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The Effects of Yoga on Anxiety and Sleep Quality Levels Among College Students

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Effect of Yoga on Sleep Quality and Anxiety Levels among College Students

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Abstract

Background: College students have poor sleep quality due to a newfound sense of freedom, exposure to new influences, or poor sleep hygiene (Dinis & Barganca, 2018). Specifically, evidence supports a correlation between sleep latency in onset or lack of nighttime sleep and increased anxiety (Dinis & Barganca, 2018). Yoga has been shown to decrease anxiety, stress symptoms, and depression (Mullen et al., 2021). Teaching yoga techniques and encouraging routine yoga practice to college students may improve sleep quality and decrease anxiety.

Purpose: This project's purpose was to evaluate the effect of yoga education and videos on sleep quality and anxiety symptoms among undergraduate college students.

Methods: This was a quasi-experimental one-group pre-test, post-test design. Participants were provided a one-time educational in-person yoga session along with a recorded yoga video for use over four weeks. Data was collected using standardized screening tools to measure anxiety symptoms (GAD-7) and sleep quality (PSQI). Students were asked to keep a log of how often they practiced yoga over the four-week intervention period. The evaluation of the intervention was analyzed using descriptive statistics.

Results: Among the students who participated, both the generalized anxiety disorder (GAD-7) scores and the Pennsylvania Sleep Quality Index (PSQI) were improved overall following the four-week yoga intervention, noting a decrease in anxiety symptoms and an improvement in sleep quality. There was not a statistically significant decrease in mean scores for the GAD-7 (p=0.083), but results showed an overall decrease post-intervention (10.3; SD 3.4) compared to pre-intervention (15.5; SD 3.3). There was not a statistically significant decrease in mean scores for the PSQI (p=0.37), but mean scores did improve from pre-intervention (10.5; SD 3.3) to post-

intervention (8.5; SD 2.4) with improvements in all subcategories except sleep duration, which was unchanged (Table 2).

Conclusion: Results suggest that teaching yoga techniques and encouragement of regular yoga practice may reduce symptoms of anxiety and improve sleep quality in undergraduate students. Future research may consider implementing a yoga intervention with a larger sample of undergraduate students to further examine the impact on quality of sleep and symptoms of anxiety in this population.

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Background and Significance

Problem Statement

Mental health problems among college students are a growing concern, with over 60% of college students meeting the criteria for a mental health disorder during the 2021 academic year (Abrams, 2022). This may be due to time constraints to their schedules, trying to learn how to juggle many different responsibilities without the physical support of parents, academic demands, poor time management skills, or lack of sleep (Kljajevie, 2022). Sleep is essential to restore crucial functions for mental and physical well-being. Many people, particularly college students, do not get quality sleep. This can be for several reasons, centered around a new sense of freedom and exposure to new influences, resulting in poor sleep hygiene. Poor sleep hygiene has a profound effect on sleep quality and anxiety levels (Dinis & Braganca, 2018). In addition, college students are often not as physically active as they were before they transitioned to college life (Kljajevie, 2022). This decrease in physical activity may have a negative impact on sleep quality, suggesting that interventions incorporating physical activity may improve the quality of sleep (Zhou et al., 2022).

Context, Scope, and Consequences of the Problem

There is a correlation between self-reported health and psychological symptoms and poor sleep among college students, resulting in poor academic performance and physical and mental health issues (Alqahtani et al., 2022). Over 40% of undergraduate college students report they are considering dropping out of college due to personal and emotional health problems (McPhilips, 2023). Students who reported poor sleep quality in their first year of college also had lower GPAs than their peers, with over a quarter of students blaming lack of academic success on poor

sleep (Prichard, 2020). Furthermore, when students leave college, the financial implications can have negative long-term results. A 2019 survey found that those without a college education made $21,000 less per year compared to college graduates. (Lake, 2021). Many college students also have student loan debt, which may become difficult to manage when they drop out of college, leading to late fees, higher interest rates on loans, and low credit scores (Lake, 2021).

