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Examining Health Impacts on Academic Performance: Identifying Key Predictors and Supporting Student Well-being

Seth Junior Nti[1], Jasmine Noor Fawzia[2] , Rizma Nurpriyanti[3]*

[1] Department of Mathematics Education, Universitas Pendidikan Indonesia
[2] Department of Computer Science, Universitas Pendidikan Indonesia
[3] Department of Computer Science Education, Universitas Pendidikan Indonesia
*Correspondence: E-mail: seth.nti@upi.edu

ABSTRACT

This study examines the correlation between health and academic achievement, highlighting the significance of various health indicators in forecasting educational success. Employing a quantitative research approach, it analyzes Sustainable Development Goal (SDG) datasets to identify key health variables, including social support, sleep quality, and stress levels. Methods such as linear regression, factor analysis, and logistic regression were applied to a comprehensive dataset of students' health and academic measures. Results show a significant positive association between overall health ratings and academic achievements, with healthier students performing better. Specifically, health rating correlated with performance impact (r = 0.35), while sleep quality and social support had strong positive relationships with well-being (r = 0.77). Stress levels negatively impacted physical activity (r = -0.42) but were positively associated with mood and health perception (r = 0.63). The study emphasizes integrating health and education policies to foster supportive environments that enhance student well-being and performance, recommending social support networks, adequate sleep, and stress management.

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1. INTRODUCTION

The relationship between health and academic performance has long been a subject of interest for educators, policymakers, and healthcare professionals. Academic success is not solely determined by cognitive abilities but it is also influenced by various physical and mental health factors. The whole development and success of students depends on their general well-being. Understanding the influence of health on academic performance becomes ever more crucial as educational systems all over aim to raise student performance. This study underlines the need of tackling health-related problems to boost educational attainment since it corresponds with the Sustainable Development Goal 3 (SDG 3), which stresses excellent health and well-being (United Nations, 2020).

Previous studies have found a considerable correlation between health and academic achievement. Students' capacity to concentrate, demonstrate consistent attendance, and engage in academic activities has been proven to be compromised by physical health problems like hunger, obesity, and chronic diseases (Basch, 2011).

Academic performance is much influenced by mental health disorders like stress, anxiety, and depression as well (Kessler et al., 1995). Studies show that students who have better physical and mental health typically show superior academic performance, greater degrees of involvement, motivation, and cognitive functioning (Michael et al., 2015).

Furthermore, the school setting, which encompasses healthcare services, physical education programs, and dietary support, has a substantial impact on the health and academic achievements of pupils (Bradley & Greene, 2013). Interventions targeting the enhancement of student health, such as health programs implemented in schools, have exhibited favourable outcomes on both health and academic indicators (Walker et al., 2010).

Despite the well-established link between health and academic achievement, there is still a lack of information about the exact health characteristics that have the greatest impact on academic success. Moreover lacking are comprehensive plans combining health policy with education to sufficiently support student wellness.. This discrepancy makes it difficult for teachers, legislators, and medical professionals to carry out successful treatments meant to improve student academic performance as well as health.

The goal of this study is to look at how different health issues affect how well students perform in school by finding important health indicators. The study also aims to come up with suggestions based on data for how teachers, policymakers, and health care providers can help students be healthy and do well in school.

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2. METHODS

This study adopts a quantitative research design to explore the relationship between health and academic performance among students using Sustainable Development Goal (SDG) datasets. The research aims to identify key health predictors that influence academic outcomes and provide evidence-based recommendations for educators, policymakers, and healthcare providers. The SDG datasets, which include diverse indicators, offer a comprehensive foundation for analyzing the impact of various health factors on educational performance.

To analyze the dataset, the study will utilize Linear Regression who utilized to model the relationship between the predicted variable "Performance impact" and the independent variable "Health rating", Factor Analysis who employed to identify underlying factors influencing variables such as "Sleep quality", "Stress level", "Social support", and others. Also Logistic Regression for binary classification problems, such as the presence or absence of specific health issues affecting academic outcomes.

