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## Impact of Academic Stress on Daytime Sleepiness of Adolescents (10th to 12th Grade)

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### Abstract

*For school going adolescents, academic stress has become a major source for their stress levels and this inevitably impacts their health. One of the important biologically necessary aspect which is impacted is sleep. Disturbed sleep patterns are often observed in students with academic stress. Hence this paper used ESS-CHAD and PSS testing techniques to determine the relationship between daytime sleepiness and academic stress. The study hypothesises a positive correlation between the two variables. A cohort of 33 students were surveyed based on the tests mentioned above. The results indeed found a positive correlation between the two variables. Hence, the study concluded that academic stress must be abated in order to reduce its negative impacts on adolescents and to maintain their health.*

**Keywords:** Academic Stress, Sleep, Daytime Sleepiness

### Introduction

This paper explores the impact of academic stress on the daytime sleepiness of adolescents aged 16-18. Stress is a psychological phenomenon and is widely experienced by adolescents under pressure[1], with academic stress being one of its prominent type. Sleep is a unique biological feature and its poor quality or alteration can lead to psychiatric or physical disorders. Therefore, although sleep quality has received little attention, it plays a major role in maintaining the biological fitness of humans. Academic stress is believed to impact sleep quality (Almojali, A.I., Almalki, S.A., Alothman, A.S. et al, 2017) [2] and thus, daytime sleepiness. To determine the severity of stress' effect on the well-being of students, I will assess its impact on an individual's daytime sleepiness. Data will be collected through a survey, using ESS-CHAD and PSS methodologies. The subjects are students in grade 10-12; in Mumbai, India.

Since Asian countries like India, are fabled for their academically brilliant students, there is likely academic stress amongst the students. In addition, academic stress is one of the most common types of stress among adolescents in India. This academic stress arises from societal and parental expectations and pressure which is impressed upon students in the country [3]. The impact of this stress on sleep, an integral part of their daily routine, can reveal whether such stress is causing genuine damage to well-being. I argue that academic stress has a negative impact on sleep and should be alleviated to produce better performances and healthier lifestyles among students.

In a recent study (Xiamen Zhu, Justin A. Haegele, Huarong Liu, Fangliang Yu, 2021) [4], the impacts of academic stress on physical activity, sleep, anxiety and depression was examined. The subjects of this study were adolescents of an eastern province in China. The results of the study supported their hypothesis which proposed that higher levels of academic stress has a negative impact on sleep and physical activity.

The research was conducted through a survey and the results showed that academic stress has a significant impact on reducing the likelihood of adolescents in China engaging in health-related behaviours such as sleep. The participants of this study reported less hours of sleep overall. They reported 6.77 +/- 0.89 hours of sleep per day.

Another study (Murugesan, G., Karthigeyan, L., Selvagandhi, P. K., & Gopichandran, V., 2018) [5] in which a survey was conducted among school going adolescents in three districts of Tamil Nadu, India had aimed to understand the sleep patterns, hygiene and daytime sleepiness among the subjects. According to the results of the questionnaire, the assessment of the sleep patterns demonstrated that more than 64% of the students had less than 8 hours of sleep and 5.6% had less than 6 hours of sleep. The results further emphasised that the subjects had poor sleep pattern and sleep quality hence proposing that school going adolescents have disturbed sleep behaviours. Adequate sleep (AS) is defined as 6-8 hours of sleep per night regularly (Chen, MY., Wang, E.K. & Jeng, YJ, 2006) [6]. In the results of both studies mentioned above, the subjects did not receive adequate sleep which indicated poor sleep quality.

Furthermore, research (Yan, 2018) [7] which aimed to establish a relationship between adolescent academic stress and sleep quality. Questionnaire assessing the sleep quality, academic stress, burn out and depression were sent out among the subjects of ages 12-18. The results of this study also established a negative correlation between academic stress and sleep quality of the subjects. The observational study (Deng, J., Zhang, L., Cao, G. *et al*, 2021) [8] explored the impact of academic stress on sleep quality of adolescents in china. Through a questionnaire, the results of the research were obtained. According to the results, the adolescents with more academic stress have worse sleep quality. Therefore, these two studies help establish a negative correlation between academic stress and sleep quality in adolescents, thus bolstering my hypothesis.