As colleges are changing from using traditional therapy, they need to determine how mental health is changing in today's culture (Abrams, 2022). There are also negative financial implications for higher education institutions when students drop out. Colleges and universities receive less money when fewer students graduate due to student budget allocations being tied to the number of graduating students, which can put academic institutions in a budgetary crisis (Martinez, 2022). This can lead to layoffs which directly affect the local economy, and it can leave the institution without the staffing resources to increase enrollment, making it a vicious cycle.

Due to the substantial number of college students suffering from some form of mental health issue that impacts academic success, colleges and universities have a responsibility to address and prevent these issues to support student wellness. In fact, many academic institutions are finding creative ways to include wellness concepts in their policies (Abrams, 2022).

Current Evidence-Based Interventions

When an individual is feeling fearful or worried, they are often unable to rest adequately, which can result in insomnia and anxiety, as they have a strong correlation (Suni & Demitrui, 2023). A current evidence-based intervention to improve poor sleep quality and anxiety is yoga. Yoga is a 2000-year-old practice that originated in India. It involves engaging the mind and body, which creates a sense of mindfulness, through breathing exercises and physical poses (Gothe et

al., 2019). The practice of yoga involves the act of mindfulness along with these three elements: (1) asana (postures) (2) pranayama (breathing exercises) and (3) meditation (Nunez, 2022). In studies conducted with college students specifically, yoga exercises were shown to improve symptoms of both anxiety and insomnia (Elstad et.al, 2020; Mullen et al., 2021). Following a six-week study in which yoga was combined with cognitive behavioral therapy, study participants noted improvements in anxiety, depression, panic, sleep, and overall quality of life (Mullen et al**.,** 2021).

Purpose and Objectives

This project's purpose was to evaluate the effect of yoga education and videos on sleep quality and anxiety symptoms among undergraduate college students.

The objectives of this project were to:

1) Evaluate the baseline symptoms of anxiety and sleep quality of college students.
2) Implement a yoga intervention including a one-time in-person yoga session and a recorded yoga video to be used nightly for four weeks.
3) Evaluate the impact of regular yoga practice on symptoms of anxiety and sleep quality among college students post-intervention by using evidence-based screening tools including GAD and PSQI.

Review of Literature

Search Strategies

The literature was searched using the following PICOT question: In undergraduate college students (P), how does daily yoga practice (I) compared to no yoga practice (C) affect quality of sleep and levels of anxiety (O) over four weeks (T)? The databases used for the literature search included Pubmed, CINAHL, and Medline. The keywords “college students,”

"yoga," "sleep" AND "anxiety" were used with a restriction to articles published in the past five years and available by "free text only." Boolean terms used in these searches included "college students" AND "anxiety" AND "yoga" as well as "college students AND sleep AND yoga." Other limitations to the search criteria included articles in English only. This search yielded 41 articles between the three databases. Each of the 41 articles was reviewed and six articles included in the review were selected based on relevance to the proposed topic.

Synthesis of Evidence

The practice of yoga has been proven to improve anxiety levels and promote an overall sense of well-being. Several of the articles reviewed involved the performance of pre and post-tests to determine whether yoga helped to decrease stress and anxiety (Kalavalli,et.al, 2022; Lemay et.al, 2019; and Yanchenko et.al, 2021). Study participants who performed yoga exercises showed improvements across multiple domains of psychological health, including reduced levels of anxiety, depression, distress, and stress, as well as improved daytime wakefulness (Gothe et al., 2019; Chaudhari et al., 2020).

Many studies support the use of yoga to decrease stress levels anxiety in both adults and children (Davis et al., 2022; Goldstein, 2020; Lemay, 2019). One study involved children who had experienced trauma practicing trauma-informed yoga twice weekly for seven weeks. These children experienced results that were statistically significant in decreasing anxiety levels measured by the GAD-7 screening tool and improving overall Strengths and Difficulties (SDQ-11) scores (Davis et al., 2022). Educators who worked to improve anxiety levels among these children who had experienced trauma, were experiencing stress and burnout themselves. After being taught yoga exercises, educators experienced less stress, developed skills to manage stress, improved sleep, and reported less worrying about work when they were home (Davis et al.,

2023). Another study measuring perceived stress using the Perceived Stress Scale (PSS) showed a significant reduction in stress levels, anxiety, and depression among college students who participated in a four-day yoga workshop (Goldstein, 2020). The literature shows compelling evidence to support that practicing yoga helps to reduce anxiety and promotes a sense of well-being.

