses could have been based on speculation or hearsay, rather than accurate observation. Generalizability should not be assumed that all students from the colleges discussed experience similar health behaviors or barriers.

Additionally, due to the limited sample size, there is a higher possibility of Type I errors within the data analyses. Although multiple data analytic tests were taken into consideration, many were not utilized due to the small sample size and potential sensitivity to potential tests being run. Furthermore, due to the small sample size, many of the variables were not normally distributed, which limited the option to use parametric tests to consider strength and direction of relationships and rather pointed towards the use of nonparametric tests to assess the presence of a relationship at all. Finally, due to the smaller sample size, less variables were permitted to be included in each test of analyses, which led to several tests to be included in the overall data analyses. This significantly enhances the chance for Type I errors, or false positives, indicating that the results are statistically significant when they are actually based on chance alone by unrelated factors. Thus, although some findings were found to be significant,

these results should be taken with caution due to the small sample size. Future studies should replicate these procedures to see if similar findings would continue with a larger and more diverse sample.

Fourth, subjective data from Part 2 interviews relied on student's knowledge of campus resources. Many students were unaware of the resources available to students even if those resources were available at that particular campus. This, in part, could be due to some students being solely online students who attend class only online and do not report to campus in person. Also, students who attend night classes may not be familiar with resources on campus since those offices may be closed by the time the night students arrive on campus.

Finally, there was limited variation in patterns of substance use discussed during the Part 2 interviews. This could be due to the perceived stigma of discussion about these personal and vulnerable topics. Students may have refrained from sharing their experiences with substance use out of concern of others learning of their use or fear of getting into trouble. Thus, many responses were discussed in vague forms rather than personal accounts.

Due to these limitations, future directions for research could replicate the methods of this study to a larger sample to enhance the sample size and provide further information on possible generalization to the broader community college student population. It would be interesting to compare students from various community colleges in different geographical locations, specifically in different areas of the United States (i.e., Pacific Northwest, Midwest, Southeast, and/or East Coast) as well as comparing urban versus rural areas to see how the sociodemographic factors impact these health behaviors and time commitments of this developmental stage. Additionally, these procedures should also be replicated among community college students who do not identify as having poor sleep but who may struggle with other health

behaviors that could be impacting their academic success, social life, or time commitments also. Finally, with the detailed information about recruitment hurdles, future studies could incorporate working professional relationships with the community college system and various professors at each institution to ensure proper communication about research and educational opportunities to the students without dealing with the turmoil of social media recruitment.

### **Implications for Next Steps**

In summary, the findings of this study highlight the importance of and necessity for further information and psychoeducation on proper sleep health and other health behaviors among community college students to assist them in prioritizing their overall well-being and enhance their limited leisure time that they have available. Furthermore, the current study provides additional information about how to assess and target multiple dimensions of sleep health among community college students, as some students may display healthy sleep behaviors in one dimension but not in one or many of the others. Thus, the information collected within this study could offer ideas for a health intervention, educational class or seminar to be given to students who attend community colleges to help bridge the gap of educational success with university students. Thus, this research offers the opportunity for community college administrators and professors to attend to the sociodemographic characteristics and health behaviors, specifically related to sleep and substance use, of current and incoming students that may negatively impact their overall success and wellbeing. Moreover, a focus on improving sleep health, a modifiable health behavior, and other related health behaviors, like substance use, could possibly decrease or prevent the detrimental effects of poor health behaviors on academic performance, social life, and other time commitments.

