Sleep Quality and Burnout Syndrome in Students at a University in Lima, Peru: A Cross-Sectional Study

Yajaira Garay-Castro[1], Luis Acosta-Avila[2], Ana Flores-Hiyo[3],
Ana Huamani-Huaracca[4], Sebastián Ramos-Cosi[5], Gina León-Untiveros[6], Alicia Alva-Mantari[7]*
Faculty of Nursing, Universidad de Ciencias y Humanidades, Lima, Perú[1, 2, 3]
E-Health Research Center, Universidad de Ciencias y Humanidades, Lima, Perú[4]
Image Processing Research Laboratory (INTI-Lab), Universidad de Ciencias y Humanidades, Lima, Perú[5, 7]
Norbert Wiener Private University, Lima, Perú[6]

***Abstract*—The World Health Organization (WHO) reports that 15% of mental health problems develop in people with demanding work and academic conditions. Both sleep quality problems and Burnout Syndrome (BS) are recognized as significant problems in university settings. In Lima, Peru, the situation is critical, as BS affects up to 60% of university students. Therefore, quantifying this problem through a nursing intervention is crucial. The objective of this study was to determine the relationship between sleep quality and BS in university students at a university in Lima. Using a quantitative, cross-sectional, and correlational approach, the Pittsburgh Sleep Quality Index (PSQI) and the Student Burnout Scale (EUBE) were applied to a sample of 216 nursing and systems engineering students, using Spearman's Rho test and the Multinomial Logistic Regression Model. The findings revealed a moderate negative correlation between sleep quality and SB (Rho=-0.508; p < 0.001) and a relationship between sleep quality problems and mild SB (RRR=7.84565; p = 0.005). Furthermore, 85.19% of participants experienced sleep problems that warranted medical attention and treatment, and 86.57% had mild SB. Sleep quality problems and the development of SB are prevalent in this population; therefore, it is essential to continue studying them and integrating specific intervention strategies.**

***Keywords*—Burnout Syndrome; sleep quality; university students; mental health**

I. Introduction

The World Health Organization (WHO) reports that at least 15% of cases of mental disorders correspond to adults with demanding work and academic lives, reflecting a growing concern towards mental health in these settings [1]. The recent COVID-19 pandemic has exacerbated this problem, contributing to a notable 25% increase in diagnoses of anxiety and depression [2]. The factors derived from the pandemic, such as social isolation and economic uncertainty, added to academic demands, have generated an environment that favors the development of mental pathologies [3].

Various studies indicate that university students assume a work dynamic and are among the most vulnerable to suffer disorders related to academic overload, which in many cases exceeds personal and emotional resources [4]. This situation intervenes in professional development, as it can negatively affect both academic performance and future performance. In response to this problem, the WHO has officially recognized student burnout as a condition that affects the world and has been included in the International Classification of Diseases (ICD-11) [5].

In countries such as Spain, it is estimated that around 24% of health professionals suffer from Burnout Syndrome (BS), a disorder that significantly affects their emotional well-being and work performance [6]. The alarming thing is that many of these professionals claim to have experienced the first signs of this syndrome during their university years, which highlights the seriousness of the problem. This situation not only reinforces the idea that burnout begins before entering the labor market, but also underlines the need to address it from educational institutions [7].

In Latin America, research conducted in Mexico revealed that all university nursing students experience some stage of Burnout Syndrome, which directly affects their overall academic performance [8]. Similarly, in Colombia, it has been observed that 1 in 3 health students between the ages of 20 and 25 suffers from Burnout Syndrome [9]. These data expose the direct relationship between mental exhaustion and the decrease in academic efficiency, since both have an effect on the other and generate a repetitive state that negatively impacts university education.

These problems are so frequent that they also affect education professionals who play an essential role in student training. During the global coronavirus pandemic, in Chile, it was detected that 93% of teachers, both at the school and university level, experienced high levels of emotional exhaustion, which had an impact on their professional work [10]. This problem not only affected teachers but also had a profound impact on the student community, especially among university students, who were already facing a considerable academic load [11].

