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# SLEEP QUALITY AMONG ADOLESCENTS AGED 15-17 IN DA NANG, 2024: A CROSS-SECTIONAL STUDY

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## ABSTRACT

**Objective:** (1) To determine the prevalence of sleep disorders among adolescents aged 15 to 17 years; (2) To analyze factors associated with sleep quality in adolescents aged 15 to 17 years.

**Design, Setting, and Participants:** Cross-sectional descriptive study. Among Adolescents aged 15-17 years old at Hoa Vang High School we collected 737 eligible participants for the study.

**Main Outcome Measures:** Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Associations between Sleep quality were evaluated with multivariable conditional logistic regression controlling for gender, exercise habits, sleep hygiene habits, pressure and expectations about academic performance (parental expectations, pressure for achievement, completing homework, extra classes).

**Results:** The sleep quality of adolescents aged 15-17 at Hòa Vang High School is alarmingly low, with PSQI scores averaging 5.5±3.3 for 10th-grade students (15 years old), 6.1±3.3 for 11th grade (16 years old), and 6.4±3.5 for 12th grade (17 years old). The findings show that 47.5% of students have poor sleep quality, with a trend of worsening sleep quality with age. Additionally, most study participants go to bed relatively late. Factors associated with poor sleep quality include being female, excessive phone use before bed, academic pressure, homework load, and hours spent on daily extra classes. Addressing this issue requires appropriate sleep education and awareness for both students and parents.

**Conclusion:** This study indicates an alarmingly low level of sleep quality among students at Hoa Vang High School, with a significant proportion experiencing poor sleep quality, and highlights several associated factors.

***Keywords:*** Sleep disorders, sleep quality, adolescents, 15-17 years old, Da Nang, Hoa Vang High School.

## 1. INTRODUCTION

Sleep plays an important role in the physical, behavioral, emotional, and cognitive development of adolescents and also affects attention and academic performance of adolescents. The average amount of sleep needed for an adolescent to maintain normal health is 8 to 10 hours per night. In adults, sleep disorders have negative impacts on patients including reduced quality of life and increased mortality and economic burden [1,2]. Sleep disorders in children are very common, affecting 25-40% of children and adolescents in some way including affecting academic performance, physical development, emotional regulation and daytime behavior [3]. Some studies also show that children who sleep too little or too much are at higher risk of suicide or suicidal ideation than children who sleep normally [4]. In addition, there is much evidence that sleep disorders in adolescents are closely related to mental problems, behavioral disorders, stimulant use, trauma and traffic accidents [5]. Meanwhile, recent reports worldwide show that a large proportion of adolescents have low or inadequate sleep quality[6].

Although sleep disorders have negative impacts on the physical and mental health of adolescents, there are very few reports on sleep problems in this group in Vietnam. Especially, in the period of 15 to 17 years old, this is the stage when children prepare for important thresholds in life and under a lot of pressures from family, studying, exams, society, competition and future

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orientation. This further highlights the important role of studies assessing the sleep quality in this group.

This study was conducted at Hoa Vang High School (Da Nang City), a school with a long history and educational tradition. Therefore, Hoa Vang High School is an ideal location to carry out the study, due to its representative geographical location, learning environment and the lack of any research or sleepcare activities here. Based on the above situation, this study was conducted with two objectives: *(1) To determine the prevalence of sleep disorders among adolescents aged 15 to 17 years; (2) To analyze factors associated with sleep quality in adolescents aged 15 to 17 years.*

## 2. RESEARCH SUBJECT AND METHODS

**2.1. Research design:** Cross-sectional descriptive study.

**2.2. Research location and time:** The study was conducted at Hoa Vang High School (Da Nang City) from April 2024 to October 2024.

### 2.3. Research subject

- Inclusion criteria: Children aged 15-17, regardless of gender, who volunteer to participate in the study after being clearly explained the research objectives and meeting the following criteria:

+ Children who have lived in Da Nang for 6 months or more;

+ Have received consent to participate in the study from their parents or legal guardians.