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Appendix A: Part 1 Quantitative Survey Questions

**Sociodemographic, Lifestyle, and Time Commitment Questions**

***General Demographics***

1. What is your date of birth? (MM/DD/YYYY)
2. What best describes your gender?
  - a. Female
  - b. Male
  - c. Non-binary
  - d. Third gender
  - e. Transgender
  - f. Prefer to self-describe
  - g. Prefer not to respond
3. How do you identify your race? Choose all that apply.
  - a. White
  - b. Black/African American
  - c. Asian
  - d. Native Hawaiian or Pacific Islander
  - e. American Indian or Alaska Native
  - f. Middle Eastern
  - g. Other: Describe
  - h. I prefer to self-describe
  - i. Prefer not to respond
4. Are you of Hispanic, Latino/a, or Spanish origin? Choose all that apply.
  - a. No.
  - b. Yes, Mexican, Mexican American, Chicano/a.
  - c. Yes, Spanish (from Spain)
  - d. Yes, Portuguese.
  - e. Yes, Puerto Rican
  - f. Yes, Cuban
  - g. Yes, Venezuelan
  - h. Yes, I am of another Hispanic, Latino/a, or Spanish origin. Describe.
  - i. Prefer not to respond
5. What is your marital status?
  - a. Single, never married
  - b. Divorced
  - c. Widowed
6. How many children do you have?
7. Are you a single parent? Co-parent?

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8. Have you served in the United States military?
  - a. Yes, I am a Veteran
  - b. Yes, I am in the United States Reserve.
  - c. No, I am civilian and have never served.

### ***Education***

9. Are you a first-generation college student (i.e., you are the first in your direct family to attend college)?
10. What college do you attend?
11. What year in school are you?
12. What is your major?
13. How many credits are you currently taking?
14. How many hours per day are you on campus?
15. Are you attending college on the G.I. Bill?

### ***Socioeconomic Status***

1. How much income do you make in a year as an individual? (Please estimate based on yearly wages, salary, and other sources of income.)
  - a. \$0-24,999
  - b. \$25-49,999
  - c. \$50-74,999
  - d. \$75-99,999
  - e. \$100-124,999
  - f. \$125-149,999
  - g. \$150-174,999
  - h. \$175-200K
  - i. Over \$200K
2. How much income does your household make (i.e., including spouse, partner, other adults in household who file taxes) in a year, including your own income?
  - a. \$0-24,999
  - b. \$25-49,999
  - c. \$50-74,999
  - d. \$75-99,999
  - e. \$100-124,999
  - f. \$125-149,999
  - g. \$150-174,999
  - h. \$175-200K
  - i. Over \$200K
3. How many people altogether live in your household, including yourself?

### ***Lifestyle and Time Commitment Questions***

#### ***Work***

1. What is your current job/employment status?

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- a. Full-time job
  - b. Part-time job
  - c. Per diem job
  - d. Student only
  - e. Disabled
  - f. Unemployed
2. How many hours per week do you work?
  3. What hours do you work your job? (Provide start time and end time)
  4. Do you work shift work (i.e., night or swing shifts)?
  5. What type of job do you work?
  6. Did you have any other jobs while attending community college?

### ***Free Time Activities***

1. How many minutes per day do you spend commuting to school, work, etc.?
2. Do you regularly have free days where you get to decide how you spend your time?
3. How many free days per week do you have?
4. How many total hours and minutes (hh:mm) during *work days* (i.e., school or work days) do you have for free time?
5. How many total hours and minutes (hh:mm) during your *free days* (i.e., not school or work demands) do you have for free time?
6. What is your main purpose to attend social activities? (Choose all that apply)
  - a. Stress reduction
  - b. Social time
  - c. Broaden your knowledge
  - d. For fun/entertainment
  - e. Earn some form of reward/payment
  - f. Other (describe)
2. What are the negative effects of attending these social activities?
  - a. Take away from study time/academic responsibilities
  - b. High psychological pressure and emotion/mood changes
  - c. Make you tired and exhausted
  - d. Some activities have little value
  - e. Other (describe)
3. How do you feel after attending social activities?
  - a. Satisfied
  - b. Relaxed
  - c. Tired
  - d. Nothing
  - e. Other (describe)

### **Sleep Questions**

1. What do you believe are the most common sleep problems among community college students? (Choose all that apply)
  - a. Short sleep duration
  - b. Poor sleep quality
  - c. Multiple nocturnal awakenings