In Peru, statistical studies reveal that the incidence of burnout in students of health sciences, such as nursing, dentistry, and medicine, ranges between 30% and 60% [12], [13]. However, despite the magnitude of this disorder in the academic field, until 2014, only four specific investigations on burnout in students had been conducted, which shows a worrying lack of in-depth studies. This situation is particularly critical in Lima, where burnout affects up to 60% of students [14]. The scarcity of scientific production limits the comprehensive understanding of a problem that advances

*Corresponding author.

silently, but that directly impacts the well-being and academic performance of future health professionals.

Burnout, also known as BS, is a psychosocial phenomenon understood as an inadequate response to stress and environmental demands, which generates a negative emotional burden and ineffective problem management [15]. Although it was initially linked to the workplace, its presence has spread to the university academic context, where students face high levels of pressure due to task overload, tight deadlines, continuous evaluations, competition, and interpersonal conflicts [16,17]. This syndrome manifests itself in negative behaviors such as pessimistic thoughts, lack of motivation, irritability, and excessive worry, even attributing failures to others [18, 19]. Its physical repercussions include chronic fatigue, persistent headaches, and recurrent abdominal pain that can evolve into gastrointestinal problems [20].

This syndrome is primarily diagnosed using the Maslach Burnout Inventory, which identifies both the frequency and intensity of the syndrome. However, other instruments adapted to different populations and contexts also exist that facilitate the detection of burnout in any individual [21]. Although there is no specific treatment, medical management usually focuses on the reduction or temporary suspension of highly stressful activities, such as work or academic overload [22]. However, this recommendation is difficult to comply with in most cases due to the influence of multiple external factors. Therefore, regular physical activity and dedication to recreational activities are promoted as measures that promote socio-emotional balance and contribute to general well-being [23].

On the other hand, sleep quality is associated with the ability to sleep continuously between 7 and 8 hours each night, which is essential for the body's proper recovery [24]. During this process, the body replenishes the energy used in daily activities, ensuring balanced physical and mental performance [25]. Furthermore, sleeping well helps strengthen the immune system, promote proper cardiovascular function, promote emotional stability, and improve overall well-being [26]. Conversely, a lack of sufficient rest has immediate consequences, such as irritability and concentration problems, and in the long term can lead to metabolic disorders, chronic stress, and mental health problems [27]. Thus, quality sleep is a decisive factor in preventing disease and preserving overall health.

Worldwide, several studies have explored the relationship between sleep quality and BS in university students. In Iran, using the Pittsburgh Sleep Quality Index (PSQI) and the Maslach Burnout Inventory for Students (MBI-SS), it was reported that 47.7% presented altered sleep patterns and 50% inadequate quality [28]. In the United States, graduate students showed an average of 6.4 hours of sleep, with 40% affected by poor quality, in addition to a high relationship with BS [29]. In Argentina, the unidimensional student burnout scale (EUBE) revealed that 59.3% of engineering students showed some degree of BS and 35.2% moderate symptoms of burnout [30, 31]. In Brazil, 34.7% presented excessive daytime sleepiness and nearly 60% poor sleep quality [32]. Finally, in Lima, 98.7% of university students reported moderate BS and 67.5% daytime sleepiness [33].

The situation described demonstrates the vulnerability of university students to problems related to sleep quality and BS, which places nursing in an essential role in health promotion. This requires overcoming the limited leadership often attributed to this profession. This work begins with the identification of risk factors that compromise well-being, especially in such demanding settings as the academic one [28]. In Lima, where the incidence is particularly high, poverty, low educational level, academic overload, long commutes, and scarcity of resources create a favorable context for the appearance of these disorders [14]. Therefore, nursing intervention is crucial, since quantifying the magnitude of the problem constitutes the first step in designing educational and preventive strategies that promote healthy lifestyles and reduce long-term consequences.