Academic stress being a major concern among the youth in India indicates the need for a scientific approach to determine the detrimental effects of this problem and the results of which must encourage a solution. More the academic stress, poorer the sleep quality which also includes higher daytime sleepiness. The above literature review supports the hypothesis that academic stress has a significant and negative impact on sleep quality of adolescents and poor sleep is indicated by high daytime sleepiness. This study thus aims at assessing the validity of this hypothesis through a survey among school going adolescents of grades 10-12 in the city of Mumbai, India.

## Methods

The sampling method revolves around adolescent students from grades 10-12 of ages ranging from approximately 16 to 18. The survey was sent to the subjects going to private schools in Mumbai, India. The subjects were selected at random, and all consented for their responses to be used in this research. The survey was conducted through a google form sent to all the subjects. The sample of subjects was small as the survey received 33 responses. All the 33 responders filled both the experimental and control questionnaires explained below.

This study is carried out through a survey, sent among students of grades 10-12, in the city of Mumbai, India. The responses were collected and analysed. The methodology to assess the academic stress among the students was PSS-10 which is the 10-point version of the Perceived stress scale. It is a questionnaire which includes 10 questions and the answers are in numbers ranging from 0-4 where 0 is never, 1 is almost never, 3 is sometimes, 4 is fairly often and 5 is very often. The PSS scale is a widely used across countries.

The reason for choosing this tool for evaluating academic stress is because in a recent study (Mozumder MK, 2022) [9], the reliability and validity of this scale was assessed by presenting the PSS-10 scale to a Bengali community of adults. The results of the study proved the test to be an ideal tool for measuring stress. Another study (Asian Journal of Psychiatry, 2017) [10] assessed the validity of the PSS-10 scale by using the scale among patients with chronic headache in Persia. The results of the study concluded that the scale has good internal consistency and the psychometric properties with which this scale was developed were appropriate, rendering it a reliable and valid tool for stress assessment. Therefore, for this particular study, the tool used for evaluating the students' academic stress is the PSS-10 scale.

Since this study explores the relationship between academic stress and sleep, the tool used for measuring daytime sleepiness is the ESS-CHAD (Epworth Sleepiness scale for children and adolescents) which measures the daytime sleepiness of children and adolescents. This scale has 8 questions, and the answers need to be in numbers ranging from 0-3 where 0 stands for would never fall asleep, 1 stands for slight chances of falling asleep, 2 stands for moderate chance of falling asleep and 3 stands for high chance of falling asleep. In a study (*J Clin Sleep Med.*, 2022) [11] the content validity of this scale was assessed through qualitative interview of the subjects. According to the study, the scale proved to be relevant and acceptable. The results of the study deemed this scale to be appropriate for even clinical trial settings and thus rendering it an ideal tool for measuring the sleep quality. Another article [12] in which Rasch analysis and exploratory factor analysis were used to determine the validity of the ESS-CHAD scale. The results of this study, too, concluded that the scale is a reliable and internally valid measure for evaluating the daytime sleepiness in adolescents from age 12-18. My study aims at evaluating the sleep quality of students aged 16-18 and thus this scale was deemed appropriate.

In both scales, slight modifications were made. For the PSS-10 questions, the additional statement "during exam season" was added to each question. This was done as the academic stress is at high levels during exam season particularly and the subjects can answer keeping the situation in mind. Similarly, for the ESS CHAD scale, the same statement was added before each of the questions. For comparison, a control questionnaire was also used in the survey in which the modification made for each of the questions of both scales was the added statement "during vacations". This allows for a comparative analysis of the stress levels and the sleep quality between two situations (one in which the subjects are under stress and another in which the subjects are relatively relaxed).