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- d. Early morning awakening (i.e., wake up earlier than alarm or earlier than expected)
  - e. Nightmares
  - f. Other (describe)
2. Here is a list of a few sleep recommendations offered by sleep experts. Which ones do you find would be helpful to include in a sleep intervention offered to community college students? Choose all that apply.
  - a. Tips on how to make sleep a priority
  - b. Keep “sleep stealers” out of the bedroom (i.e., worries, cell phones, TV)
  - c. How to set a bedtime routine and prepare sleep environment\*
  - d. Limit blue light 30 minutes before bedtime\*
  - e. Establishing consistent sleep schedules even on weekends (i.e., consistent wake time\*, bright light in the morning)
  - f. Naps (when to have them and how long should they occur)
  - g. Limit caffeine after 6pm and alcohol close to bedtime

Appendix B: MacArthur Scale of Subjective Social Status

**Q1) Instructions: Think of this ladder as representing where people stand in the United States.** At the **top** of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the **bottom** are the people who are the worst off – those who have the least money, least education, the least respected jobs, or no job. The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.

**Where would you place yourself on this ladder?**

Please place a large “X” on the rung where you think you stand at this time in your life relative to other people in the United States.



**Q2) Instructions: Think of this ladder as representing where people stand in their communities.** People define community in different ways; please define it in whatever way is most meaningful to you. At the **top** of the ladder are people who have the highest standing in their community. At the **bottom** are the people who have the lowest standing in their community.

**Where would you place yourself on this ladder?**

Please place a large “X” on the rung where you think you stand at this time in your life relative to other people in your community.



Appendix C: Pittsburgh Sleep Quality Index (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? \_\_\_\_\_
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? \_\_\_\_\_
3. During the past month, what time have you usually gotten up in the morning? \_\_\_\_\_
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.) \_\_\_\_\_

5. During the <u>past month</u> , how often have you had trouble sleeping because you...	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month, how would you rate your sleep quality overall?				

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	No bed partner or room mate	Partner/room mate in other room	Partner in same room but not same bed	Partner in same bed
10. Do you have a bed partner or room mate?				
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
If you have a room mate or bed partner, ask him/her how often in the past month you have had:				
a. Loud snoring				
b. Long pauses between breaths while asleep				
c. Legs twitching or jerking while you sleep				
d. Episodes of disorientation or confusion during sleep				
e. Other restlessness while you sleep, please describe:				

Appendix D: RU-SATED

		Rarely/never (0)	Sometimes (1)	Usually/always (2)
Regularity	Do you go to bed and get out of bed at about the same times (within one hour) every day?			
Satisfaction	Are you satisfied with your sleep?			
Alertness	Do you stay awake all day without dozing?			
Timing	Are you asleep (or in bed) between 2:00 a.m. and 4:00 a.m.?			
Efficiency	Do you spend less than 30 min awake at night? This includes the time it takes to fall asleep plus awakenings during sleep			
Duration	Do you sleep between 6 and 8 h per day?			

Appendix E: Sleep Beliefs Scale (SBS)

This is a survey of the effects of selected behaviours upon sleep. We are interested in knowing your opinion about whether any of these behaviours may influence the quality and/or quantity of sleep. For the following list of behaviours, please indicate whether you believe they produce a “positive” effect, a “negative” effect, or “neither” effect on sleep (this is the central list below). Please do not make reference to how they influence your sleep in particular, but to the effects you think these behaviours have on people in general. Please answer ALL the statements by checking the appropriate box, even if you are not completely sure of the answer.

	Positive effect	Neither effect	Negative effect
1. Drinking alcohol in the evening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Drinking coffee or other substances with caffeine after dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Doing intense physical exercise before going to bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Taking a long nap during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Going to bed and waking up always at the same hour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Thinking about one’s engagements for the next day before falling asleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Using sleep medication regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Smoking before falling asleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Diverting one’s attention and relaxing before bedtime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Going to bed 2 h later than the habitual hour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Going to bed with an empty stomach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Using the bed for eating, calling on the phone, studying and other non-sleeping activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Trying to fall asleep without having a sleep sensation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Studying or working intensely until late night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Getting up when it is difficult to fall asleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Going to bed 2 h earlier than the habitual hour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Going to bed immediately after eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Being worried about the impossibility of getting enough sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Sleeping in a quiet and dark room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Recovering lost sleep by sleeping for a long time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix F: The Alcohol Use Disorders Identification Test (AUDIT)