In this sense, the present study has the general objective of determining the relationship between sleep quality and Burnout Syndrome in university students from a university in Lima, Peru. In addition, the specific objectives are to describe the sociodemographic characteristics, evaluate sleep quality, and identify Burnout Syndrome in students from a university in Lima, Peru. Through this, we seek to identify the risk factors that contribute to the development of the syndrome in this population group. This will allow us not only to better understand the problem within the university setting but also to establish a solid and novel foundation that fills the gap in current theoretical knowledge regarding university students in Lima for the design of effective intervention strategies, since previous studies either do not link the variables to study this population or do so with insufficient methodological evidence.

II. Materials and Methods

A. Type and Design

The present study adopts a quantitative methodology with a cross-sectional design, which means that the variables were measured at a specific time and in a given context, without monitoring over time [34]. In addition, it was correlational because it evaluated the relationship between both variables and the factors that modify them [35].

B. Population and Sample

The University of Sciences and Humanities, located in the Los Olivos district, was selected as the setting for the research due to criteria of convenience and accessibility. This approach made it possible to take advantage of the logistical and academic facilities provided by the institution, which facilitated in the realization of the necessary internal coordination with its academic representatives. From these efforts, a total population of 600 students was identified, distributed between the careers of Nursing and Systems Engineering, who were studying the first, third and ninth cycles to evaluate the variations. The selection of these careers was made randomly from among the 15 careers offered by the selected university. Furthermore, comparing the challenges faced by Nursing students, known for their rigorous academic and practical demands, with those of Systems Engineering students, whose field of application is increasingly broad due to technological advancements, is important for the comparative analysis.

To determine the appropriate sample, the statistical software Epidat 4.2 was used, which is recognized for its accuracy in the

calculation of samples for population studies [36]. Through this program, a sample of 216 students was calculated, taking into account a confidence level of 95%, which guarantees that the results obtained will have a high degree of reliability and can be generalized to the population studied with a minimum margin of error.

1) Inclusion criteria:

- Students of 18 years of age and older.
- Students of both sexes.
- Students with current enrollment at the University of Sciences and Humanities.
- Students who are in the first, third, or ninth cycle of the Nursing or Systems Engineering careers.
- Students who agree to participate in the study through informed consent.

2) Exclusion criteria

- Students with chronic health conditions.
- Students who use substances or drugs.
- Students with night shift jobs.

C. Variables

This research focuses on analyzing two main variables, which are sleep quality and Burnout Syndrome. Both variables are quantitative in nature, as they are measured and expressed using numerical data that allow statistical analysis. In addition, the measurement scale used for both variables is ordinal, implying that the values assigned to each category represent an order or hierarchy [37].

1) Sleep quality

a) Conceptual definition: It refers to the ability to achieve adequate rest during the night, allowing optimal performance during the day. This concept is essential for physical recovery, as well as for strengthening cognitive processes such as learning and memory [24].

b) *Operational definition:* Sleep quality is the condition of the night's rest experienced by nursing and engineering students in Lima and will be assessed through the Pittsburgh Sleep Quality Index (PSQI).

2) Burnout Syndrome

a) Conceptual definition: It is a state of exhaustion that encompasses physical, emotional, and cognitive aspects, as a result of academic demands. It manifests itself predominantly through emotional exhaustion, lack of interest in activities, inclination to self-sabotage, and experience of doubts [15].

b) Operational definition: It is the mental fatigue experienced by nursing and engineering students in Lima, within the framework of academic pressures, and will be evaluated using the Student Burnout Syndrome Scale (EUBE).

D. Technique and Instrument

1) Data collection technique: In this study, we chose to use the survey technique to gather a wide range of questions, aimed at obtaining answers and collecting data in an agile and efficient way. This methodology is widely valued by researchers, as it allows key information to be obtained effectively, which is essential for the development of the investigations [38].