- Exclusion criteria: Subjects with one of the following criteria:

+ Children who have difficulty understanding

+ Children who are suffering from acute diseases requiring surgical treatment;

+ Children who have chronic diseases that affect their ability to perform daily activities such as heart failure, kidney failure, cirrhosis, tuberculosis, etc.

+ Incompletely answering the sleep quality survey or intentionally filling in non-existent information.

### 2.4. Sample size

The minimum sample size is calculated using the single proportion estimation formula

$$n = Z^2_{1-\alpha/2} \frac{1 - p}{\varepsilon^2 p}$$

(with α=0.05; ε=0.09; P=0.4 [3]) substituted into the formula with a minimum sample size of 712 required.

Results: The study collected 737 eligible subjects to participate in the study.

**- Sampling method:** Simple random sampling.

### 2.5. Research variables and indicators

+ Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), studies have shown that this scale is reliable when used for adolescents, with a cutoff point of PSQI≥5 being poor sleep quality [7]. Sleep habits, sleep duration.

+ Independent variables: gender, exercise habits, sleep hygiene habits, pressure and expectations about academic performance (parental expectations, pressure for achievement, completing homework, extra classes).

+ Dependent variable: Poor sleep quality (PSQI≥5).

**2.6. Research process:** After having a list of all students of Hoa Vang High School, the researcher coded them in order and randomly selected the applications until the minimum number of data was reached. The researcher approached the subjects and clearly explained the purpose and asked for their consent to participate in the study. After the subjects agreed to participate in the study, the researcher collected information according to a pre-designed form.

### 2.7. Data processing

Collect data via Kobotool box, export data as Excel file, process data using R-language version 4.1.0.

### 2.8. Ethical issues

The research subjects were explained about the purpose and content of the research before conducting the interview and only started when they received the approval from participants. The topic has been approved by the Science and Technology Council of Hoa Vang High School regarding ethics in biomedical research.

## 3. RESULTS

The study collected 737 research subjects from all three grades 10, 11, 12 of Hoa Vang High School. In which, grade 10 (15 years old) had 362 students, grade 11 (16 years old) had 230 students and grade 12 (17 years old) had 145 students participating in the study, female accounted for 62.7%, male accounted for 37.3%.

The results of sleep quality assessment showed that 47.5% of students had poor sleep quality, with grade 10 students had 43.4%, grade 11 students had 49.6% and grade 12 students had 54.4%. The study results show that the PSQI scores are slightly skewed to the left of the 5-point cutoff, in which the average PSQI scores of the study participants tend to increase gradually (Fig.1). The average PSQI scores of grade 11 and grade 12 students are higher than those of grade 10, the difference is statistically significant with $p<0.05$. The average PSQI scores of grade 11 and grade 12 are not statistically significant. Specifically, grade 10 students have an average PSQI score of 5.5±3.3 points, grade 11 students have 6.1±3.3 points, and grade 12 students have 6.4±3.5 points.