<p>PATIENT: Because alcohol use can affect your health and can interfere with certain medications and treatments, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential so please be honest. Place an X in one box that best describes your answer to each question.</p>						
Questions	0	1	2	3	4	
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week	
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in the last year		Yes, during the last year	
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year	
					<b>Total</b>	

Appendix G: Brief Young Adult Alcohol Consumption Questionnaire (B-YAACQ)

Below is a list of things that sometimes happen to people either during, or after they have been drinking alcohol. Next to each item below, please mark an “X” in either the YES or NO column to indicate whether that item describes something that has happened to you **IN THE PAST MONTH.**

		NO	YES
1.	While drinking, I have said or done embarrassing things.		
2.	I have had a hangover (headache, sick stomach) the morning after I had been drinking.		
3.	I have felt very sick to my stomach or thrown up after drinking.		
4.	I often have ended up drinking on nights when I had planned not to drink.		
5.	I have taken foolish risks when I have been drinking.		
6.	I have passed out from drinking.		
7.	I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk.		
8.	When drinking, I have done impulsive things that I regretted later.		
9.	I’ve not been able to remember large stretches of time while drinking heavily.		
10.	I have driven a car when I knew I had too much to drink to drive safely.		
11.	I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking.		
12.	My drinking has gotten me into sexual situations I later regretted.		
13.	I have often found it difficult to limit how much I drink.		

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14.	I have become very rude, obnoxious or insulting after drinking.		
15.	I have woken up in an unexpected place after heavy drinking.		
16.	I have felt badly about myself because of my drinking.		
17.	I have had less energy or felt tired because of my drinking.		
18.	The quality of my work or schoolwork has suffered because of my drinking.		
19.	I have spent too much time drinking.		
20.	I have neglected my obligations to family, work, or school because of drinking.		
21.	My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents , or other near relatives.		
22.	I have been overweight because of drinking.		
23.	My physical appearance has been harmed by my drinking.		
24.	I have felt like I needed a drink after I'd gotten up (that is, before breakfast).		

Appendix H: The Tobacco, Alcohol, Prescription medications, and other Substance (TAPS) Tool

General Instructions:

The TAPS Tool Part 1 is a 4-item screening for tobacco use, alcohol use, prescription medication misuse, and illicit substance use in the past year. Question 2 should be answered only by males and Question 3 only be females. Each of the four multiple-choice items has five possible responses to choose from. Check the box to select your answer.

Segment:

Visit number:

1. In the PAST 12 MONTHS, how often have you used any tobacco product (for example, cigarettes, e-cigarettes, cigars, pipes, or smokeless tobacco)?

Daily or Almost Daily       Weekly       Monthly  
 Less Than Monthly       Never

2. In the PAST 12 MONTHS, how often have you had 5 or more drinks containing alcohol in one day? One standard drink is about 1 small glass of wine (5 oz), 1 beer (12 oz), or 1 single shot of liquor. (Note: This question should only be answered by males).

Daily or Almost Daily       Weekly       Monthly  
 Less Than Monthly       Never

3. In the PAST 12 MONTHS, how often have you had 4 or more drinks containing alcohol in one day? One standard drink is about 1 small glass of wine (5 oz), 1 beer (12 oz), or 1 single shot of liquor. (Note: This question should only be answered by females).

Daily or Almost Daily       Weekly       Monthly  
 Less Than Monthly       Never

4. In the PAST 12 MONTHS, how often have you used any drugs including marijuana, cocaine or crack, heroin, methamphetamine (crystal meth), hallucinogens, ecstasy/MDMA?