2) Instruments

a) Sleep quality: PSQI was used, comprising 19 questions organized into seven distinct categories. Each question is evaluated on a scale of 0 to 3 points, where a score of "0" indicates that the task is simple, while a "3" indicates that it is extremely difficult within its corresponding category. The scores for the seven categories are added together to obtain a total score ranging from 0 to 21 points. A score of "0" suggests that sleep is easy, while "21" reflects that sleep is extremely complicated in all categories. In addition, these scores are categorized into ranges that indicate sleep quality: a score below 5 indicates absence of sleep problems, 5 to 7 suggests that you deserve medical attention, 8 to 14 indicates that care and treatment are required, and a score of 15 or higher is considered a severe sleep problem [39].

Although the instrument was adapted and validated in [40], it was decided to carry out a new validation process, in which it was submitted to the evaluation of five expert judges in the area of research. To this end, the review was requested under criteria of relevance, coherence, and clarity, which resulted in an Aiken V of 0.91, affirming its validity. In addition, a pilot test was carried out in which the instrument was applied to 20 individuals with the characteristics of the study sample, and a Cronbach's Alpha of 0.87 was calculated, which determined the reliability of the instrument.

b) Burnout Syndrome: EUBE is used, designed to analyze the prevalence and intensity of Burnout Syndrome in students, encompassing physical, emotional, and cognitive exhaustion. It consists of 15 questions organized into two dimensions: behavior, which includes class attendance, participation, and effort in academic tasks; and the dimension focused on the attitude that university students must maintain during their learning process. In addition, it is measured on a four-option Likert scale: Never (1), Sometimes (2), Almost Always (3), and Always (4). The scores are summed and interpreted in percentage terms. In this context, it is established that a percentage between 0% and 25% indicates "does not present" burnout, while a range of 26% to 50% corresponds to a "mild" level. The "moderate" level is defined as between 51% and 75%, and the "deep" level is assigned to percentages ranging from 76% to 100% [41].

The validity and reliability of the instrument have been demonstrated at [42], but through the new expert evaluation, an Aiken V of 0.89 was obtained, which again demonstrated its validity. Likewise, the calculation of Cronbach's Alpha was performed, and with a result of 0.86, its reliability was reaffirmed in the proposed context.

E. Procedure

1) Prior authorization and coordination: For the collection of data for this study, the approval of the ethics committee of the University of Sciences and Humanities was obtained, which allowed the necessary permits to be obtained for the realization

of the project with the students of said institution. At the beginning of the fieldwork, the students were asked to read and sign the informed consent, guaranteeing their voluntary participation.

2) Application of the instruments: Data collection took place at the University of Sciences and Humanities between April and May 2025. The process consisted of the application of surveys divided into three sections. The first collected general data for the analysis of personal history. The second included the EUBE for the assessment of the prevalence and severity of physical and emotional exhaustion due to academic overload. The final section presented the PSQI for the collection of information on the quality of nightly rest. Each student had 10 minutes to complete the survey, ensuring that all items were answered correctly.

3) Bioethical aspects: This project was based on strong ethical principles to ensure the proper treatment and comprehensive protection of university students. Informed consent was used to provide each participant with clear information, ensuring the confidentiality of their data. In addition, the bioethical principles of autonomy, beneficence, non-maleficence, and justice were applied, fundamental to conduct research in an ethical and responsible manner [43].

- *Autonomy:* Autonomy was guaranteed through informed consent, which was complete, informative, and voluntary. Participants were provided with clear information about the risks, benefits, and purpose of the study, ensuring their understanding before participating.
- *Beneficence:* The university students were informed about the advantages of the study results, highlighting the importance of this research in improving exhaustion, fatigue, and, especially, the quality of sleep.
- *Non-maleficence:* It was guaranteed that the participation of the students does not imply risks to their health or integrity, highlighting the balance between benefits and possible risks, and their contribution to the prevention of these. In addition, the processing of the data was particularly careful, avoiding the disclosure of private information.
- *Justice:* Non-discrimination was guaranteed in the selection of participants, attending to their needs in an equitable and respectful manner. In addition, fair treatment was ensured without distinction throughout the project; each participant was treated with cordiality and respect, creating a welcoming environment for the completion of the questionnaire.

