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Student Mental Wellness Prediction Using Machine Learning

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Abstract:

Mental wellness is an essential factor influencing students' academic achievement, personal growth, and overall quality of life. Increasing academic demands, prolonged screen time, social expectations, financial concerns, and lifestyle changes have contributed to higher levels of stress, anxiety, and emotional fatigue among students. Early identification of these concerns allows educational institutions to provide timely guidance and support before problems become more severe.

This study proposes a machine learning–based approach for predicting student mental wellness by analyzing academic, behavioral, and lifestyle characteristics. The proposed framework considers factors such as attendance, study duration, sleep patterns, physical activity, academic performance, social interaction, and self-reported stress levels.

Keywords:

Machine Learning, Student Mental Wellness, Artificial Intelligence, Predictive Analytics, Educational Data Mining, Mental Health, Student Well-being, Classification.

Introduction:

Mental wellness is one of the fundamental aspects of a student's educational journey. A healthy mental state enables students to concentrate effectively, participate actively in learning activities, maintain positive relationships, and perform well academically. However, modern students frequently encounter challenges such as examination pressure, assignment deadlines, career uncertainty, financial responsibilities, family expectations, and excessive use of digital devices. These challenges may increase stress levels and negatively affect both academic performance and emotional well-being.

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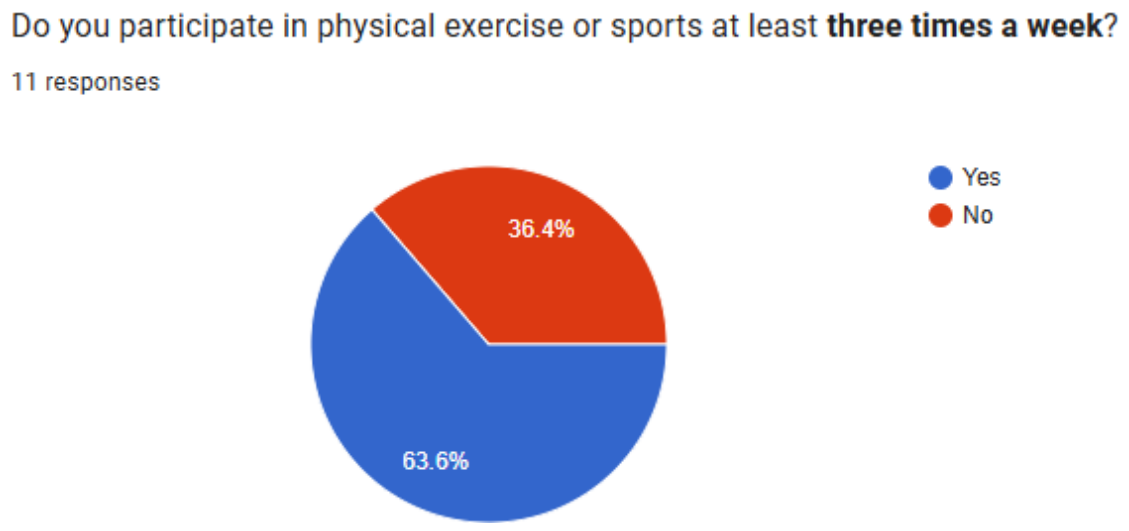
Educational institutions generally identify students experiencing mental health difficulties through counseling sessions, teacher observations, or self-reporting. Although these methods remain valuable, they often depend on students voluntarily seeking help or educators recognizing behavioral changes. As a result, some students may not receive support during the early stages of mental distress.

Recent developments in machine learning provide opportunities to analyze educational data and identify patterns that may indicate changes in a student's mental wellness. Machine learning algorithms are capable of processing large volumes of data, recognizing relationships among multiple variables, and generating predictions that assist decision-making. By examining factors such as attendance, study habits, sleep duration, academic performance, physical activity, screen time, and social engagement, predictive models can estimate the likelihood of students experiencing mental wellness challenges.

Objectives:

1. To identify the major academic, behavioral, and lifestyle factors that influence students' mental wellness.
2. To collect and prepare student data suitable for machine learning analysis.
3. To develop a predictive model for assessing student mental wellness.
4. To evaluate the effectiveness of machine learning algorithms in predicting mental wellness.
5. To promote data-driven decision-making for improving student well-being.