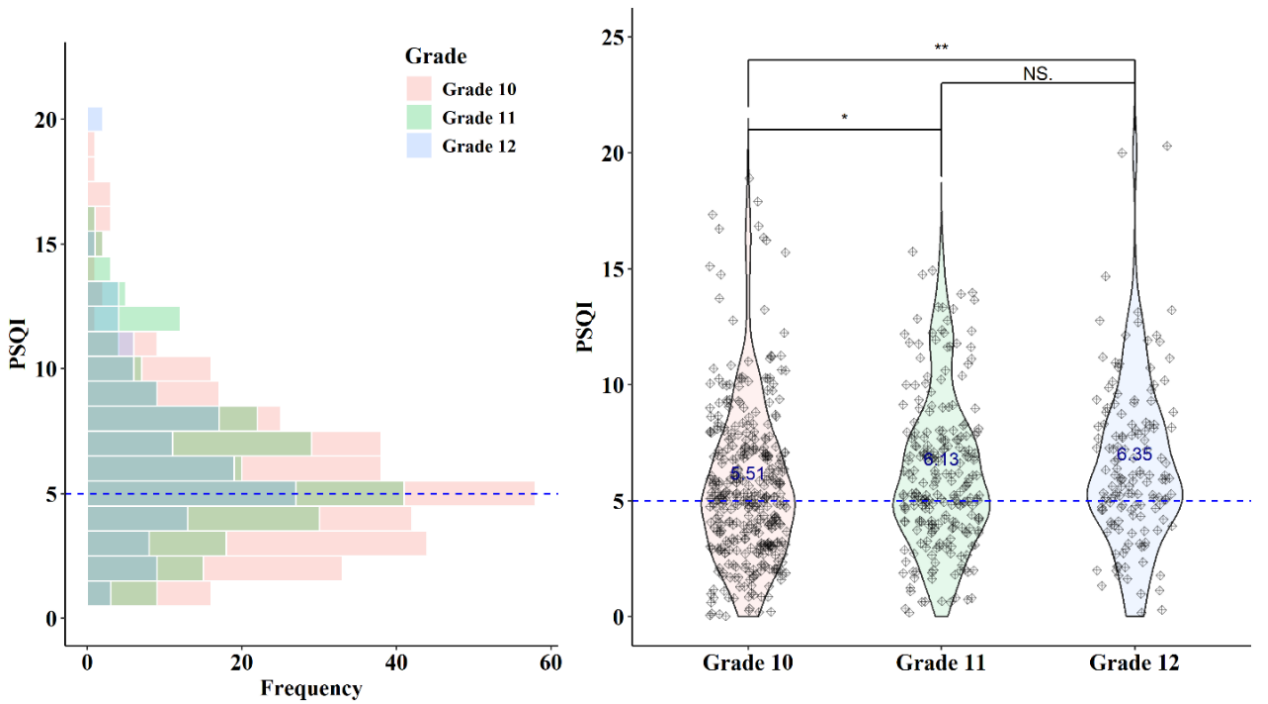


**Figure 1. PSQI score distribution characteristics of study participants**

**: p<0.05; **: p<0.01; NS: non-statistically significant*

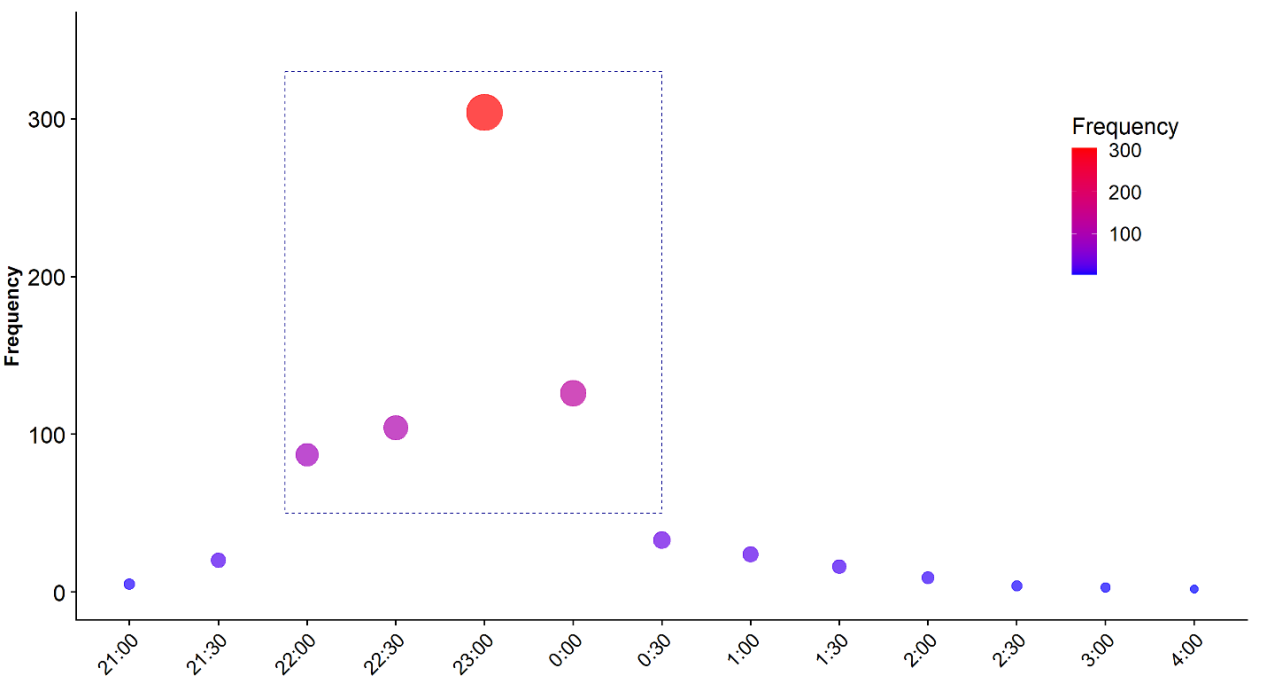


**Figure 2. Sleep habits of research subjects**

According to the report, people sleep between 21:00 to 4:00 (Fig.2). The large concentration of data points in this range suggests that the majority of participants go to bed between 22:00 and 24:00. The frequency hits about 300 participants about 23:00, marking the apex. Additionally, a significant portion of participants sleep past midnight, with the frequency gradually declining from 0:30 to 4:00. Very few people reported going to bed before 22:00 outside of these periods. According to the findings, late bedtimes are typical.