The SDG dataset "Impact_of_Mobile_Phone_on_Students_Health.csv" (Variables: Age, Daily usages, Academic Performance, Health rating, Health Risks, Usage symptoms, Symptom frequency, Performance impact) used in this study includes comprehensive information on students' mobile phone usage, various health indicators, and academic performance metrics. The data collection approach involves the following steps:

1. Data Acquisition: The dataset is obtained from a reliable source, ensuring that it contains accurate and relevant information for the study's objectives.
2. Data Cleaning: Handling Missing Values, missing data will be addressed using appropriate imputation techniques to ensure the integrity of the dataset.
3. Data Transformation: Converting age ranges to numerical values, facilitates statistical analysis and modeling tasks that require numerical inputs rather than categorical ranges.

The data analysis approach is structured to provide a detailed understanding of the impact of health on academic performance. The analysis process is Exploratory Data Analysis (EDA), there are two parts, Descriptive Statistics for calculating measures such as mean, median, and standard deviation for key variables to summarize the data. Visualization for using visual tools like subplots, histplot, and heatmap to identify distributions, trends, and potential correlations between health indicators and academic performance.

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All the codes are shared in Group 2_Project Task.ipynb. The analysis will be conducted using Python, a versatile programming language widely used for data science and machine learning tasks. The following libraries will be utilized:

1. Pandas: For data manipulation, cleaning, and preprocessing.
2. NumPy: For numerical computations and array handling.
3. Matplotlib and Seaborn: For data visualization and exploratory analysis.
4. Statsmodels: For conducting statistical analysis and time series modeling.
5. FactorAnalyzer: For factor analysis in multidimensional data analysis

By employing these research methods and tools, the study aims to provide a detailed and comprehensive understanding of how various health indicators impact academic performance. The findings will offer valuable insights for educators, policymakers, and healthcare providers, enabling them to develop targeted interventions that support student well-being and academic success. Through rigorous data analysis and the application of advanced computational models, this research seeks to contribute to the broader goal of enhancing educational outcomes by addressing health-related challenges faced by students.

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 Health Impacts on Academic Performance

Table 1. Correlation between Health and Academic Performance Variables

	Final Output			
Variable	**Health Rating**	**Symptom Frequency**	**Daily Usages**	**Performance Impact**
Health Rating	1	-0.64	0.71	0.35
Symptom Frequency	-0.64	1	-0.35	0.009
Daily Usages	0.71	-0.35	1	0.28
Performance Impact	0.35	0.009	0.28	1

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3.1.2 Key Predictors and Supporting Student Well-Being

Table 2. Correlation between Key Predictors and Supporting Student Well-being

	Final Ouput					
Variable	**Sleep Quality**	**Stress Level**	**Social Support**	**Physical Activity**	**Mood**	**Health Perception**
Sleep Quality	1	0.23	0.77	-0.81	0.63	0.63
Stress Level	0.23	1	0.44	-0.42	0.63	0.63
Social Support	0.77	0.44	1	-0.94	0.28	0.28
Physical Activity	-0.81	-0.42	-0.94	1	-0.37	-0.37
Mood	0.63	0.63	0.28	-0.37	1	1
Health Perception	0.63	0.63	0.28	-0.37	1	1

3.2 Discussion

Based on table 1, there are four variables: Health rating, Symptom frequency, Daily usages, and Performance impact. A strong negative correlation between Health rating and Symptom frequency (-0.64) indicates that higher health ratings are associated with lower symptom frequency. Additionally, there is a strong positive correlation between Health rating and Daily usages (0.71) and a moderate positive correlation between Health rating and Performance impact (0.35), suggesting that higher health ratings are associated with higher daily usages and performance impact. Symptom frequency has a moderate negative correlation with Daily usages (-0.35) and a nearly neutral correlation with Performance impact (0.009), indicating weak relationships with these two variables. Daily usages have a weak positive correlation with Performance impact (0.28).

The Health Rating variable in Table 1 represents an individual's overall assessment of their health status. This self-reported metric is crucial as it encapsulates the general well-being of the person, which can significantly impact various aspects of life, including

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academic performance. There is a significant positive correlation (0.35) between health rating and performance impact, indicating that better health is associated with better academic performance. There is a moderate positive correlation between Health Rating and Performance Impact. This implies that individuals with better health ratings tend to experience better academic performance. A higher health rating likely means fewer health-related distractions and disruptions, allowing students to focus better on their studies. Good health can lead to higher energy levels, better concentration, and improved cognitive function, all of which are essential for academic success.