Support for Proposed Practice Change and Gap Identification

College students are a vulnerable population that is susceptible to poor quality sleep, decreased physical activity, and increased symptoms of anxiety (Abrams, 2022). These issues can be detrimental to academic performance and student success and cause a financial burden for the institution (Pelman & Watson, 2023). Yoga is an evidence-based physical activity that has been shown to be an effective intervention to improve sleep quality and decrease symptoms of anxiety (Mullen et al., 2021).

At the University of Pikeville, yoga is not currently part of the general education curriculum. There is one elective course, Religion 240, that includes didactic yoga content. This course is not a part of the general education curriculum and offers 20 seats once per academic year. The average student enrollment is 15 students per academic year. In addition, yoga is not currently offered as a fitness class on the college campus. In the past, yoga was offered free of charge once weekly in the campus chapel, with poor student turnout. This project aimed to address this gap by providing a free in-person yoga class taught by a certified yoga instructor and provide access to a resource video for independent use to evaluate the impact of regular yoga practice on quality of sleep and symptoms of anxiety in undergraduate college students.

Theoretical Framework

The theoretical framework for this DNP project was Plan, Do, Study, Act (PDSA) model. The PDSA model is an easy-to-use model for testing the efficacy of innovative ideas. There are four steps to this framework. The first step is "planning." Ideas for improvement are formed in this step, and it is determined how the improvement will be made. The second step is "doing." This is when a small-scale intervention is performed, and data are assessed. The third step in the process is "studying." In this stage, the results of the data from the study are learned. The fourth step is "acting." In this step, it is determined whether the small-scale experiment had positive results. It is then decided whether the intervention should be implemented on a larger scale or whether more improvements need to be made (Chen et al., 2020).

For this project, the plan was put in place to pilot a yoga intervention to assist college students in decreasing their anxiety levels and improving sleep quality. A one-time in-person yoga class was taught, and students were given access to a yoga video and encouraged to practice yoga each night before bedtime for four weeks. In the second step of this framework (doing), a survey was performed. Students were given paper questionnaires on anxiety levels (GAD-7) and sleep quality (PSQI) prior to beginning the yoga intervention. They were also asked to complete the same questionnaires via Qualtrics after the four-week intervention period. In the third step of the study (study), the results from the questionnaires were analyzed to determine if improvements in sleep quality and anxiety levels had been made. The fourth step of the project (act) is when it is determined, based on the results of the pilot program, whether the implementation will take place on a larger scale.

Methods

Design

This was a quasi-experimental one-group pre-test, post-test design. Evidence based screening tools were used to evaluate sleep quality (PSQI) and symptoms of anxiety (GAD-7) before and after the yoga intervention, which included one in person yoga class and a resource video for students to use throughout a four-week intervention period. The evaluation of the intervention was analyzed using descriptive statistics. While the literature does not specify a specific time frame to experience the benefits of yoga, the period of 20 minutes nightly was chosen due to students' busy schedules and to reduce the burden of adding it into their routines.

Setting

Agency Description

The project took place at the University of Pikeville (UPike) in Pikeville, KY with undergraduate students who lived in a dorm on campus. UPike is a small, private liberal arts college, with approximately 1,051 undergraduate students. The full-time undergraduate population consists of 52% women and 48% men. Concerning racial data, 83.2% of the population is Caucasian, 12.7% Black or African American, with the remaining 5% being Hispanic or international students (UPike, 2023). According to US News and World Report (2024), 55% of the students live on campus. The college is in the eastern corner of Kentucky, in Pike Co., and was founded in 1889 by the Presbyterian Church. It is on a hill in the center of Pikeville, KY in the Appalachian Mountains on a 25-acre campus.