F. Data Analysis

For statistical analysis, the collected information was organized into a data matrix using Microsoft Excel and subsequently exported to the Statistical Package for the Social Sciences (SPSS) version 20 software, where processing was performed. A descriptive analysis of the sociodemographic characteristics and the main variables was first performed. Subsequently, for inferential analysis, the data were assessed for normality, determining that they did not follow a normal distribution ($p < 0.05$). Therefore, the nonparametric Spearman's Rho test was applied, which is used to measure the strength and direction of the relationship between two variables when they are ordinal or do not meet the assumptions of normality. Statistical significance was established at a $p < 0.05$ value [44].

In addition, the multinomial logistic regression model was used, considered an ideal inferential statistical tool when the dependent variable is categorical with more than two categories. This procedure allowed us to analyze whether any of the variables evaluated significantly increased a student's likelihood of experiencing BS. The application of this model provided a more precise view of the associated factors by estimating the magnitude of the risk in each response category [30]. Finally, the findings were organized and represented in tables and figures of frequency, as well as correlation, which facilitated a clearer, more detailed, and more accessible interpretation of the results.

III. Results

A. Sociodemographic Characteristics

TABLE I. Sociodemographic Characteristics of Students in a University in Lima, Peru

Sociodemographic characteristics	n = 216	
	fi	%
Sex		
Female	150	69.44
Male	66	30.56
Children		
Yes	28	12.96
No	188	87.04
Marital status		
Single	192	88.89
Married	15	6.94
Cohabitant	8	3.71
Divorced	1	0.46
Widower	0	0
University Cycle		
1st Cycle	72	33.33
3rd Cycle	105	48.61
9th Cycle	39	18.06
University career		
Nursing	161	74.54
Systems Engineering	55	25.46
Occupational conditions		
Study	95	43.98
Study and work casually	52	24.07

Study and work stably	69	31.95
Hours of sleep		
Less than 6 hours	21	9.72
6 hours	143	66.20
7 hours	12	5.56
8 hours	34	15.74
More than 8 hours	6	2.78

Table I shows the sociodemographic data of the study participants. Regarding sex, 150 (69.44%) were women, 188 (87.04%) had no children, 192 (88.89%) were single, 105 (48.61%) were in the third cycle, 161 (74.54%) were studying nursing and 95 (44.98%) were dedicated exclusively to studying, 143 (66.20%) indicated sleeping 6 hours a day.

B. Incidence of Variables

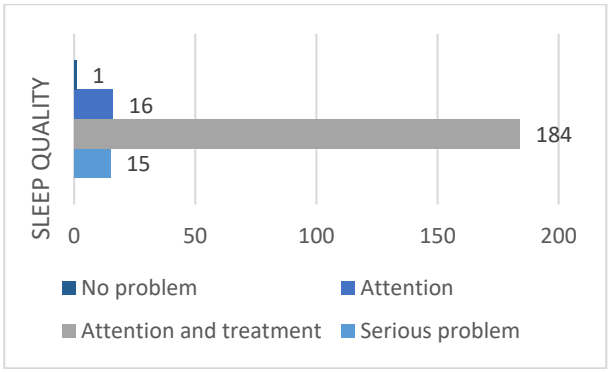

Fig. 1. Incidence of sleep quality problems.

Fig. 1 shows the incidence of sleep quality problems in the participants. It can be observed that 1 (0.46%) do not have any sleep problems, 16 (7.41%) have sleep problems that deserve medical attention, 184 (85.19%) have sleep problems that deserve medical attention and treatment, and 15 (6.94%) have serious sleep problems.