Daily or Almost Daily       Weekly       Monthly  
 Less Than Monthly       Never

5. In the PAST 12 MONTHS, how often have you used any prescription medications just for the feeling, more than prescribed or that were not prescribed for you? Prescription medications that may be used this way include: Opiate pain relievers (for example, OxyContin, Vicodin, Percocet, Methadone) Medications for anxiety or sleeping (for example, Xanax, Ativan, Klonopin) Medications for ADHD (for example, Adderall or Ritalin)

Daily or Almost Daily       Weekly       Monthly  
 Less Than Monthly       Never

**TAPS Tool Part 2**

Web Version: 2.0; 4.00; 09-19-17

**General Instructions:**

The TAPS Tool Part 2 is a brief assessment for tobacco, alcohol, and illicit substance use and prescription medication misuse in the PAST 3 MONTHS ONLY. Each of the following questions and subquestions has two possible answer choices- either yes or no. Check the box to select your answer.

1. In the PAST 3 MONTHS, did you smoke a cigarette containing tobacco?  Yes  No  
If "Yes", answer the following questions:
  - a. In the PAST 3 MONTHS, did you usually smoke more than 10 cigarettes each day?  Yes  No
  - b. In the PAST 3 MONTHS, did you usually smoke within 30 minutes after waking?  Yes  No
  
2. In the PAST 3 MONTHS, did you have a drink containing alcohol?  Yes  No  
If "Yes", answer the following questions:
  - a. In the PAST 3 MONTHS, did you have 4 or more drinks containing alcohol in a day?\* (Note: This question should only be answered by females).  Yes  No
  - b. In the PAST 3 MONTHS, did you have 5 or more drinks containing alcohol in a day?\* (Note: This question should only be answered by males).  Yes  No

\*One standard drink is about 1 small glass of wine (5 oz), 1 beer (12 oz), or 1 single shot of liquor.

  - c. In the PAST 3 MONTHS, have you tried and failed to control, cut down or stop drinking?  Yes  No
  - d. In the PAST 3 MONTHS, has anyone expressed concern about your drinking?  Yes  No
  
3. In the PAST 3 MONTHS, did you use marijuana (hash, weed)?  Yes  No  
If "Yes", answer the following questions:
  - a. In the PAST 3 MONTHS, have you had a strong desire or urge to use marijuana at least once a week or more often?  Yes  No
  - b. In the PAST 3 MONTHS, has anyone expressed concern about your use of marijuana?  Yes  No
  
4. In the PAST 3 MONTHS, did you use cocaine, crack, or methamphetamine (crystal meth)?  Yes  No  
If "Yes", answer the following questions:
  - a. In the PAST 3 MONTHS, did you use cocaine, crack, or methamphetamine (crystal meth) at least once a week or more often?  Yes  No
  - b. In the PAST 3 MONTHS, has anyone expressed concern about your use of cocaine, crack, or methamphetamine (crystal meth)?  Yes  No
  
5. In the PAST 3 MONTHS, did you use heroin?  Yes  No  
If "Yes", answer the following questions:
  - a. In the PAST 3 MONTHS, have you tried and failed to control, cut down or stop using heroin?  Yes  No

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b. In the PAST 3 MONTHS, has anyone expressed concern about your use of heroin?  Yes  No

6. In the PAST 3 MONTHS, did you use a prescription opiate pain reliever (for example, Percocet, Vicodin) not as prescribed or that was not prescribed for you?  Yes  No

If "Yes", answer the following questions:

a. In the PAST 3 MONTHS, have you tried and failed to control, cut down or stop using an opiate pain reliever?  Yes  No

b. In the PAST 3 MONTHS, has anyone expressed concern about your use of an opiate pain reliever?  Yes  No

7. In the PAST 3 MONTHS, did you use a medication for anxiety or sleep (for example, Xanax, Ativan, or Klonopin) not as prescribed or that was not prescribed for you?  Yes  No

If "Yes", answer the following questions:

a. In the PAST 3 MONTHS, have you had a strong desire or urge to use medications for anxiety or sleep at least once a week or more often?  Yes  No

b. In the PAST 3 MONTHS, has anyone expressed concern about your use of medication for anxiety or sleep?  Yes  No