Congruence of Project to Agency's Mission Statement

The mission statement for UPike states, "Preparing graduates through quality academic programs grounded in the liberal arts, and through involvement in community service,

experiential learning, research, athletics, humanitarian efforts, and global outreach" (University of Pikeville, 2023). This project aligns with the mission of the university by engaging students in experiential learning, research, and community involvement. According to Kolb's Experiential Learning Theory, individuals learn by experiencing situations (Institute for Experiential Learning, 2023). The one-time in-person yoga session familiarized students with yoga exercises and allowed them to get real-time feedback from a certified yoga instructor. Students could experience yoga and therefore, learn how to perform the exercises. The outcomes may result in improved academic performance and retention rates. This project also allowed students to be involved in a research project and become involved with their peers in the campus community.

Description of Stakeholders

Stakeholders involved in this project included the student participants at the University of Pikeville, as well as Sumer Musick, UPike professor, and certified yoga instructor who provided the in-person yoga training and the YouTube video of the yoga exercises. Luke Kopp, Executive Director of Resident Life and Engagement, is also a stakeholder in this project and he assisted with marketing by adding the flier to the weekly student newsletter.

Site Specific Facilitators and Barriers to Implementation

Facilitators for this DNP project included the support of UPike in implementation of this project, the availability of sufficient space to host the one-time in-person yoga session, and student participants willingness to attend the in-person session and complete the screening tools. Other facilitators include the ability to recruit participants through social media, on paper with fliers, and electronically through email of the weekly student newsletter. An expected barrier regarding the project student participation. Most students have classes during the daytime hours, so the in-person class was given in the evening to accommodate more students.

Sample

Target Population/Inclusion & Exclusion Criteria

The target population was undergraduate students at UPike. Inclusion criteria were undergraduate students over 18 who lived in a dorm and were agreeable to participate in the project and did not regularly practice yoga. Exclusion criteria included students who lived off campus, graduate students, and students who practiced yoga regularly.

Procedure

IRB Approval

The project was approved by the University of Pikeville and the University of Kentucky on 8/3/2023 and 11/07/2023, respectively. Approval from the University of Kentucky's Medical IRB was obtained before the project's implementation.

Description of Evidence-Based Intervention

Undergraduate students living on campus were invited to participate in this project. Approved fliers were placed around campus, including dormitories, classrooms, elevators, and the student cafeteria. There were also announcements made on Facebook. Luke Kopp, Executive Director of Residence Life and Engagement, included the flier in the weekly newsletter going out to students. All UPike students were also sent a recruitment email of the flier as well by the PI. The flier also stated that a door prize would be given to attract more participants.

Interested students were invited to come to a one-time in-person yoga session, which was provided free of charge and a door prize was offered to one student whose name was randomly chosen in a drawing. During the yoga portions session, students had the opportunity to learn the yoga poses and were given time to ask questions about the exercises or project. Students who wished to participate completed the pre-intervention GAD and PSQI screening tools on paper,

which were then collected by the PI and kept in a secure location that could only be accessed by the PI. Students were given informed consent information to read and sign at this session as well. The recording of the yoga exercises was provided to students via email, and they were instructed to watch the video each night and perform yoga exercises each night for four weeks.

Before leaving the in-person session, students were advised that a link would be sent to their email address which would allow them to log how often they performed the yoga exercises each week in an online document. The goal was for students to participate in the exercises at least five nights per week. The link allowed them to document their participation for the entire four weeks of the project, at which time they submitted their final data. Phone calls were made to remind students who did not submit their data within 48 hours after the study had ended. Students also received notification via email, reminding them to complete their submitted data. Upon submission of students uploading data, they were also asked to complete the post-implementation GAD and PSQI screening tools.