Results

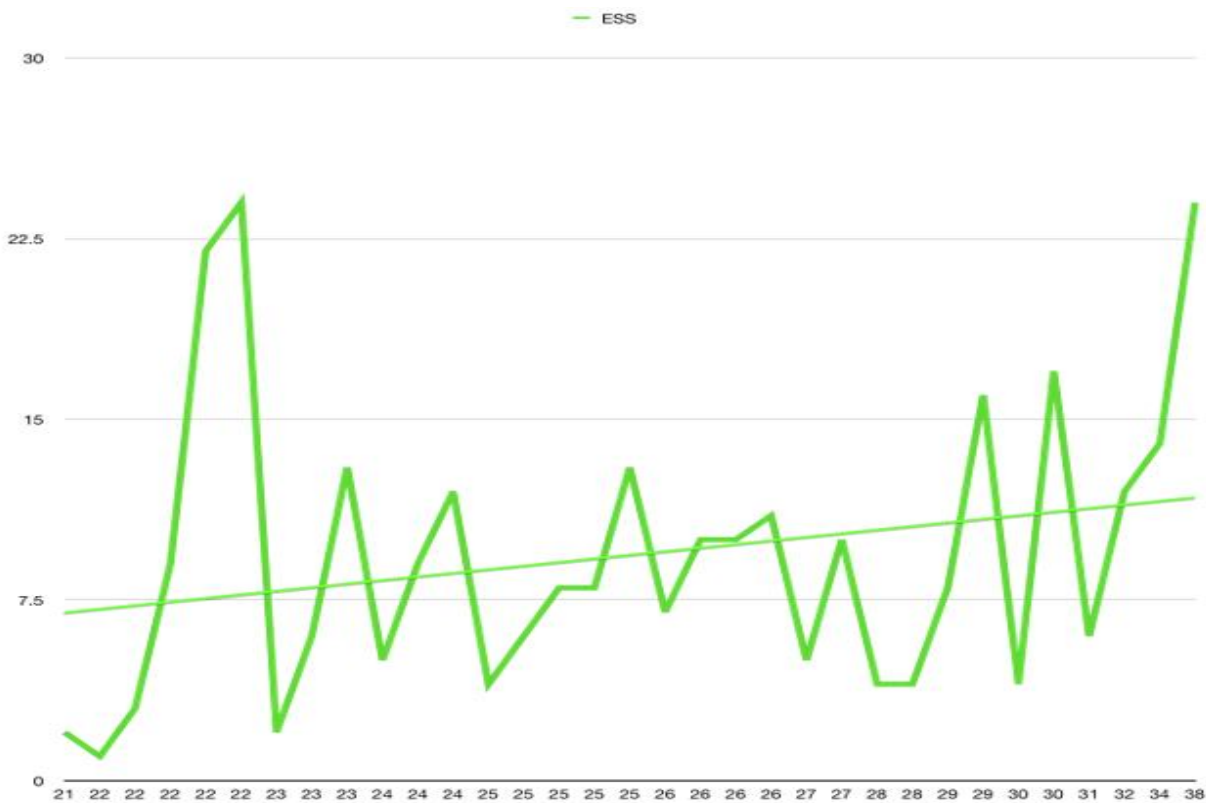


Figure 1: This is a graphical representation of the PSS score of all subjects and their corresponding ESS-CHAD score

● 30    ● 34    ● 28    ● 27    ● 28    ● 38    ● 27    ● 29    ● 32    ● 29  
● 31    ● 30

