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DOI:

10.4103/jehp.jehp\_1534\_22

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Received: 23-10-2022

Accepted: 22-12-2022

Published: 31-08-2023

# Correlation between health status and academic achievement among elementary school students in North Jakarta

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**Abstract:**

**BACKGROUND:** High-performing students are essential investments in building the nation's future. In Indonesia, however, the correlation between students' health and academic achievement is rarely examined. This study aimed to evaluate primary school students' health status and its relation to their academic achievement.

**MATERIAL AND METHODS:** A survey was conducted on 1335 students from four primary schools in North Jakarta. Health assessments included nutritional status, hair, skin condition, dental, vision, and ear conditions. Parents filled sociodemographic questionnaire. Mid-exam scores in core subjects determined academic achievement. Data were analyzed using binomial logistic regression to determine the relation of health status with students' academic achievement.

**RESULTS:** In the younger group, students who were stunted (adjusted odds ratio [AOR] 2.23, 95% CI: 1.11-4.50), had dental caries (AOR 2.16, 95% CI: 1.15-4.04), hair problems (AOR 2.04, 95% CI: 1.15-3.59), and skin problems (AOR 1.49, 95% CI: 1.01-2.20) were more likely to have a low-performing index. In the older group, students with hair problems tend to have a low-performing index (AOR 3.05, 95% CI: 1.88-5.89). Meanwhile, the students who wore eye glasses were more likely to achieve a high-performing index in the older group (AOR 0.60, 95% CI: 0.50-0.78).

**CONCLUSION:** This study shows a significant correlation between students' health status and academic achievement, where students with health problems were more likely to have lower grades compared to their counterparts. Regular health screening and examination are vital to maintaining students' health; therefore, their academic achievement can be increased.

**Keywords:**

Child nutrition disorder, dental caries, health promotion, health status

## Introduction

Children are the nation's successor generation, and therefore, high-performing students are important investments in building the nation's future.<sup>[1]</sup> According to the PISA (*Program for International Student Assessment*) survey, a survey that evaluates students' performance in reading, mathematics, and science held

in 2018, Indonesian students only ranked 74<sup>th</sup> out of 79 countries being evaluated.<sup>[2]</sup> Moreover, the mean score of Indonesian students in three subjects fell below the average mean score.<sup>[3]</sup> These results show that the academic quality of Indonesian students is far left behind, hence requiring more attention.

One of the factors contributing to improving children's academic achievement is health

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**How to cite this article:** Kurniawan F, Wiraharja RS, Santi BT, Astiarani Y, Kristian K, Amita AS, *et al.* Correlation between health status and academic achievement among elementary school students in North Jakarta. *J Edu Health Promot* 2023;12:262.

because sickness will hinder their learning process and growth.<sup>[4,5]</sup> Previous research showed a significant correlation between students' health and academic achievement; healthy students are more likely to perform better.<sup>[6-8]</sup> Other research also showed a correlation between academic achievement and nutritional status,<sup>[9]</sup> refractive errors,<sup>[10]</sup> hair hygiene,<sup>[11]</sup> skin conditions,<sup>[12]</sup> dental caries,<sup>[13]</sup> and hearing disorders.<sup>[14]</sup> Considering these research findings, students' health needs to be given more attention to produce more high-performing students.

Measures to maintain children's health is needed to make sure children are in healthy condition to learn optimally.<sup>[15]</sup> One of the measures to maintain children's health is to hold regular health examinations or screenings. Regular examination or screening is expected to monitor their health and any diseases that can hinder their learning process. Primary health care usually does the health screening and is limited only to new students (Grade 1). This screening comprises anthropometric assessment, nutritional status assessment, personal hygiene status, visual acuity, ear health, dental health, skin health, and hair health. The health screening must be done annually so that children's health status can be monitored well, and any disorder can be intervened promptly. The existing research mostly only correlated academic achievement and a single health problem. Following these facts, this research is done to know the correlation between health status and health factors with the academic achievement of students from grades 1 to 6 of primary school. This research is done at two public schools and two private schools in Penjaringan district, Jakarta, Indonesia.

## Materials and Methods

### