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SLEEP HEALTH AND ACADEMIC PERFORMANCE DURING THE COVID-19 PANDEMIC: A CROSS-SECTIONAL ANALYSIS

A Thesis

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Public Health

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by

Rushil Gumasana

May 2022

SLEEP HEALTH AND ACADEMIC PERFORMANCE DURING THE COVID-19 PANDEMIC: A CROSS-SECTIONAL ANALYSIS

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May 2022

Approved by:

Monideepa Becerra, Committee Chair, Health Science and Human Ecology

Benjamin Becerra, Committee Member, Information and Decision Sciences

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ABSTRACT

Background: Sleep health is an important public health topic that is often overlooked by college students who are trying to juggle between school, work, and social life. Sleep is seen as a luxury and as a result, most often sacrificed for other activities. The purpose of this thesis is to make a connection between the factors that lead to poor sleep quality and its influence on academic performance.

Methods: The study utilized the cross-sectional approach to evaluate sleep health and identify the relationship that exists with academic performance among college students. All data were collected virtually and kept anonymous. All statistical analyses were conducted using SPSS version 28 with $p<.05$ denoting significance.

Results: Results on 132 participants demonstrates that on an average school night, only 2.3% of the study population got 9 or more hours of sleep, while the majority (62.9%) got less than 7 hours of sleep. Of the population that got less than 7 hours of sleep per night, 88% reported feeling tired, fatigued, or sleepy during the daytime. Such sleep variables were also associated with participants' reporting their grade being impacted.

Conclusion: These results highlight the importance of public health efforts on sleep health as it pertains to the overall well-being of college students.

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CHAPTER ONE:

LITERATURE REVIEW

Overview

The purpose of this section is to highlight the current empirical evidence on sleep health as it relates to academic performance. Academic performance is expanded into how and why student achievement is measured as well as the importance of education and how the level of education leads to different life outcomes relating to health and well-being. The seriousness of sleep health is expanded upon by showing the negative outcomes of lack of sleep. Lastly, the determinants of sleep health are explored to delineate how different physical and psychological factors can influence the ability to sleep.

Academic Performance

Academic performance is the measurement of student achievement in school which affects the level of education attainment which has its origins dating back to the mid 1800's, although the National Education Association (NEA, 2020) began formal assessment of student achievement in 1838. While often interchangeably used with the term academic achievement or performance, experts note that such a measure usually exclusively relies on grades of assignments, exams, and grade point average (GPA), and is further used to assess academic success, such as knowledge acquisition and retention, as well as skills and competencies (York et al., 2015).

Education is stated to be “an integral part of being healthy” (Hahn & Truman, 2015, p. 3) and is one of the primary determinants of employment and income, which contribute to health outcomes. The U.S Bureau of Labor Statistics (BLS) presents data that consistently shows “the more you learn, the more you earn” (Torpey, 2018, p. 1). Education gives individuals the chance of upward mobility, which not only helps find better paying jobs, but also increases the capacity for better decision-making regarding one’s health and provides an increasing scope of social and personal resources that are important for both physical and mental health (Shankar et al., 2013). Academic performance is also directly associated with (life) satisfaction and (overall) well-being by providing the ability to learn problem solving as a means of coping strategy among students (Trucchia et al., 2013). The Centers for Disease Control and Prevention (CDC, 2019) provides data that confirms consistent higher average grades are directly linked with lower rates of risk behaviors such as drug and alcohol use.

Furthermore, long-term impact of academic performance directly affects mortality and life expectancy. Literature notes that there is a strong association between those with higher education attainment and mortality rate from several diseases, including, major circulatory diseases, diabetes, liver disease, and several psychological symptoms, such as, sadness, hopelessness, and worthlessness (Hahn & Truman, 2015). Additionally, research highlights the importance of academic performance and associated poor school performance

with health compromising behaviors as well as problems relating to the physical, mental, and emotional states (Ansari & Stock, 2010).

Sleep Health

Sleep health is best described as “a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being” and goes on to state that, good sleep health can be characterized through subjective satisfaction as it attains to the individual's needs, appropriate timing based on daily schedules, duration, efficiency, and continued alertness retained during working hours (Buysse, 2014, p?). This puts a broad emphasis on sleep and how it plays a positive role in the overall health of an individual. Based on the most recent guidelines, the CDC recommends seven to nine hours of sleep for adults and yet, more than a third of American adults are not getting enough sleep on a regular basis (CDC, 2017).

As reported by the National Heart, Lung, and Blood Institute (NHLBI, n.d.), sleep is a critical determinant of good health and well-being, getting enough sleep helps protect your mental and physical health as well as helping improve your overall quality of life. Sleep loss has been associated with deficits in cognitive functions which may increase the likelihood of making impulsive or risky decisions (Acheson et al., 2007). The colloquial saying “woke up on the wrong side of the bed” has a bit of truth to it. Lack of sleep can directly affect your mood and behavior, we tend to become a lot more sensitive emotionally and socially when we are sleep deprived (Worley, 2018). Being easily irritable or short

tempered directly affects what we do throughout the day and how we react to situations. It does not account for the most ideal situation to learn and process information. Moreover, mood disturbances are often viewed as the hallmark symptoms of mental health disorders such as depression and anxiety, which result in disturbances in sleep and poor sleep quality (Triantafillou et al., 2019).

Sleep plays an especially important role in physical health as it is involved in healing and repairing heart and blood vessels. Current evidence highlights that ongoing sleep deficiency is associated with heightened risks of heart disease, kidney disease, diabetes, stroke, and high blood pressure (NHLBI, n.d.). Shorter sleep times have also been linked to the contribution of excessive weight gain (Reiter et al., 2012), due to disruption in hormone regulation. Imbalance of ghrelin, which is a hormone that makes one feel hungry, and leptin, which inhibits hunger, is associated with inadequate sleep. Further, increases in ghrelin level, coupled with decreases in leptin level, is associated with feelings of hunger among such groups with inadequate sleep, as compared to those who are well-rested (NHLBI, n.d.). In addition, the Office of Disease Prevention and Health Promotion (ODPHP, 2022) states that unchecked sleep disorders can cause a decrease in health-related quality of life, contribute to functional restrictions and loss of independence, and are related with a heightened risk of death from any cause.

Overall performance in daily tasks is also affected by diminished sleep due to the neurobiological consequences which include brain function such as

memory and learning, as well as synaptic plasticity. Sleep plays a key role in cognitive functions such as attention and emotion (Alkadhi et al., 2013). According to the (CDC, 2017) drowsy driving is like drunk driving in that lack of sleep can directly affect your coordination, judgment, and reaction time while driving. The National Highway Traffic Safety Administration (NHTSA, 2020) reported 697 deaths in 2019 from drowsy driving related accidents. Cognitive impairment can also affect work in which an individual may not be able to manage and process their daily duties as effectively as they may be required to do so. Not getting enough sleep has also been shown to increase the probability of workplace accidents by 70% (Suni, 2021). For students, academic performance is influenced by their sleep health. The CDC advises students to get the proper amount of sleep each night to help stay focused, enhance concentration, and improve academic performance (CDC, 2019).

Determinants of Sleep Health

Many factors can disrupt sleep health, these include the environment with physical, psychological, biological, and social disruptions (Altun et al., 2012). All such varied factors play a role in being able to obtain the required amount of sleep. Physical barriers consisting of environmental disruptors, such as light, noise, temperature, and air pollution have been found to negatively impact sleep (Mantua et al., 2019). Psychological barriers can be linked to insomnia as patients with insomnia are likely to display association with psychological issues (Coon, 2008). According to the American Sleep Association (ASA, n.d.),

insomnia is the most common sleep disorder, with short term issues reported by 30% of adults and chronic insomnia by 10%. Current literature suggests that the most common biological disruptors of sleep are pain, strenuous physical activity, and fatigue (Altun et al., 2012).

A study conducted by the CDC, which included all 50 states and the District of Columbia showed that more than a third of American adults do not get enough sleep of seven or more hours per day on a regular basis (CDC, 2016). Waking activities are often exchanged for sleep, young adults have a lot on their plate, between learning and mastering independence to maintaining social life and managing higher education and careers. An increasing number of people are beginning to choose social, leisure, and work-related activities or pursuing their personal or professional goals over their sleep. A sizable population is also experiencing sleeping problems due to medical or psychosocial causes (St-Onge et al., 2016). Most of what we do today is through a screen, from attending classes, meetings, and keeping up with family and loved ones through social media platforms either through our smart phones or computers, however the blue light that is emitted from these devices affects the circadian rhythms, which control our sleep and wake cycles. Blue light was reported for having the strongest impact on the circadian cycle (CDC, 2020).