8. In the PAST 3 MONTHS, did you use a medication for ADHD (for example, Adderall, Ritalin) not as prescribed or that was not prescribed for you?  Yes  No

If "Yes", answer the following questions:

a. In the PAST 3 MONTHS, did you use a medication for ADHD (for example, Adderall, Ritalin) at least once a week or more often?  Yes  No

b. In the PAST 3 MONTHS, has anyone expressed concern about your use of a medication for ADHD (for example, Adderall or Ritalin)?  Yes  No

9. In the PAST 3 MONTHS, did you use any other illegal or recreational drug (for example, ecstasy/molly, GHB, poppers, LSD, mushrooms, special K, bath salts, synthetic marijuana ('spice'), whip-its, etc.)?  Yes  No

If "Yes", answer the following questions:

In the PAST 3 MONTHS, what were the other drug(s) you used?

Comments:

Appendix I: Patient Health Questionnaire, 8 Item (PHQ-8)

<i>Over the last 2 weeks, how often have you been bothered by any of the following problems?</i>	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Nearly every day</b>
<b>1. Little interest or pleasure in doing things</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2. Feeling down, depressed, irritable or hopeless</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3. Trouble falling or staying asleep, or sleeping too much</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4. Feeling tired or having little energy</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5. Poor appetite or overeating</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>7. Trouble concentrating on things, such as school work, reading or watching television</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix J: Generalized Anxiety Disorder, 7 Item (GAD-7)

GAD-7				
Over the <u>last 2 weeks</u> , how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Total Score — = Add Columns — + — + —

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix K: Adapted Scale of College Students' Routines (SCAR)

For each of the following activities below, within the past 7 days on average, please indicate:

- 1) The time of day that you typically conduct that activity (e.g., 8:00 AM), up to 3 time points
- 2) The number of times you performed that activity within a typical day
- 3) The time it takes to complete the activity (duration in minutes)

Activity		Work/School Days			Free Days (No Work/School)		
		Time	Frequency	Duration	Time	Frequency	Duration
1.	Drink caffeine						
2.	Attend class at school						
3.	Attend work						
4.	Return home for end of day						
5.	Relaxation activities (watch TV, read book, video games)						
6.	Engage in physical activity/exercise						
7.	Caretaking for another						
8.	Childrearing						
9.	Spending time with friends						
10.	Spending time with partner						
11.	Spending time with family						

Appendix L: Leisure Time Satisfaction (LTS)

We are interested in how satisfied you are with the amount of time you have been able to spend in various activities that you might enjoy.

**Over the past month, how satisfied are you with the amount of time you have been able to spend:**

		Not at all 0	A Little 1	A Lot 2
1.	In quiet time by yourself			
2.	Attending church or going to other meetings or groups or organizations			
3.	Taking part in hobbies or other interests			
4.	Going out of house for meals or other social activities			
5.	Doing fun things with other people outside home			
6.	Visiting with family and friends			
7.	Engaging in recreational sports or physical activity			
8.	Spending time on electronics (i.e., TV, video games) to converse with friends			
	Total Score:			

## Appendix M: Recovery Experiences Questionnaire (REQ)

In the past month, during my off-job (leisure) time,

		Totally Disagree	Disagree	Neutral	Agree	Totally Agree
1.	I forgot about work					
2.	I didn't think about work at all.					
3.	I distanced myself from work.					
4.	I got a break from the demands of work.					
5.	I kicked back and relaxed					
6.	I did relaxing things.					
7.	I used the time to relax					
8.	I took time for leisure					
9.	I learned new things.					
10.	I sought out intellectual challenges.					
11.	I did things that challenged me					
12.	I did something to broaden my horizons.					
13.	I felt like I could decide for myself what to do.					
14.	I decided my own schedule.					
15.	I determined for myself how I spent my time					
16.	I took care of things the way that I want them done.					

## Appendix N: Qualitative Analysis - Interview Questions

### **Sleep Health Questions**

1. What are common sleep difficulties of students attending community college?
2. What influences your overall sleep or prevents you from getting a good night sleep (i.e., daytime activities, other time commitments, bedroom environment, etc.)?
3. If you could change one thing about your sleep, what would you pick? What would you need?