Measures and Instruments

Demographic information collected included age (in years), race (White, Black, Hispanic), gender (male, female), and program of study; these were collected on the pre-survey only. Anxiety was measured using the GAD-7. This is a seven-item scale with scores ranging from 0-21. Scores of 10 or greater indicate a possible anxiety disorder (Anxiety and Depression Association of America, 2024). Sleep quality was evaluated using the Pennsylvania Sleep Quality Index (PSQI). The PSQI yields component scores (sleep quality, sleep latency, sleep efficiency, sleep disturbance, sleep medication use, and daytime dysfunction) as well as an overall score, with a potential range of 0-21. Higher scores indicate poorer sleep quality.

Additionally, on the post-survey, students were asked how much time they spent performing nightly yoga exercises (<10 minutes, or 10 minutes or more).

Data Collection

Data was collected using the pre-intervention surveys, which were on paper. Students were emailed reminding them to complete the post-intervention surveys. Post-intervention data was collected using Qualtrics.

Data Analysis

Descriptive statistics were used to summarize student demographic characteristics. Changes in anxiety and sleep quality before and after the intervention were evaluated using the two-sample t-test. This method was used since the surveys were anonymous, so linking pre- and post-surveys was not possible. Data analysis was conducted using IBM SPSS Software (version 28), with an alpha level of 0.5.

Results

Demographics and Findings

Four students volunteered to participate in the study. The average age of the study participants was 22 years (SD = 3.2, see Table 1). Half of the participants identified as male, and the majority were White (50%) Three-quarters of the participants were nursing students while the remaining 25% majored in social work. All four of the participants completed the four-week project and completed the post-intervention survey. There were no significant changes in anxiety ($p = .058$), overall sleep quality measured by the PSQI ($p = .083$), or any of the components, from pre- to post-intervention (see Table 2). However, there was a slight decrease in anxiety; the

pre-intervention mean score of the GAD was 15.5 (SD =3.3) and decreased to 10.3 (SD = 3.3) on the post-survey. For sleep quality, there was also a slight decrease in the overall scores (pre M = 10.5, SD = 3.3 vs. post M = 8.5, SD = 2.4), indicating better sleep quality. The PSQI component with the greatest improvement was subjective sleep quality (pre M = 1.8, SD = 0.5 vs. post M = 1.0, SD = 0.0), which had a mean of 1.75 pre-intervention and a mean of 1.0 post intervention. Three-fourths of the students reported practicing yoga for more than 10 minutes nightly for the four weeks of the project, while 25% of the students reported practicing yoga for less than 10 minutes nightly for the four weeks of the project.

Discussion

This project aimed to evaluate sleep quality and anxiety levels among college students after a four-week yoga intervention. College students are particularly susceptible to stress due to their many commitments and busy schedules. Yoga is an evidence-based intervention proven to be effective in reducing symptoms of stress, anxiety, and depression (Mullen et al., 2019). By implementing a yoga intervention in college students, anxiety levels were decreased, and sleep quality was improved following the four-week intervention.

Majority of domains on the PSQI showed improvement after the yoga intervention and the overall global score improved from a pre-intervention mean of 10.5 to a post-intervention mean of 8.5 (Table 2), suggesting yoga had a positive impact on sleep quality at the conclusion of the project. Although improved overall, the post-intervention mean for the overall global score remained above five, indicating students were still experiencing poor sleep quality after the intervention. Improvements in sleep latency indicate that yoga was beneficial for reducing the amount of time it took for participants to fall asleep after performing yoga exercises, reducing delayed onset of sleep. Scores were improved for sleep efficiency as well, indicating an increase

in the amount of time spent sleeping compared to the amount spent in bed, meaning sleep was more effective. Sleep disturbances, use of sleeping medication, and daytime dysfunction were all improved, indicating that the yoga intervention enhanced daytime functioning, reduced sleep disruptions, and impacted how often participants were using pharmacological sleep aids. The component with the greatest improvement was subjective sleep quality, with a pre-intervention mean of 1.75 and a post intervention mean of 1.0. The component of sleep duration was unchanged with a mean of 1.5 pre and post intervention, indicating there was no improvement with this domain. This suggests that yoga was not beneficial in extending the amount of time the participants spent asleep. Further exploration into whether sleep duration is insufficient or excessive in this population is warranted, as too much or too little sleep may impact physical health, mood, and cognitive function.