Summary

Academic performance has been proven to dictate how well and how long individuals live due to its effect on upwards mobility, helping individuals break

barriers and have good careers, leading to better pay and an overall satisfaction in life. As such, academic performance and level of education has become extremely valued in society. Sleep on the other hand has become one of the most overlooked determinants of health. The impact that sleep has on our physical as well as mental well-being is being undervalued by college students who are trying to juggle multiple things at once. Young adults are sacrificing sleep time for other tasks and activities such as work, and social life, without fully understanding that academic performance is influenced by sleep.

Purpose of Study

The purpose of this study is to evaluate sleep health among college students and identify potential association with long- and short-term academic performance.

Research Questions

1. What is the prevalence of reported average hours of sleep in the study population?
2. What is the distribution of the general physical health status of the study population?
3. What is the distribution of general mental health among the study population?
4. What percent of the study population report feeling tired, fatigued, or sleepy during the day?
5. What percent of the study population report that they have been observed to stop breathing while they sleep?

6. What percent of the study population noticed themselves or have been observed snoring while sleeping?
7. What percent of the study population report that their quality of sleep has gotten worse since the pandemic?
8. What percent of the study population report that their hours of sleep has gotten less since the pandemic?
9. What is the association between the pandemic, sleep, and academic performance among the study population?
    a) Is there an association between pandemic-related sleep health and grade point average in the study population?
    b) Is there an association between pandemic-related sleep health and study population reporting their grades have been impacted?

Significance to Public Health

This study aimed to assess sleep among college students as well as the negative effects of under sleeping, especially relating to academic performance. The results of this study provide the scope for creating awareness on the importance of sleep health and why it is easily overlooked as a determinant of health, such that evidence-based interventions can be implemented. The results displayed in this study further highlight the imperative need for proper time management in which sleep, and rest are highly valued. This could promote academic institutions to acknowledge the importance of sleep and how a well-rested mind is able to perform better. Using the findings of this study, sleep

health can be advocated among college students and needed interventions prioritized by campus administrators.

CHAPTER TWO:

METHODS

Study Design

The present study utilized the cross-sectional approach to evaluate sleep health and identify the relationship it has with academic performance (long- and short-term) among college students.

Data Source and Collection

Data was collected from a four-year public institution located in the Inland Empire region in Southern California, consisting of 19,404 students, of whom, 63% are females, 88% are seeking an undergraduate degree, 82% attend on a full-time basis, and 58% of the undergraduates are low-income students (Pell Grant recipients). The student diversity of the campus is broken down to 66% Hispanic, 12% White, 6% non-resident foreign students, 5% African American, 5% Asian, and less than 5% as unknown/two or more races, Native American/Alaskan Native or Native Hawaiian/Pacific Islander as noted by the campus demographics data.

All students aged 18 years or older and currently enrolled at the institution met the eligibility criteria and were included in the recruitment process. All participants received informed consent forms and those who agreed to participate were further given access to the virtual survey to complete via Qualtrics. Participants were given 5 extra credit points as an incentive to

participate. All collected data was kept anonymous and a random sample of 100-150 were selected to avoid accidental identification of participants based on order of answers/responses.

Measures

The primary latent variables of interest were pandemic-related sleep health and academic performance.

Pandemic-related sleep health were measured using the following survey questions:

- *On an average school night, how many hours do you sleep? Do you often feel tired, fatigued, or sleepy during the daytime?*
- *Has anyone observed you stop breathing during your sleep?*
- *Have you noticed or has anyone told you that you snore while sleeping?*
- *I feel my sleep quality has gotten worse since before the pandemic.*
- *I feel the number of hours I sleep has gotten less since before the pandemic.*

Academic performance was measured using the following survey questions:

- *I feel my grades are suffering due to the pandemic.*
- *What is your current GPA?*

Data Analysis

To answer each of the following research questions, descriptive statistics was conducted using SPSS version 28.

1. What is the prevalence of reported average hours of sleep in the study population?
2. What is the distribution of the general physical health status of the study population?
3. What is the distribution of general mental health among the study population?
4. What percent of the study population report feeling tired, fatigued, or sleepy during the day?
5. What percent of the study population report that they have been observed to stop breathing while they sleep?
6. What percent of the study population noticed themselves or have been observed snoring while sleeping?
7. What percent of the study population report that their quality of sleep has gotten worse since the pandemic?
8. What percent of the study population report that their hours of sleep has gotten less since the pandemic?

To answer the following research question, bivariate statistics (chi-square) were conducted using SPSS version 28, with $p < .05$ denoting significance.

