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Application of Questionnaire to Evaluate the Quality of Sleep in Children

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ABSTRACT: Sleep is essential for the proper development of children and adolescents. Sleep assessment can be performed practically and cost-effectively using standardized questionnaires that evaluateboth, sleep habits and sleep hygiene. **Objective:** To evaluate the sleep quality of children and adolescents attending intwo public schools. **Method:** A questionnaire concerning sleep habits and sleep hygiene, developed based on international instruments in the field, was applicated to children and adolescents regularly enrolled in two public schools Cascavel City, state of Paraná, Brazil, from November 2024 to March 2025. The variables analyzed were age, sex, body mass index (BMI), and questionnaire` score. One-way analysis of variance (ANOVA) with a Least Significant Difference (LSD) post hoc test was used to investigate the association between age and sleep quality. The chi-squared (χ^2) test was used to determine the association between sleep quality and BMI, as well as sleep quality and sex. A p value <0.05 were considered significant. **Results:** 200 subjects completed the questionnaire, 100 (50%) females and 100 (50%) males. The age ranged from 8 to 18 years (average: 13.9 years). There was relationship between age and sleep quality ($p < 0.001$), with 55% boys and 52% girls having good sleep quality. Moreover, there was no association betweensex (0.565), BMI (p 0.909)and sleep quality. **Conclusion:** Younger children and adolescents had better sleep quality. BMI and sex did not influence sleep quality.

Key-words: Child, adolescent, questionnaire, sleep quality, sleep hygiene.

I.INTRODUCTION

Sleep is essential for maintaining homeostasis and welfare, being crucial to proper physical and psychological functioning, as well as in the growth and development of children and adolescents [1,2]. For this population, sleep is particularly important due to numerous changes occurring during this stage, including anatomical development such as brain maturation, bone and muscle growth, sexual maturation, and hormonal fluctuations, as well as social and psychological changes such as entering to job market, improving school performance, pressure to pursue higher education, and maturing social relationships[3-5]. Understanding how these factors influence sleep in this population is essential, considering the long-term effects on physical, emotional, and cognitive well-being.

The diagnosis of sleep disorders requires the presence of specific criteria over a prolonged period that result in negative consequences for the child, adolescent, or their parents [6].

Sleep assessment can be conducted through medical history, observations, laboratory methods, questionnaires, and polysomnography[7]. Although polysomnography is considered the gold standard for accurate sleep assessment, it has limitations, including high cost and difficulty in identifying behavioral disorders in unnatural environments. In this context, questionnaires such as the Adolescent Sleep Hygiene Scale (ASHS), offer a practical and cost-effective alternative. This 28-item self-assessment tool explores nine conceptual domains of sleep hygiene in adolescents and children, allowing the identification and monitoring of sleep-related behaviors using a 6-points Likert scale[8,9]. This scale was designed for children over 12 years of age and includes 9 domains: physiological (5 items), cognitive (6 items), emotional (3 items), sleep behavior (4 items), sleep variability (4items), substance use (2 items), daytime sleep periods (1 item), sleep location (2 items), and sleep routine (1 item).

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The objective of this study was to assess the sleep quality of children and adolescents from two public schools.

II.METHOD

This epidemiological, observational, cross-sectional study was conducted from November 2024 to March 2025 with children and adolescents aged 8 to 18 years, regularly enrolled in two public schools in a municipality at theWestern Paraná State, Brazil. After obtaining signed Free and Informed Consent Forms from guardians and the Adolescent Written Informed Assent by adolescents over 12 years of age, participants completed the Adolescent Sleep Hygiene Scale (ASHS) questionnaire. However, this was not a formal translation or validation of the instrument.

The variables analyzed included age, gender, body mass index (BMI) and ASHS questionnaire scores. Participants were instructed to respond based on the frequency with which they performed certain sleep-related behaviors over the past month, using a six-points Likert scale with the following options: always, often, almost always, sometimes, rarely and never. Sleep quality was assessed using a questionnaire based on theoretical references on adolescent sleep hygiene, structured according to the Likert scale and classified into four categories: excellent, very good, good, and poor. Scores were assigned as follows: 6 points for "never", 5 for "rarely", 4 for "sometimes", 3 for "almost always", 2 for "often", and 1 point for "always". Question 27 was reverse-coded, with 6 points assigned for "always" and 1 point for "never." Based on the total score, sleep quality was categorized as: excellent (165 to 198 points), very good (132 to 164), good (99 to 131), and poor (≤ 98 points). The questionnaire was distributed individually, allowing each participant to read and answer it independently and subjectively. A researcher was available to clarify any questions. The objective was to encourage self-reflection on habits and personal perception of one's own sleep.