In evaluating and comparing, it is evident that the first table focuses more on the relationship between health and academic performance variables. It has several strong correlations but also more weak or neutral correlations

Based on table 2, there are six variables: Sleep quality, Stress level, Social support, Physical activity, Mood, and Health perception. Sleep quality has a strong positive correlation with Social support (0.77) and a strong negative correlation with Physical activity (-0.81). Moderate correlations are found between Sleep quality and Mood (0.63) as well as Health perception (0.63), indicating that better sleep quality is associated with better mood and health perception. Stress level has moderate positive correlations with Social support (0.44), Mood (0.63), and Health perception (0.63), and a moderate negative correlation with Physical activity (-0.42). Social support has a very strong negative correlation with Physical activity (-0.94), but weak correlations with Mood (0.28) and Health perception (0.28). Physical activity has weak negative correlations with Mood (-0.37) and Health perception (-0.37). The very strong correlation between Mood and Health perception (1) indicates a very close relationship between better mood and better health perception.

Social support, sleep quality, and stress level are the key predictors for supporting student well-being. Positively correlated with social support (0.77), mood (0.63), and health perception (0.63), and negatively correlated with physical activity (-0.81). Good sleep quality supports better social connections, mood, and perceived health, although it appears to be inversely related to physical activity. Shows positive correlations with mood (0.63) and health perception (0.63), indicating that higher stress levels might coincide with worse mood and perceived health. Strongly correlated with sleep quality (0.77) and inversely correlated with physical activity (-0.94). Social support is a critical factor for overall well-being, significantly enhancing sleep quality.

In evaluating and comparing, the second table focuses on the relationships between health-related variables and shows clearer relationships between variables.

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Both tables provide valuable insights into how different aspects of health and academic performance are interrelated, which can aid in designing more effective interventions to improve individual health and performance.

4. CONCLUSION

This study offers an in-depth examination of how various health indicators affect students' academic performance. The results show a strong link between health and educational success, with healthier students typically performing better academically. A significant positive correlation exists between overall health ratings and academic outcomes, suggesting that students in better health tend to excel more in their studies. Key factors influencing student well-being, including social support, sleep quality, and stress levels, play crucial roles in determining academic success. Positive correlations were found between social support, good sleep quality, and enhanced mood and health perception, whereas higher stress levels were negatively associated with physical activity. These findings emphasize the necessity of creating a supportive social environment and encouraging healthy sleep practices to boost students' academic performance.

By tackling health-related issues with specific interventions, educators, policymakers, and healthcare providers can promote student well-being and academic achievement. The study highlights the need for integrated strategies that merge health and education policies, aiming to establish learning environments that prioritize students' physical and mental health. This approach supports the broader goal of improving educational outcomes and aligns with sustainable development goals related to health and well-being.

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6. AUTHORS' NOTE

This paper examines the impact of health on academic performance, identifying key predictors and promoting student well-being. The authors declare that there is no conflict of interest regarding the publication of this article. Additionally, the authors confirm that the paper was meticulously reviewed to ensure it is free of plagiarism, maintaining academic integrity throughout the research process. This study underscores the imperative of fostering supportive environments within educational settings to optimise student outcomes.

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7. REFERENCES

Basch, C. E. (2011). Healthier Students Are Better Learners: A Missing Link in School Reforms to Close the Achievement Gap. *Journal of School Health*, *81*(10), 593–598. https://doi.org/10.1111/j.1746-1561.2011.00632.x

Bradley, B. J., & Greene, A. C. (2013). Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. *Journal of Adolescent Health*, *52*(5), 523–532.

Kessler, R. C., Foster, C. L., Saunders, W. B., & Stang, P. E. (1995). Social consequences of psychiatric disorders, I: Educational attainment. *American Journal of Psychiatry*, *152*(7), 1026–1032.

Michael, S. L., Merlo, C. L., Basch, C. E., Wentzel, K. R., & Wechsler, H. (2015). Critical Connections: Health and Academics. *Journal of School Health*, *85*(11), 740–758. https://doi.org/10.1111/josh.12309

United Nations, U. (2020). *The Sustainable Development Goals Report 2020 | Department of Economic and Social Affairs*. https://sdgs.un.org/publications/sustainable-development-goals-report-2020-24686

Walker, S. C., Kerns, S. E., Lyon, A. R., Bruns, E. J., & Cosgrove, T. J. (2010). Impact of school-based health center use on academic outcomes. *Journal of Adolescent Health*, *46*(3), 251–257.

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