Symptoms of anxiety were also shown to be improved on the post-intervention survey. College students gained notable benefits from this project. Based on the findings of this project, the yoga intervention was effective, and the objectives were adequately met. Application of these skills may continue to improve these domains beyond this project's scope. Further iterations of this project may require modification in the intervention delivery or design to address the project's findings that were not positively impacted, including sleep duration and restlessness. Continuous evaluation of the benefits of yoga in this population is necessary to refine the intervention and improve outcomes.

Project Impact and Sustainability

Colleges and universities are in ideal positions to help students improve their mental health and overall college experience by incorporating evidence-based interventions such as yoga into the curriculum. Policy changes regarding the curriculum are required to be approved

by the university's curriculum committee, so college administrators must be made aware of the positive benefits of yoga practice on sleep, anxiety, and overall health and wellness in college students. Historically, offering weekly in-person yoga classes on UPike's campus has not been successful. Providing education on the basics of yoga early on in students' college careers will help set them up for success and may increase buy in to the benefits of this practice, prompting students to continue this practice independently. This can be accomplished by hiring certified yoga instructors who can educate students on the benefits of yoga as well as teach basic yoga skills. The yoga instructors could also have yoga classes for students at various times and locations on campus to accommodate students' varying schedules and make available to students who cannot attend in-person classes. By teaching yoga practices and benefits to students when they enter their college careers, they will incorporate it into their daily routines. The number of students who attend yoga classes or participate virtually should be noted.

Implications for Practice, Education, Policy, and Research

The outcomes of this project have implications for practice, education, policy, and research. This project addressed a gap in the resources available to address poor sleep, anxiety symptoms, and lack of physical activity for undergraduate college students at UPike. While counseling is available on college campuses, this addresses mental health needs after the issue has occurred. By educating students about the benefits of yoga on the frontlines of their college careers, and incorporating it into general curriculum classrooms, students may have improved quality of sleep and reduction or prevention of symptoms of anxiety. This may prevent further sequelae from occurring.

Since anxiety and poor sleep quality are prevalent among college students, the ideal timing for this change would be upon college admittance. Specifically, at UPike, the "New

Student Seminar" offered each Fall for new college Freshman and transfer students, would provide an opportunity to reach a large group of undergraduate students at the beginning of their college career. This practice is not currently in place at the University of Pikeville and could be an asset both to students and the university. However, it should not be limited to in-person participation only. In the future, yoga should be offered virtually due to time constraints and demanding schedules of students.

In addition to practice and education, the outcomes of this project also have implications for policy and research. Policy implications include a consideration for incorporating yoga into college wellness programs to promote mental health and wellness among students. Identifying potential facilitators and barriers of implementing yoga practice into the general educational curriculum may drive policy changes at the university level. Further research is needed in this area, specifically longitudinal studies that explore the long-term effects of yoga practice on sleep and anxiety in college students. Additionally, future research may examine the benefits of yoga on sleep and anxiety in more diverse student populations, such as graduate level students or students living off campus.

Cost Implications and Cost Benefits

By implementing yoga into the curriculum of certain classes, such as 'New Student Seminar,' the primary cost the university would incur would be hiring a yoga instructor, either full-time or part-time. The cost would vary depending on the frequency and level of services provided by the instructor. There are currently no yoga interventions that are combined with this required course at UPike.

In addition to the cost of the yoga instructor, there are cost implications to the college as well. As noted previously, mental health issues including poor sleep and symptoms of anxiety

have contributed to students deciding to drop out of college early, resulting in financial implications for the institution.

According to Pelman and Watson (2023), out of 1669 colleges and universities, the total amount of lost revenue due to early dropouts is close to $16.5 million annually, collectively. However, this is thought to be a low number as this does not include the cost of enrollment, which includes academic success coaches and other student support services.