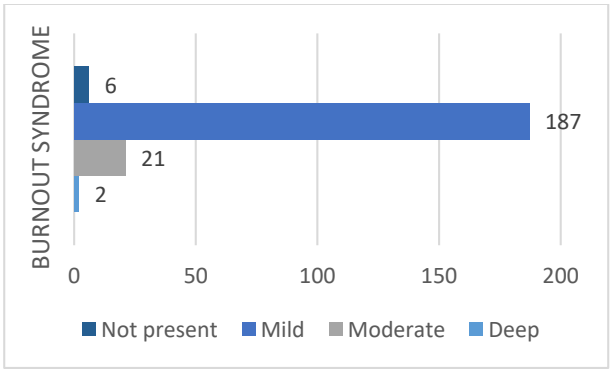

Fig. 2. Incidence of burnout syndrome.

Fig. 2 shows the incidence of Burnout Syndrome in the study sample. Of the participants, 6 (2.78%) did not have the syndrome, 86.57% (187) had a mild syndrome, 21 (9.72%) had moderate burnout, and 2 (0.93%) had a syndrome in its deep stage.

C. Correlational Analysis

TABLE II. CORRELATION BETWEEN SLEEP QUALITY AND BURNOUT SYNDROME

			Sleep quality	Burnout Syndrome
Spearman's Rho	**Sleep quality**	Correlation Coefficient	1.000	-0.508
		Sig. (bilateral)	.	<0.001
		n	216	216
	Burnout Syndrome	Correlation Coefficient	-0.508	1.000
		Sig. (bilateral)	<0.001	.
		n	216	216

Table II shows a negative and moderate correlation between the variables sleep quality and Burnout Syndrome, which is determined by a Spearman's Rho of -0.508 with statistical significance ($p < 0.001$), which means that, as sleep quality decreases, burnout levels tend to increase; therefore, there is a relationship between the variables.

TABLE III. SLEEP QUALITY PROBLEMS AND BURNOUT SYNDROME UNDER THE MULTINOMIAL LOGISTIC REGRESSION MODEL

Multinomial logistic regression		**Sleep quality problems**	
		Relative Risk Ratio (RRR)	p value (p<0.05)
Burnout Syndrome	Leve	7.84565	0.005
	Moderado	5.50934	0.053
	Profundo	7.563511	0.307

Table III shows the relationship between sleep quality problems and BS assessed using a multinomial logistic regression model. The results highlight that mild BS has a Relative Risk Ratio (RRR) of 7.84565, with statistical significance ($p = 0.005$). However, sleep quality problems are not related to moderate and severe BS.

TABLE IV. BURNOUT SYNDROME AND SLEEP QUALITY IN FEMALES

n = 150		**Sleep quality**				
Burnout Syndrome		**No problem**	**You deserve medical attention**	**You deserve medical attention and treatment**	**Serious problem**	**Total**
Not present	n	0	1	2	0	3
	%	0	0,67	1,33	0	2
Mild	n	0	12	108	10	130
	%	0	8	72	6,67	86,67
Moderate	n	0	1	14	0	15
	%	0	0,67	9,33	0	10
Deep	n	0	0	2	0	2
	%	0	0	1,33	0	1,33
Total	n	0	14	126	10	150
	%	0	9,33	84	6,67	100

Table IV shows the relationship between BS and sleep quality in the 150 women identified. Among them, 2 (1.33%) did not have BS but their sleep quality deserves medical attention and treatment, 108 (72%) had mild BS and a sleep quality that deserves medical attention and treatment, 14 (9.33%) had moderate BS and a sleep quality that deserves medical attention and treatment, 2 (1.33%) had profound BS and a sleep quality that deserves medical attention and treatment.