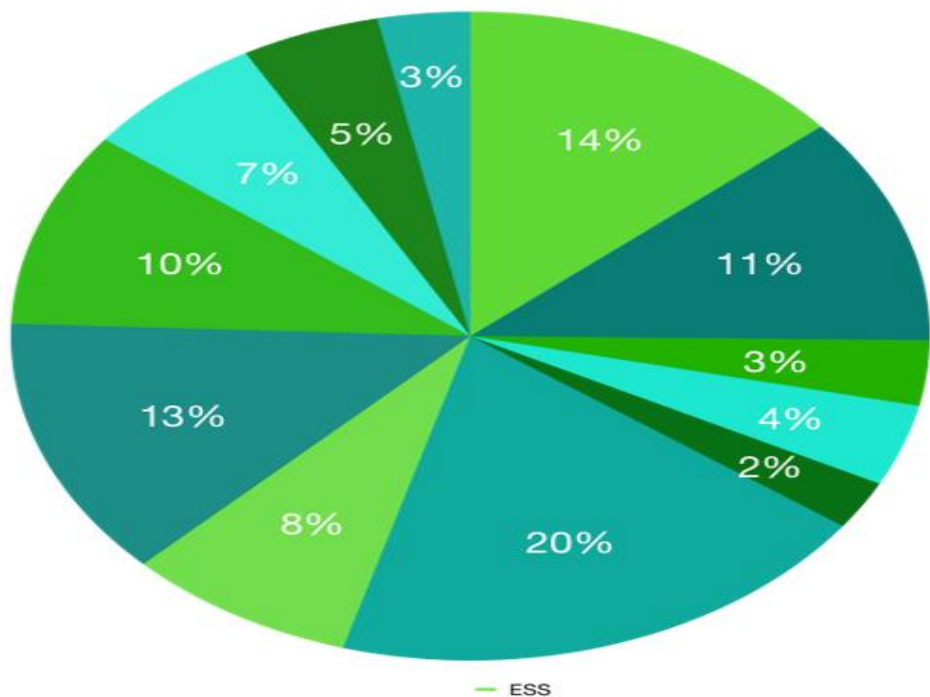
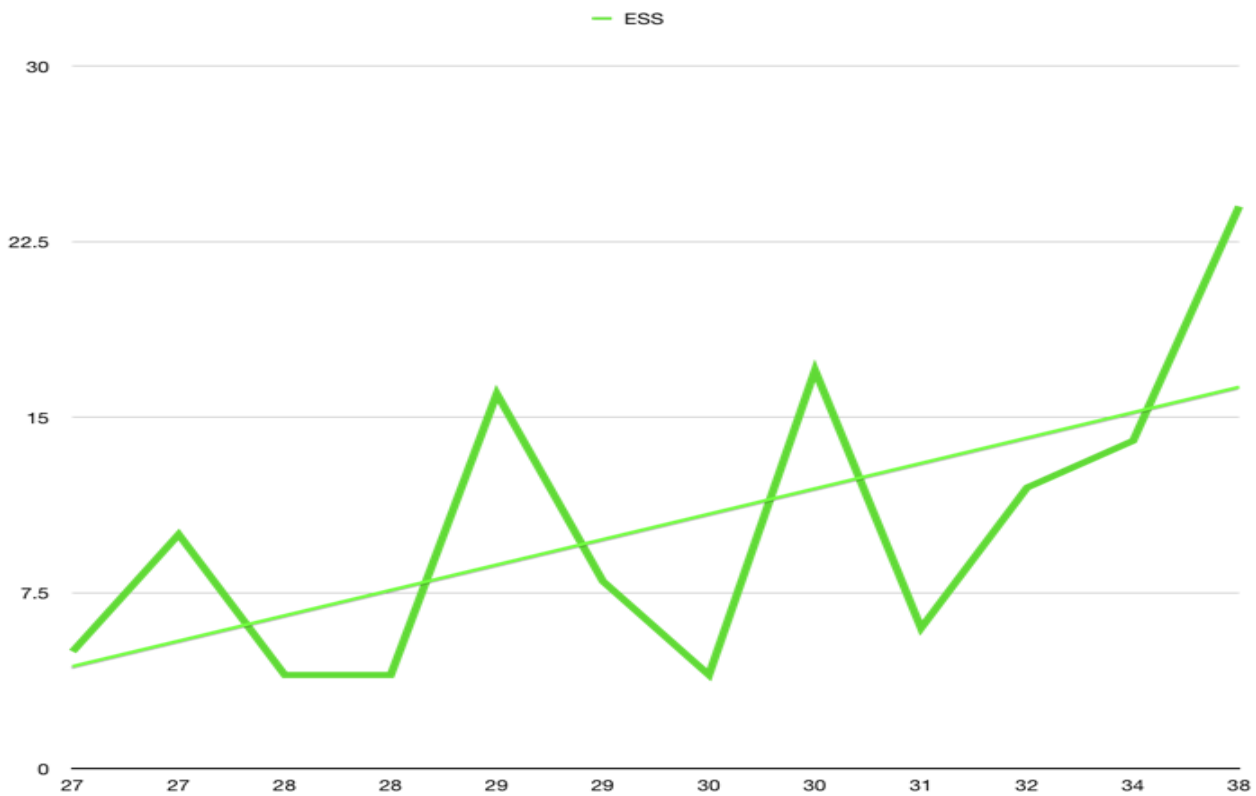


Figure 2: This figure represents, through a pie chart, the subjects who have high perceived stress scores (according to their PSS score) and their corresponding ESS-CHAD score.