Limitations

There were several limitations identified with this project. One limitation of this project was that only students who lived on campus could participate. Students who commute to campus may have contributed valuable information and reap the benefits of this intervention. Another limitation was the sample size. Only four students showed up for the initial one-time yoga session, which meant they were the only students who could participate. Timing of this intervention was also a limitation, as the in-person session was held during the Winter season and required rescheduling due to inclement weather. If this study were to be reproduced on a larger scale, piloting a similar intervention during the ‘New Student Seminar’ may allow recruitment of more participants, providing a more robust sample size. Finally, students were required to attend the initial in-person yoga class to participate in the study. Perhaps if students had been allowed to participate virtually, there may have been more participants. In the future, a more diverse group of college students should be permitted to participate in such studies, whether they live on or off campus.

Conclusion

This project demonstrates the significant potential of a yoga intervention to improve sleep quality and reduce symptoms of anxiety in college students. Findings of this project suggest that

incorporating a routine of yoga practice can contribute to student wellness by improving sleep quality and reducing anxiety symptoms. Integration of yoga practice into the college curriculum may provide students with skills to improve their overall mental wellness. Further research is needed to understand the long-term benefits of yoga in this population. By prioritizing low cost, holistic wellness interventions such as yoga, colleges and universities will retain more students, decrease overall costs, and foster a healthier and more resilient academic community.

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Tables

Table 1. Descriptive Summary of Student Demographics N=4

	Mean (SD) or n (%)
Age	22 (3.2)
Race	
White	2 (50%)
Black	1 (25%)
Hispanic	1 (25%)
Gender	
Male	2 (50%)
Female	2 (50%)
Degree	
Nursing	3 (75%)
Social Work	1 (25%)

Table 2. Pre-intervention and Post-Intervention anxiety and sleep quality mean scores.

	Potential Range	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	P
Generalized Anxiety Disorder	**0-21**	**15.5 (3.4)**	**10.3 (3.3)**	**.083**
Pennsylvania Sleep Quality Index				
Subjective Sleep Quality	**0-3**	**1.75 (0.5)**	**1.0 (0.0)**	**.058**
Sleep Latency	**0-3**	**2.0 (0.8)**	**1.75 (1.0)**	**.71**
Sleep Duration	**0-3**	**1.5 (0.6)**	**1.5 (1.3)**	**1.00**
Sleep Efficiency	**0-3**	**0.3 (0.5)**	**0.0 (0.0)**	**.39**
Sleep Disturbance	**0-3**	**1.5 (0.6)**	**1.3 (0.5)**	**.54**
Use of Sleep Medication	**0-3**	**1.5 (0.6)**	**1.3 (0.5)**	**.54**
Daytime Dysfunction	**0-3**	**2.0 (0.8)**	**1.8 (1.3)**	**.75**
Global Score	**0-21**	**10.5 (3.3)**	**8.5 (2.4)**	**.37**

Appendices

Appendix A Flier and email inviting students to participate in a research project.

THE UNIVERSITY OF KENTUCKY RESEARCH PROJECT
Researchers at the University of Kentucky are inviting you to participate in a research project at the University of Pikeville.

This project seeks to determine whether practicing Yoga nightly helps to decrease anxiety levels and improve sleep quality.

Requirements to participate:

Be an undergraduate student, living in a dorm at UPike.

Cannot be proficient in practicing Yoga.

Come to a one-time in-person Yoga session at 2nd floor classroom Bears Tower.

Consent to watch and practice the exercises on the associated Yoga video nightly for four weeks.

Answer anxiety and sleep quality questions before and after the four-week study.

Document the amount of time spent performing the nightly Yoga exercises.