Data Collection:



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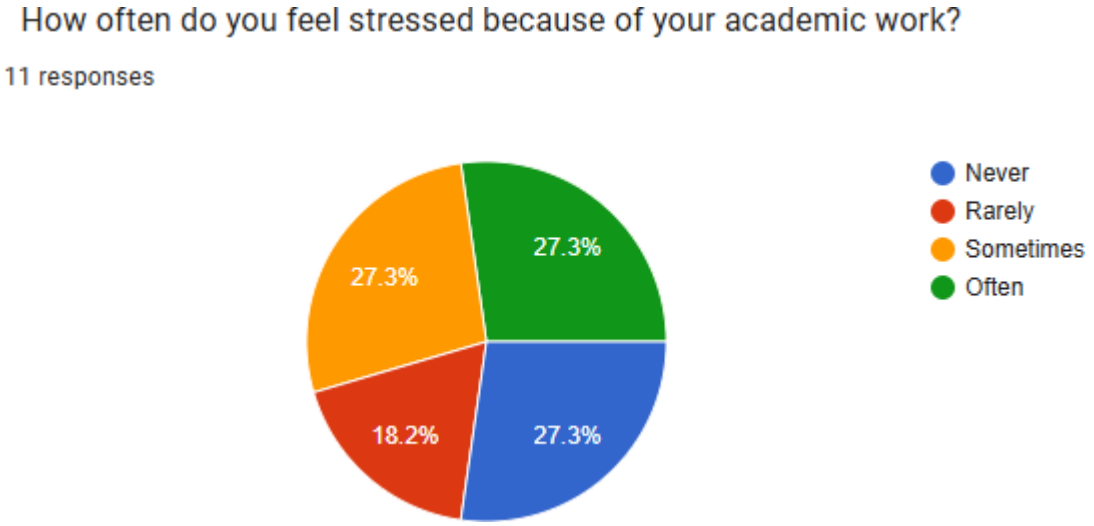

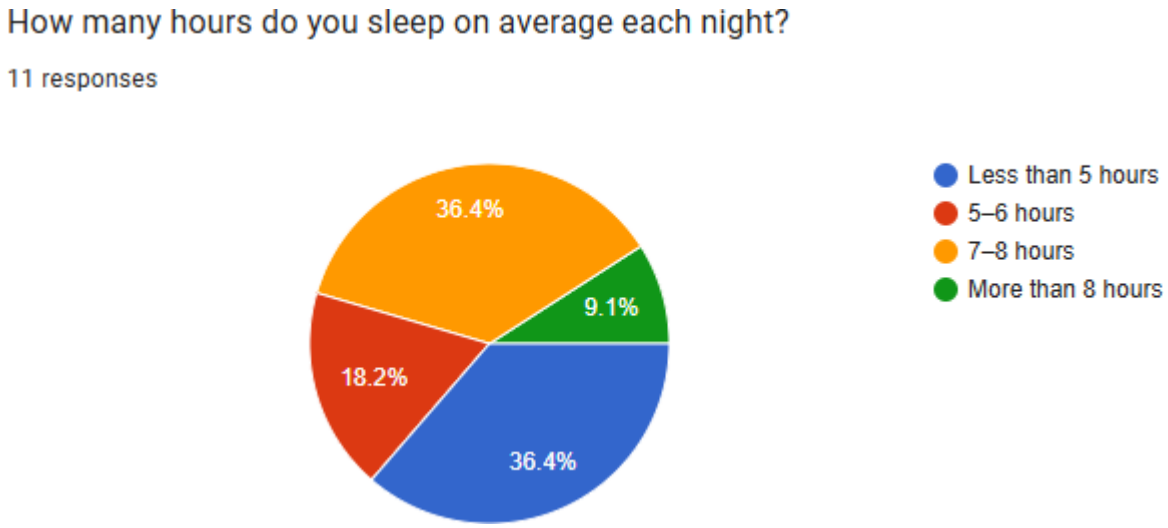

Hypothesis:

Chi-Square Test

1. Do you participate in physical exercise or sports at least three times a week?

Sr. No	Options	Oi	Ei	Oi-Ei	$(Oi-Ei)^2$	$(Oi-Ei)^2/Ei$
1	Yes	30	25	5	25	1
2	No	20	25	-5	25	1

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Total		**50**				**2**

X^2=2, Degree of Freedom = 3.841

3.841 > 2 (DOF > X^2)

Conclusion:

Mental wellness is an essential aspect of a student's academic success and overall well-being. Academic pressure, sleep patterns, physical activity, social support, and lifestyle habits can significantly influence a student's mental health. This research explored the potential of using machine learning techniques to predict student mental wellness based on these factors. By collecting and analyzing student survey data, predictive models can help identify students who may require additional support or counseling. The proposed approach demonstrates that machine learning can serve as a valuable decision-support tool for educational institutions by enabling early identification of mental wellness concerns. However, such systems should be used responsibly, ensuring data privacy, informed consent, and ethical handling of student information. Future research may focus on larger datasets, additional behavioral indicators, and comparisons of different machine learning algorithms to improve prediction accuracy and reliability.

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