Body Mass Index (BMI) wascalculated using the formula: weight (kg) divided by height squared (m^2) and classified based on the World Health Organization (WHO, 2007) Z-score table for individuals aged 5 to 18 years, separated by gender,using the Z-score as follows: thinness (≥ Z -3 and < Z -2), eutrophy (≥ Z -2 and ≤ Z +1) and overweight, including overweight, obese and severely obese (> Z +1 and > Z +3). Body weight was measured using an electronic scale (Líder®, model P-300C, series 31403, year 2014, Brazil) with participants wearing light clothing. Height was measured using a wall-mounted stadiometer (Tonelli Equipamentos Médicos Ltda., model E150A, year 2014, Brazil) with participants barefoot.

For statistical analysis, the age variable was summarized using descriptive statistics: mean, median, minimum and maximum values, first and third quartiles, and standard deviation. Categorical variables (gender and BMI classification) were described using absolute and relative frequencies (percentages). To analyze the association between age and sleep quality, a one-way analysis of variance (ANOVA) was performed, followed by a post hoc LSD (Least Significant Difference) test. The chi-square (χ^2) test was used to assess the association between sleep quality and BMI, as well as between sleep quality and gender. A p-value < 0.05 was considered statistically significant.

This research was approved by Institutional Review Board fromWestern ParanáState University under opinion number 7.208.593/2024.

III.RESULTS

A total of 207 questionnaires were completed, of which seven (3.3%) were excluded due to incomplete responses. Thus, 200 questionnaires regarding the sleep habits of children and adolescents were analyzed, 100 (50%) of which were female and 100 (50%) male. There was no significant association between gender and sleep quality (p = 0.566). Most participants reported good sleep quality, including 55 (55%) boys and 52 (52%) girls. In contrast, poor sleep quality was observed in seven (7%) boys and 10 (10%) girls. The relationship between age and sleep quality is presented in Table 1 below.

Table 1: quality of sleep according with age.

Qualityof sleep	n	average	Minimum	1rst quartil	Median	3rdquartil	Maximum	S-D*	p value**
Excellent	7	10,6	8	8,5	9	12	16	3.0	
Optimum	69	14,1	11	13	15	16	18	2.0	
Good	107	13,9	8	13	14	16	17	1.9	<0.001
Poor	17	14,6	13	14	14	16	17	1.4	

*S-D: Standard-deviation. **p value < 0.05indicated statistical significance.

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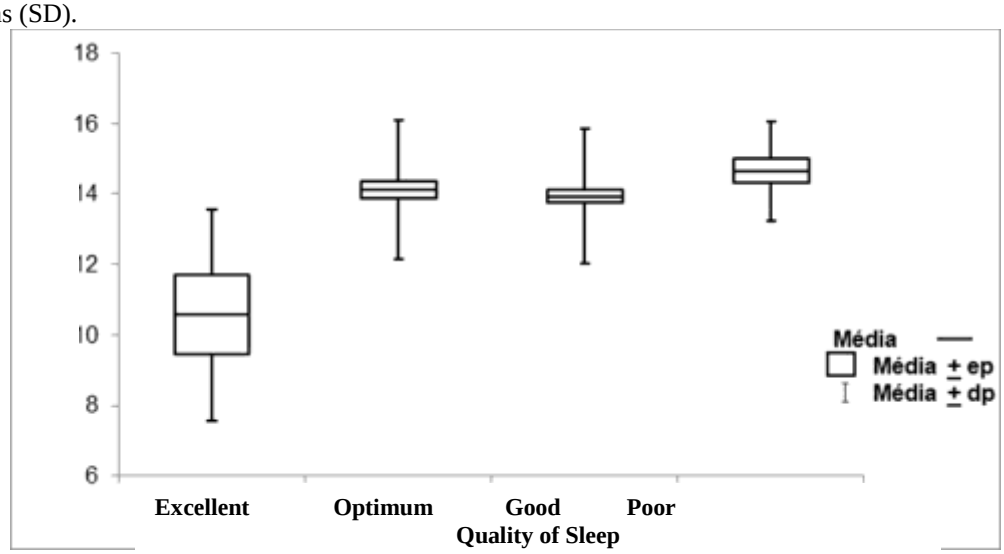
It should be noted that the “excellent” sleep quality classification corresponds to the youngest average participant age, while the “poor” classification corresponds to the oldest. Table 2 presents themultiple comparisons. It is evident that the average age of participants classified as having "excellent" sleep quality was significantly ($p<0.05$) lower than that of the other groups. However, when comparing the other classes among themselves, “Very good,” “Good,” and “Poor,” there was no statistically significant age differences were observed.

Table 2: quality of sleep concerning age when compared among groups.