9 b. Is there an association between pandemic-related sleep health and study population reporting their grades have been impacted?

To answer the following research question, bivariate statistics (two-sample t-test) were conducted using SPSS version 28, with $p < .05$ denoting significance.

9 a. Is there an association between pandemic-related sleep health and grade point average in the study population?

All data reported is in valid percentage (%).

Ethics

The present study was approved by the Institutional Review Board of the institution (IRB-FY2022-146). Given this is human subject research, all three principles of the Belmont followed Report were followed (OHRP, 2016). To ensure respect of persons and thus autonomy, informed consent forms were given to all participants. Participation for the survey was completely voluntary and participants could choose not to answer questions or leave the study at any point without any negative impact to their academics. To ensure beneficence, all efforts were made to reduce any kind of harm and increase benefits. The questions were kept to the minimum needed to reduce boredom of students. The survey was made anonymous to ensure that students do not feel the risk of identification upon answering sensitive questions. During analysis, a random sample was selected to prevent unique cross-tabulations as that may indirectly identify a participant of rare cases. Incentives were also provided to increase benefit. Finally, all students enrolled at the institution and aged 18 years or older

were allowed to participate, and thus no one group was burdened with the study while another benefited; further ensuring justice.

CHAPTER THREE:

RESULTS

Research question:

1. What is the prevalence of reported average hours of sleep in the study population?

As shown in Table 1, on an average school night, only 2.3% of the study population got 9 or more hours of sleep, while 34.8% got 7-8 hours of sleep, and 62.9% got less than 7 hours of sleep.

Table 1. Reported Hours of Sleep on an Average School Night.

	%
7-8 hours	34.8%
9 or more hours	2.3%
Less than 7	62.9%

2. What is the distribution of the general physical health status of the study population?

Table 2 shows that general physical health was categorized into average, excellent, good, poor, and very poor. Majority of the study population, which made up 50.8% of the group, reported having average general health, 35.6%

reported having good general health, only 8.3% reported having excellent general health, and 4.5% and 0.8% reported having poor and very poor general health respectively.

Table 2. Reported General Physical Health Status.	
	%
Excellent	8.3%
Good	35.6%
Average	50.8%
Poor	4.5%
Very poor	0.8%

3. What is the distribution of general mental health among the study population?

As shown in table 3, approximately 34.1% of the study population reported having average general mental health, 34.8% reported good, only 8.3% reported excellent, 21.2% reported poor, and 1.5% reported very poor.

Table 3. General Mental Health Status.	
	%
Excellent	8.3%
Good	34.8%
Average	34.1%

Poor	21.2%
Very poor	1.5%

4. What percent of the study population report feeling tired, fatigued, or sleepy during the day?

Table 4 shows that 80.3% of the study population reported feeling either tired, fatigued, or sleepy during the daytime and only 19.7% reported no to this.

Table 4. Feeling Tired, Fatigued, or Sleepy During the Daytime.	
	%
No	19.7%
Yes	80.3%

5. What percent of the study population report that they have been observed to stop breathing while they sleep?

As shown on table 5, Only 9.1% of the study population reported yes on being observed to stop breathing while they sleep and 90.9% reported no.

Table 5. Stopped Breathing During Sleep.	
	%
No	90.9%
Yes	9.1%

6. What percent of the study population noticed themselves or have been observed snoring while sleeping?

As per table 6, about 44.7% of the study population reported yes to either noticing themselves or having been observed to snore and 55.3% reported no.

Table 6. Snore While Sleeping.	
	%
No	55.3%
Yes	44.7%

7. What percent of the study population report that their quality of sleep has gotten worse since the pandemic?

Table 7 shows that 56.8% of the study population said their sleep quality had not been affected since the pandemic and 43.2% said that their sleep quality had gotten worse since then.

Table 7. Sleep Quality Has Gotten Worse Since Before the Pandemic.	
	%
No	56.8%
Yes	43.2%

8. What percent of the study population report that their hours of sleep have gotten less since the pandemic?

According to table 8, 61.4% of the study population reported that the pandemic did not influence the number of hours of sleep they get per night while 38.6% reported that the number of hours they sleep has decreased since the pandemic.

Table 8. Number of Hours of Sleep Has Gotten Less Since Before the Pandemic.

	%
No	61.4%
Yes	38.6%

9. What is the association between the pandemic, sleep, and academic performance among the study population?
    a. Is there an association between pandemic-related sleep health and grade point average in the study population?