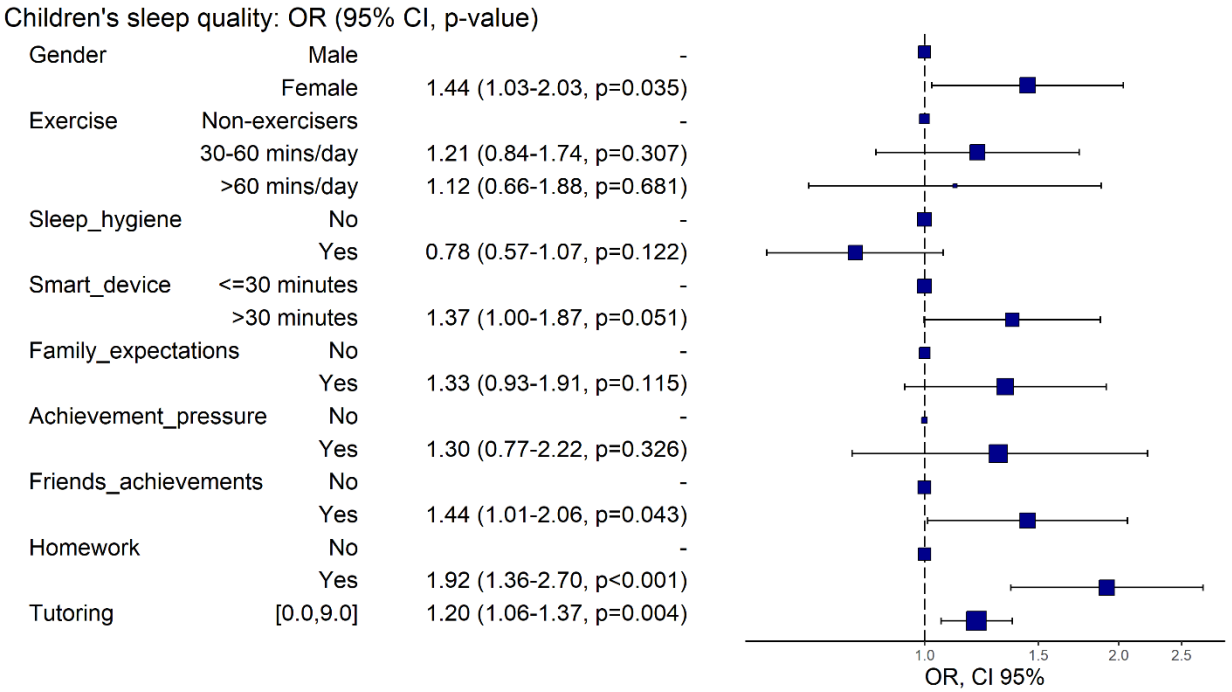


**Figure 3. Factors associated with sleep quality**

*(Tutoring: hours per day )*

The results associated with sleep quality show that gender, using the phone before going to bed, peer pressure, homework pressure, and extra classes are related to the sleep quality of the participants (Fig.3). Specifically, women are 1.44 times more likely to have sleep disorders than men (95% CI 1.03 - 2.03); the difference is statistically significant with p<0.05. Using the phone before going to bed for more than 30 minutes is 1.37 times more likely to have sleep disorders (95% CI 1.0 - 1.87). Similarly, pressure for achievement, including peer pressure, homework pressure, and extra classes, also increases the risk of sleep disorders from 1.2 to 1.9 times; the difference is statistically significant with p<0.05.

## 4. DISCUSSION

According to the results, the sleep quality of students at Hoa Vang High School is alarming with the proportion of poor sleep quality among students reaching nearly 50%. The higher their education level, the higher the rate tends to increase, although the difference is not statistically significant with p>0.05. The results of Figure 2 also show that the PSQI scores are distributed to the left of the 5-point mark, while the average scores of grades 11 and 12 are higher than those of grade 10, the difference is statistically significant.

Our study was similar to some domestic studies such as research results in Thai Nguyen (2017) showing that the proportion of high school students suffering from sleep disorders accounted for 46.7% [8]. However, the result is lower than some other studies such as Nguyen Huynh Thuy Trang's (2024) research in An Giang, the incidence of poor sleep quality accounted for 70.1%. This result is similar to those of Somayeh and colleagues (2019) who surveyed 1,153 adolescents and concluded that up to 75.3% of children had low or inappropriate sleep quality for their age [6]. Another meta-analysis in China found a prevalence of sleep disorders in 26% (95% CI 24–27%), adolescents in high school (28%, 95% CI: 24–31%, p < 0.001) had a higher prevalence of sleep disorders than adolescents in middle school (20%, 95% CI: 15–24%, p < 0.001) [9]. The above data show that the sleep quality of high school students is alarming, although there is no uniformity in rates, which differences in culture and educational environment can explain. In Vietnam and China, especially in areas with a long history of educational achievement, the pressures of academic achievement and future orientation can affect children's sleep quality.

Figure 2 demonstrates students' habits of going to bed late, with the major time frame fluctuating from 10:00 p.m. to 0:00 a.m. In addition, a large proportion of students go to bed later than 0:00 while still having to get up on time for school the next morning. Some changes during puberty are associated with sleep-wake rhythm disorders in students, these biological changes can cause students to go to bed later than usual [10]. owever, it is necessary to screen for the causes of sleep disorders to minimize negative consequences, reasonable sleep hygiene can be the best and long-term solution [11]. In addition, it is necessary to pay attention to factors that can affect sleep quality in adolescents. Reports show that apart from biological causes, external factors such as too much homework, using media in the evening, and using caffeine ... have affected the sleep quality of students during this

period [12]. Our study showed similar results with the increased risk of insomnia of the above factors (Fig.3), our study also showed that female gender, studying more hours per day also increased the risk of poor sleep quality.

The research results warn of the current situation of sleep quality and some related factors in adolescents aged 15-17, requiring reasonable attention and care for sleep to ensure physical development and mental health.

## 5. CONCLUSION

The results demonstrate that the sleep quality of students at Hoa Vang High School is at an alarming level, with nearly 50% of students experiencing poor sleep. This rate tends to increase with each grade level, especially in 11th and 12th grade students, although the difference in rate distribution is not statistically significant. This clearly reflects academic pressure and other factors that can affect students' sleep during this period. Some factors associated with poor sleep quality include female gender, excessive phone use before going to bed, academic pressure, homework load, and extra study hours every day.

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