### **Substance Use Questions**

1. What patterns of substance use do you see among community college students?
2. Some common substances that people use are caffeine, alcohol, and nicotine. A common reason that people use caffeine is to become more alert. What are some common reasons why community college students use different substances?
3. What resources are available for substance use help among community colleges?
4. What are the barriers to get help for substance use among community college students?

### **Barriers to Community College**

1. What do you find are some common barriers to being successful in college? To having a successful social life? To having free time to yourself?
2. What time commitments or social responsibilities impact your free-time activities?
3. How have you tried to overcome these barriers? What are some possible solutions?

### **Intervention Questions**

1. If a health intervention or educational class was offered to community college students on sleep, what would you suggest should be included? What information, resources, recommendations, methods of presenting it? What format would be most successful and helpful?
2. If you could promote a behavioral health intervention at your community college campus or to fellow students, what would you say to your peers to entice them to attend.

## Appendix O: IRB Approval Letter



February 16, 2024

To: Kelly Doudell, MA  
Department of Psychology  
College of Arts & Sciences  
The University of Alabama

From: Edward M. Shirley, MA, CIP  
Interim IRB Team Lead

Re: **Notice of Approval**  
 IRB Application #: eprotocol # 23-10-7013  
 Project Title: "Understanding Sleep Health and Other Health Behaviors of Community College Students in Alabama (STaSH Study - Student Time and Sleep Health Study)"  
 Submission Type: New  
 Approval Date: February 16, 2024  
 Expiration Date: February 15, 2025  
 Funding Source: None  
 Review Category: EXPEDITED  
 Approved Documents: Informed Consent, Waiver of Written Consent, Recruitment Flyer

Dear Kelly Doudell:

The University of Alabama Institutional Review Board has approved your proposed research. Therefore, your application has been approved according to 45 CFR part 46 as outlined below:

*(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.*

The approval for your application will lapse, as noted above. If your research will continue beyond this date, please submit the Continuing Review to the IRB as University policy requires before the lapse. Please note any modifications made in research design, methodology, or procedures must be submitted to and approved by the IRB before implementation. Please submit a final report form when the study is complete.

Please use reproductions of the stamped IRB-approved consent form to obtain consent from your participants.

All the best with your research.

166 Rose Administration | Box 870127 | Tuscaloosa, AL 35401 | 205-348-8461 | [rscompliance@ua.edu](mailto:rscompliance@ua.edu)

## Appendix P: IRB Continuing Review Approval Letter

**APPROVAL****No Continuing Review Required**

February 26, 2025

Kelly Doudell  
Department of Psychology  
Box 870358

Dear Ms. Doudell:

On February 26, 2025 the IRB reviewed the following protocol:

Protocol Information	Submission Details
Type of Review:	Expedited Amendment
Title:	Understanding Sleep Health and Other Health Behaviors of Community College Students in Alabama (STaSH Study – Student Time and Sleep Health Study)
Investigator:	Kelly Doudell
IRB ID:	23-10-7013
Funding:	None
Grant Title (If different than IRB protocol title):	N/A
Grant ID:	N/A
IND, IDE or HDE:	N/A
Documents Reviewed:	Informed Consent, Waiver of Written Consent, Recruitment Flyer

The IRB approved the protocol on 2/26/2025. This study does not require continuing review. However, investigators are required to continue to meet all institutional requirements for conducting research with human subjects as outlined in HRP-103 – INVESTIGATOR MANUAL. Additionally, the IRB may change its determination regarding continuing review for an individual study based on new information it receives via an amendment, event report, or new findings related to the study procedures and/or population.

As a reminder:

- Modifications to this study must be approved by the IRB in advance of implementing changes to the research
- New information related to this study must be reported to the IRB in accordance with institutional reporting requirements
- Close this study once all research activities are complete

If you have any questions or require further information, please contact the UA HRPP via email at [rscompliance@ua.edu](mailto:rscompliance@ua.edu).