Contact Larisa Lucas, MSN, RN @larisalucas@upike.edu (606) 213-2187

Date: ____Monday, January 22, 2024 _____Time 6:00 PM

University of Kentucky
Research

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Appendix B Pittsburg Sleep Quality Index

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

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

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

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

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

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

5. During the past month, how often have you had trouble sleeping because you . . .	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) Had bad dreams				
i) Feel pain				

j) Other reason(s), please describe_____

_____

How often in the past month have you had trouble sleeping because of this?	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week

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

Very good _____ Fairly good _____ Fairly bad _____ Very bad _____

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				

10. Do you have a bed partner or roommate?

No bed partner or roommate _____ Partner/roommate in other room _____ Partner

in same room, but not same bed _____ Partner in same bed _____

If you have a roommate or bed partner, ask him/her how often in the past month you have had . . .	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a) Loud snoring				
b) Long pauses between breaths while asleep				
c) legs twitching or jerking while you sleep				
d) Episodes of disorientation or confusion while you sleep				
e) Other restlessness while you sleep Please describe.				

Scoring the PSQI

The order of the PSQI items has been modified from the original order to fit the first nine items (which are the only items that contribute to the total score) on a single page. Item 10, which is the second page of the scale, does not contribute to the PSQI score.

In scoring the PSQI, seven component scores are derived, each scored 0 (no difficulty) to 3 (severe difficulty). The component scores are summed to produce a global score (range 0 to 21). Higher scores indicate worse sleep quality.

Global PSQI Score: Sum of seven component scores:_____

Appendix C Generalized Anxiety Disorder Scoring

GAD-7 Anxiety

Over the last two weeks, 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

Column totals _____ + _____ + _____ + _____ =

Total score _____

If you checked any problems, how difficult have they 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
☐	☐	☐	☐

Scoring GAD-7 Anxiety Severity

This is calculated by assigning scores of 0, 1, 2, and 3 to the response categories, respectively, of “not at all,” “several days,” “more than half the days,” and “nearly every day.” GAD-7 total score for the seven items ranges from 0 to 21.

0–4: minimal anxiety

5–9: mild anxiety

10–14: moderate anxiety 15–21: severe anxiety

Appendix D: UK IRB Approval

Initial Review

Approval Ends: 11/7/2024	IRB Number: 90794

TO:	Larisa Lucas College of Nursing PI phone #: 6069391004 PI email: ljo274@uky.edu
FROM:	Chairperson/Vice Chairperson Medical Institutional Review Board (IRB)
SUBJECT:	Approval of Protocol
DATE:	11/9/2023

On 11/8/2023, the Medical Institutional Review Board approved your protocol entitled:

Effects of Yoga on Sleep Quality and Anxiety Levels Among College Students who live on Campus

Approval is effective from 11/8/2023 until 11/7/2024 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, the IRB approved consent/assent document(s) to be used when enrolling subjects can be found on the approved application's landing page in E-IRB. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.] Prior to the end of this period, you will be sent a Continuation Review (CR)/Annual Administrative Review (AAR) request which must be completed and submitted to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions, and requirements. The research procedures should be implemented as approved in the IRB protocol. **It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.**

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online Office of Research Integrity's IRB Survival Handbook. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

seeblue.
405 Kinkead Hall | Lexington, KY 40506-0057 | P: 859-257-9428 | F: 859-257-8995 | www.research.uky.edu/ori/
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Appendix E: UPike IRB Approval

Status of Request for Exemption from IRB Review

***Federal-Wide Assurance Number FWA*00021396**

Institutional Organization Research Group (IORG) IORG0008047

University of Pikeville IRB#1 IRB00009652

Approval Date: 3 August 2023 **Expiration Date: Not applicable**

Proposal Number: PROTOCOL_23_0029

Title of Project: Does practicing yoga improve sleep quality and decrease anxiety levels?

Principle Investigator(s) and Co-Investigators: Lucas, L.

☒ **Research exempted from IRB review.**

☐ **Research requires IRB review.**

The IRB has reviewed this proposal and rendered the decision noted above.

This study has been found to fall under the following exemptions(s):

☒ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ **6**

Continuing review is not required for exempt proposals; however, you must still report any modifications to the protocol and any unexpected/adverse events to the committee if these should occur.

The UPike IRB reserves the right to observe, review and evaluate this study and its procedures during the course of the study.

LeAnne Forquer Epling

LeAnne Forquer Epling, Ph.D.

Professor of Psychology

Chair, UPike Institutional Review Board