**Figure 3: This figure graphically represents the relation between the ESS-CHAD score and the PSS score of all subjects who have a high perceived stress score (according to their PSS score).**

### Discussion

The study aims to establish a relationship between academic stress and daytime sleepiness in adolescents. As per the hypothesis which proposed a directly proportional correlation between the two variables, the results of the study through the survey of school going adolescents corresponds to the hypothesis. The results obtained from the survey have been plotted onto graphs and pie charts mentioned above in order to display the relationship between academic stress (measured by the PSS scale) and daytime sleepiness (measured by the ESS-CHAD scale).

According to the graph in figure 1, the trend line is a linear one showing a directly proportional trend between academic stress and daytime sleepiness. The figure is the graph of the results of all responses obtained from the survey. With the PSS score on the x-axis and the ESS-CHAD score on the y-axis, the graph of the calculated data from the responses of the survey has been plotted. As the PSS score increases, the trend line shows a simultaneous increase in the ESS-CHAD score as well. The responses from survey were all in numbers and through addition, the PSS score and ESS-CHAD score was calculated for each responder. Hence, some responders had the same scores on either or both of the scales. The PSS score was thus arranged in ascending order on the x-axis and repeated values were also accounted for in the graph as every response's calculation has been plotted in the graph of figure 1. For the repeated values on the x-axis, there is a different corresponding y-axis value (a different ESS-CHAD score for every PSS score) due to varying responses of every responder of the survey. Overall, the trend line is a linear, increasing one, suggesting the directly proportional relationship between academic stress and daytime sleepiness. Adolescents with a higher PSS score, have a higher ESS-CHAD score, as proposed by the results. Those students having higher academic stress, experience a greater amount of daytime sleepiness.

Figure 2 is a pie chart displaying the PSS score of all responders with a high perceived stress score and their corresponding ESS-CHAD score. According to the PSS scoring system, scores ranging from 27-40 is considered to be high perceived stress score and all response calculations falling under this range are thus considered to have high academic stress (as per the modifications made in the questionnaire). The figure represents only the responses of the students having high perceived stress scores and their corresponding ESS CHAD scores. According to the ESS CHAD scoring system, all scores above 10 mean excessive daytime sleepiness and all scores above 16 mean high levels of excessive daytime sleepiness and only the scores between 0-10 are considered to be normal (suggesting normal levels of daytime sleepiness).

Figure 3 represents the data of all responders having a high perceived stress score and their corresponding ESS-CHAD scores in a graphical form. The trend line is a linear, increasing one. This trend line suggests a directly proportional relationship between the ESS-CHAD score and the PSS score of the responders. As the stress level increases (with the increasing PSS scores plotted on the x-axis), the ESS-CHAD score is also increasing. Out of the 33 responses, 12 responders have a high perceived stress score out of which 6 responders have a corresponding ESS-CHAD score of 10 and above which suggest an excessive daytime sleepiness. 3 of the responders have a high level of daytime sleepiness calculated. Hence, from the data collected through the survey, 2/5<sup>th</sup> of the responders have high perceived stress scores which is 40% of the total sample.

The sample of responders was not entirely representative of the entire nation as only the school going adolescents of Mumbai were the responders. India has different education system with a number of boards having a distinct curriculum and rigour and thus the sample size, along with being small, does not entirely represent the nation, but is representative of the students studying in Mumbai. The calculations and results correspond with the hypothesis that students with a high academic stress, have a higher level of daytime sleepiness. The relationship established suggests a significant correlation between academic stress and daytime sleepiness.

## Conclusion

The purpose of this study was to emphasise on the detrimental effects academic stress can have on sleep quality and sleeping patterns in school going adolescents. For every student, quality sleep is important not only for a good school performance but also for efficient completion of daily routine and tasks. The results of this study proved that with increasing academic stress, the daytime sleepiness in adolescents also increase. This signifies poor sleeping patterns and hence lack of quality sleep. With 40% of students having high perceived stress (hence high academic stress), the study also emphasises on the importance of helping students reduce stress levels for efficiency and good mental and physical health. Improvements in studying schedules and vigilance by adults of the students to ensure that they receive adequate sleep can be carried out in order to alleviate this situation.

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