According to table 9, the mean GPA for 7 or more hours of sleep is 3.22 while the mean GPA for less than 7 hours of sleep is 3.18. No significant difference was found between the two.

Table 9. Association Between Hours of Sleep and Mean GPA ($p > .05$).

	Average hours of sleep	Mean
Current GPA	7 or more	3.22
	Less than 7	3.18

b. Is there an association between pandemic-related sleep health and study population reporting their grades have been impacted?

Table 10 shows among those that reported that their hours of sleep were impacted because of the pandemic, 64.7% said yes to their grades suffering due to the pandemic compared to 35.3% that said their grades did not suffer because of the pandemic. This difference is statistically significant at $p<.05$.

Table 10. Association Between Sleep and Grades ($p <.05$).

		Grades suffering due to the pandemic.	
		No	Yes
Number of hours of sleep has gotten less since the pandemic.	No	61.7%	38.3%
	Yes	35.3%	64.7%

As per table 11, those that reported their sleep quality getting worse since the pandemic, 59.6% also reported that they felt their grades were also suffering due to the pandemic compared to 40.4% that reported not feeling like their grades are suffering due to the pandemic. This difference is statistically significant at $p<.05$.

Table 11. Association Between Sleep Quality and Grades ($p<.05$).

		Grades suffering due to the pandemic.	
		No	Yes
Sleep quality has gotten worse since the pandemic.	No	60.0%	40.0%
	Yes	40.4%	59.6%

Table 12 shows that 54.7% of the college students reported yes to both feeling tired, fatigued, or sleepy during the daytime and feeling like their grades are suffering while 45.3% reported no to both. This difference is statistically significant at $p<.05$.

Table 12. Association Between Feeling Tired, Fatigued, or Sleepy During Daytime and Grades ($p<.05$).

		Grades suffering due to the pandemic.	
		No	Yes
Feel tired, fatigued, or sleepy during the daytime.	No	76.9%	23.1%
	Yes	45.3%	54.7%

No significant associations were found between snoring, stopped breathing, and seven or less hours of sleep and perception that grades were impacted (data not shown).

CHAPTER FOUR:

DISCUSSION

The purpose of this study was to evaluate sleep health and identify potential association to long- and short-term academic performance among college students, using a cross-sectional design. All data was collected anonymously via an online survey and descriptive and bivariate statistics were conducted. There were several major findings from this study that warrant further discussion.

There was a significant association between the number of hours of sleep getting less during the pandemic and participants reporting that they felt their grades were suffering due to COVID-19 pandemic as well. Such an association poses a public health concern as it demonstrates students' reported connectedness between sleep and academic performance. Poor academic performance among college students could lead to a delay in their graduation, further adding more burden on them to continue paying tuition. College requires a significant personal and societal cost, to be able to gain optimal return on the investment of time, money, and effort, students need to maximize their learning. However, lack of sleep can compromise these goals (Hershner & Chervin, 2014). Proper resources, such as, routine counseling and follow up, peer to peer mentorship, etc. should be provided to students to ensure that they do not fall behind on their classes and grades.

There was also a significant association between reported worsened sleep quality because of the pandemic and grades suffering during the pandemic. This indicates that not only does the number of hours of sleep matter in academic performance, but also the quality of sleep. Such results highlight that understanding the key determinants of low sleep quality is needed to ensure adequate outcomes for students. For example, socio-demographic characteristics may play a critical role in the quality of sleep that college students receive, as disparities related to low socioeconomic status such as living in a noisy neighborhood or going to bed hungry may play a factor. Public health interventions should focus on making it simpler for college students to live on campus at affordable rates, where students can have a safe and quiet environment to study. Colleges can also implement food drives that focus on providing groceries and fresh fruits and vegetables to students in need. Together, such interventions may alleviate the burden of low sleep quality among the population.

Significant association was also found between those that reported feeling tired, fatigued, or sleepy during the daytime and feeling like their grades were suffering due to COVID-19. Feeling tired, fatigued, or sleepy during the daytime is reflective of poor daytime alertness or wakefulness, which in turn can lead to lowered concentration levels. This can make learning new information in class and retaining such new content difficult. Moreover, daytime sleepiness which is a well-known cause of motor vehicle crashes which could be life threatening (Gottlieb et al., 2018). The importance of sleep health should be advocated to colleges to help raise more awareness on this topic among students. Scheduling

more classes in the afternoon compared to early morning is important as it is shown to increase student performance (Williams & Shapiro, 2018). Colleges can also provide sleep pods or nap stations on campus libraries that promote a quiet environment for students, as naps have been determined to be beneficial in helping reduce students' sleep debts (Wise, 2018).