TABLE V. BURNOUT SYNDROME AND SLEEP QUALITY IN MALES

n = 66		Sleep quality				
Burnout Syndrome		No problem	You deserve medical attention	You deserve medical attention and treatment	Serious problem	Total
Not present	n	1	0	2	0	3
	%	1,52	0	3,03	0	4,55
Mild	n	0	2	50	5	57
	%	0	3,03	75,76	7,58	86,36
Moderate	n	0	0	6	0	6
	%	0	0	9,09	0	9,09
Deep	n	0	0	0	0	0
	%	0	0	0	0	0
Total	n	1	2	58	5	66
	%	1,52	3,03	87,88	7,58	100

Table V shows the relationship between BS and sleep quality in the 66 men. It was identified that 2 (3.03%) did not present BS but did have sleep quality that deserves medical attention and treatment, 50 (75.76%) had mild BS and sleep quality that deserves medical attention and treatment, 6 (9.09%) had moderate BS and sleep quality that deserves medical attention and treatment; no men were identified with profound BS.

TABLE VI. BURNOUT SYNDROME AND SLEEP QUALITY IN NURSING STUDENTS

n = 161		Sleep quality				
Burnout Syndrome		No problem	You deserve medical attention	You deserve medical attention and treatment	Serious problem	Total
Not present	n	0	1	2	1	4
	%	0	0,62	1,24	0,62	2,48
Mild	n	0	4	129	6	139
	%	0	2,48	80,13	3,73	86,34
	n	0	3	9	4	16
Moderate	%	0	1,87	5,59	2,48	9,94
Deep	n	0	0	1	1	2
	%	0	0	0,62	0,62	1,24
Total	n	0	8	141	12	161
	%	0	4,97	87,58	7,45	100

Table VI shows the relationship between BS and sleep quality of the 161 nursing students. It was found that 2 (1.24%) did not have BS but their sleep quality deserves medical attention and treatment, 129 (80.13%) had mild BS and sleep quality that deserves medical attention and treatment, 9 (5.59%) had moderate BS and sleep quality that deserves medical attention and treatment, 1 (0.62%) had deep burnout and a serious problem with sleep quality.

TABLE VII. BURNOUT SYNDROME AND SLEEP QUALITY IN SYSTEMS ENGINEERING STUDENTS

n = 55		Sleep quality				
Burnout Syndrome		No problem	You deserve medical attention	You deserve medical attention and treatment	Serious problem	Total
Not present	n	1	1	0	0	2
	%	1,82	1,82	0	0	3,64
Mild	n	0	5	41	2	48
	%	0	9,09	74,54	3,64	87,27
Moderate	n	0	2	2	1	5
	%	0	3,64	3,64	1,82	9,09
Deep	n	0	0	0	0	0
	%	0	0	0	0	0
Total	n	1	8	43	3	55
	%	1,82	14,55	78,18	5,45	100

Table VII shows the relationship between BS and sleep quality in systems engineering students. Among them, 1 (1.82%) did not present BS but had a sleep quality that deserves medical attention, 41 (74.54%) had mild BS and sleep quality that deserves medical attention and treatment, 2 (3.64%) presented moderate BS and sleep quality that deserves medical attention and treatment; none of these students were identified with profound BS.

IV. DISCUSSION

This study showed a moderate, negative correlation between sleep quality and BS, meaning that as sleep quality deteriorates, exhaustion levels tend to increase, creating a state of vulnerability in university students in Lima. These results are similar to those of another study [29], which reported a stronger relationship between both factors, possibly explained by the fact that the population analyzed was graduate students, who face greater demands. However, in this undergraduate sample, the moderate relationship could be attributed to the influence of

other elements, such as academic overload, especially in programs such as nursing, which combines theory and clinical practice, or systems engineering, characterized by its high technical complexity. In addition, the statistical model showed that sleep problems are associated with mild BS, which partially agrees with another study [32], which linked it to daytime sleepiness, suggesting that severe BS could be conditioned by additional factors not yet explored.