Classification in comparison	p value*
Excellent vs. Optimum	<0.001
Excellent vs. Good	<0.001
Excellent vs. Poor	<0.001
Optimum vs. Good	0.512
Optimum vs. Poor	0.325
Good vs. Poor	0.160

*p value < 0.05indicated statistical significance

Graph 1 displays the average age of participants categorized by sleep quality classification, with their standard deviations (SD).



Graphic 1: Distribution of average, median and standard-deviation of age according with quality of sleep of subjects.

Table 3 presents the association between gender and sleep quality.

Table 3: classification of quality of sleep according gender of subjects.

Quality of sleep	Gender				
	Male		Female		p value*
	n	%	n	%	
Excellent	2	2.0%	5	5.0%	
Optimum	36	36.0%	33	33.0%	
Good	55	55.0%	52	52.0%	0.566
Poor	7	7.0%	10	10.0%	
Total	100	100.0%	100	100.0%	

p value < 0.05indicated statistical significance

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Table 4 presents the relationship between sleep quality and participants' BMI. It can be observed that most of participants had "good" sleep quality across different BMI categories; however, no significant association was found between sleep quality and BMI (p = 0.909).

Table4: classification of quality of sleep according Body Mass Index of subjects.

Quality of sleep	thinness		Eutrophic		Overweight or obesity		p value*
	n	%	n	%	n	%	
Excellent orOptimum	4	40.0%	50	37.6%	22	38.6%	
Good	6	60.0%	71	53.4%	30	52.6%	0.909
Poor	0	0.0	12	9.0%	5	8.8%	
Total	10	100.0%	133	100.0%	57	100.0%	

pvalue < 0.05indicated statistical significance

IV.DISCUSSION

Sleep directly influences learning, school performance, memory consolidation, attention, and behavior, thereby impacting quality of life and overall satisfaction[10]. Assessing the duration, quality, and regularity of sleep is essential to determine whether sleep is healthy[11,12]. Sleep quality is defined as the subjective perception of the sleeping experience, including satisfaction and well-being upon waking[13]. This directly affects daily activities, mood fluctuations, and cognitive and behavioral functions [14].

The literature emphasizes the influence of age on sleep quality, particularly during adolescence, a phase marked by significant neurobiological and behavioral changes. Studies show that inadequate sleep patterns, such as shorter sleep duration and greater difficulty falling asleep, are associated with increased behavioral problems in this age group, as well as overweight and psychological symptoms like depression and anxiety [15, 16]. These findings corroborate the results of the present study, which also showed that older adolescents had poorer sleep quality compared to younger age groups, suggesting that developmental factors specific to this stage contribute negatively to sleep hygiene.

This study also found no association between gender and sleep quality, consistent with studies conducted in Europe [17]. These data support the idea that, in certain age groups and sociocultural contexts, biological sex may not be a determining factor for sleep duration or quality. Although the literature suggests possible behavioral and physiological differences between boys and girls, these distinctions may not be significantly expressed in heterogeneous populations or during the early stages of pubertal development, as analyzed in this study. A longitudinal study conducted by Saelee et al. (2023), based on a national sample in the United States, found that during the transition from adolescence to adulthood, men were more likely to follow persistent trajectories of insufficient sleep, while women tended to maintain a slightly higher average sleep duration [18].

Kampaniet al. (2024), who evaluated adolescents treated at a pediatric endocrinology clinic in Greece, found poorer sleep quality in subjects with a high BMI [19]. Tambaliset al. demonstrated that short sleep duration in children is associated with overweight, unhealthy eating habits, and increased screen time[20]. These findings support the hypothesis that the worsening of sleep quality in overweight individuals may be part of a broader context of unhealthy lifestyle behaviors, rather than isolated physiological changes. In this study, no relationship was found between sleep quality and BMI, which contradicts previous research. However, it is important to note that the relationship between obesity and sleep disorders is well established in the literature, especially among adolescents and young adults. Figorilliet al. (2025) reinforce this perspective by describing a bidirectional relationship between obesity and sleep disorders such as insomnia and obstructive sleep apnea, showing that excess weight can compromise sleep and poor sleep quality can promote weight gain [21].

This research had some limitations, including the use of a self-assessment questionnaire—the Adolescent Sleep Hygiene Scale (ASHS), without formal translation or validation for the Brazilian population, as well as a relatively small sample, which prevents definitive

conclusions. Despite these limitations, the results underscore the importance of paying special attention to sleep health in this age group, which is characterized by significant social, behavioral, and physiological changes. Additionally, there is a scarcity of research addressing sleep quality and sleep hygiene practices among Brazilian adolescents, further emphasizing the relevance of this study.

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