Finally, no significant difference was found between average hours of sleep and GPA. This is likely because GPA is a cumulative score that is built over years and does not easily reflect short-term changes caused by the COVID-19 pandemic. These finding highlights that when assessing academic performance, GPA or summative only measures may not be idea, and instead seeking student perception may provide novel insights, as did in this study.

Strengths and Limitations

The results of this study should be interpreted in the context of its strengths and limitations. A major strength in collecting data was that incentive was provided because this helps reduce self-selection bias. Literature notes that without incentive, only those that are strongly opinionated are more motivated into sharing their answers resulting in more extreme results (Marinescu et al., 2021). Adding incentive helps mitigate the motivational deficit of those who have moderate opinions (Marinescu et al., 2021). This ensures that the collected data is more evenly distributed rather than mostly being on the extreme ends of both sides. Further, the inclusion of all students aged 18 years or above and currently enrolled, instead of limiting to only one specific discipline, allowed for lower

selection bias as well, and thus reduced threat to internal validity. The anonymous nature of the survey further improves internal validity as this approach reduces the risk of social desirability bias (Joinson, 1999).

Among limitations, the cross-sectional nature of the study does not allow for assessment of causation. Further, despite being open to all enrolled students of legal age at one campus, the study does not represent all college students and thus this poses a threat to external validity (lack of generalizability).

Conclusion

The present study evaluated the burden of poor sleep health among college students and its potential association with long- and short-term academic performance of the population. Major findings from the study note that sleep hours and quality were negatively impacted during the COVID-19 pandemic, and such lowered hours and quality were significantly related to students reporting worsened grades during the pandemic. Such results highlight the imperative need for creating awareness on sleep health literacy among college students, as well as campus leadership. For instance, interventions that address class scheduling, places to rest, coping mechanisms, etc. are needed on campus to promote overall well-being. Such results call for academic institutions to acknowledge the importance of sleep health when assessing academic performance of college students. Given this study was conducted at a federally designated Hispanic- and minority-serving institution, addressing equity gaps among such students need to address sleep health as well.

APPENDIX A:

INSTITUTIONAL REVIEW BOARD LETTER OF APPROVAL

February 22, 2022

CSUSB INSTITUTIONAL REVIEW BOARD
Protocol Change/Modification
IRB-FY2022-146
Status: Approved

Prof. Monideepa Becerra
CNS - Health Science
California State University, San Bernardino
5500 University Parkway
San Bernardino, California 92407

Dear Prof. Becerra:

The protocol change/modification to your application to use human subjects, titled "Student health needs assessment-Third round" has been reviewed and approved by the Chair of the Institutional Review Board (IRB). A change in your informed consent requires resubmission of your protocol as amended. Please ensure your CITI Human Subjects Training is kept up-to-date and current throughout the study. A lapse in your approval may result in your not being able to use the data collected during the lapse in your approval.

This approval notice does not replace any departmental or additional campus approvals which may be required including access to CSUSB campus facilities and affiliate campuses. Investigators should consider the changing COVID-19 circumstances based on current CDC, California Department of Public Health, and campus guidance and submit appropriate protocol modifications to the IRB as needed. CSUSB campus and affiliate health screenings should be completed for all campus human research related activities. Human research activities conducted at off-campus sites should follow CDC, California Department of Public Health, and local guidance. See CSUSB's COVID-19 Prevention Plan for more information regarding campus requirements.

You are required to notify the IRB of the following by submitting the appropriate form (modification, unanticipated/adverse event, renewal, study closure) through the online Cayuse IRB Submission System.

1. If you need to make any changes/modifications to your protocol submit a modification form as the IRB must review all changes before implementing them in your study to ensure the degree of risk has not changed.
2. If any unanticipated adverse events are experienced by subjects during your research study or project.
3. If your study has not been completed submit a renewal to the IRB.
4. If you are no longer conducting the study or project submit a study closure.

You are required to keep copies of the informed consent forms and data for at least three years.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, Research Compliance Officer. Mr. Gillespie can be reached by phone at (909) 537-7588, by fax at (909) 537-7028, or by email at mgillesp@csusb.edu. Please include your application approval number IRB-FY2022-146 in all correspondence.

Best of luck with your research.

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