In the individual analysis, it was identified that the majority of the university students evaluated presented sleep problems that merited medical attention and treatment, exceeding the results reported in other studies [32, 28], where just over half of the students showed poor sleep quality. This finding could be related to the cultural and socioeconomic context of Lima, which can represent a challenge in the daily lives of university students, especially in vulnerable areas. Furthermore, the number of hours of rest may be another associated factor, since in this sample, most reported sleeping around six hours a day, which coincides with the findings of the study [29], where a similar average was found. In this sense, the evidence suggests that sleep duration directly influences its quality, which invites us to reflect on the importance of prioritizing adequate rest despite factors such as academic overload, work schedules, or multiple responsibilities that may interfere with achieving effective recovery [24].

Regarding SB, it was determined that the majority of university students presented a mild level, which is worrying and reflects a latent risk in the population studied. This finding contrasts with that reported in another study [31], where more than half of the students showed some degree of SB, although in both cases, the relevance of the problem and its impact on academic life is confirmed. In our study, the proportion of students with SB was higher, which could be attributed to the predominant participation of nursing students compared to systems engineering students, since health professions have experienced greater academic pressure after the pandemic. Likewise, the severity of BS could be related to the limited access to medical care and psychological support in Peru. However, the results also differ from those found in [33], where almost all rehabilitation students presented medium SB, which shows that careers related to the health field show greater vulnerability to SB.

The percentage of nursing students and males with mild BS and sleep quality that warrants medical attention and treatment was found to be higher than that of systems engineering students and females, suggesting that these groups are more exposed to burnout. However, severe BS, considered the most severe level, was present only in nursing students and females, which could be associated with gender-specific factors, such as greater emotional empathy or greater vulnerability to stress. External factors linked to academic and social expectations may also play a role. These findings highlight the need to further analyze these differences and design targeted interventions within university settings that promote healthy habits and strengthen student motivation.

It is important to note the limitations encountered during the study. The first was related to the selection of programs, as the goal was to include at least two per faculty to ensure greater representativeness of the sample. However, for administrative reasons and due to overlap with academic evaluations, the institution only authorized two programs, which generated an inevitable bias, although this was addressed by the researchers to ensure the completion of the work. The second limitation was the time allotted for administering the instruments, initially set at 10 minutes, but which proved insufficient in the initial trials due to the students' lack of familiarity. In some cases, twice that time was required, which delayed the schedule. This situation was resolved by hiring and training additional interviewers, which made it possible to align the established deadlines.

V. Conclusion

This cross-sectional study demonstrated, through the innovative use of statistical models that sleep quality problems moderately and significantly influence the development of BS in university students, highlighting a problem that requires priority attention at Lima's universities. In response, we suggest implementing support strategies and health education programs focused on promoting adequate sleep habits so that students have effective resources to address this situation. In addition, it is essential to incorporate interdisciplinary support from health professionals, especially psychologists and physicians, for the early detection of this and other related problems, thus contributing to prevention, strengthening student well-being, and optimizing academic performance.

The incidence of sleep quality and BMS problems is particularly concerning among future nursing professionals, as it reflects insufficient healthcare management among those who, due to their training, should have greater knowledge of the subject. This finding provides new empirical evidence from an understudied population, establishing a quantifiable risk that can guide the implementation of specific nursing interventions, such as training for nursing students and professionals, aimed at strengthening physical and mental health. These actions could be managed through university departments responsible for promoting comprehensive well-being, as well as through the support of national health entities, which assume an active role in prevention and in the creation of support spaces that guarantee the necessary balance for adequate academic and personal development.

Finally, the results achieved in this study constitute a solid foundation for opening new avenues of research in similar contexts, broadening our understanding of the relationship between sleep quality and BS in university students. In this sense, the contribution not only enriches the available scientific knowledge but also generates a framework for future studies that integrate specific intervention strategies. Thus, the research offers a significant opportunity to transform the university environment into a healthier space.

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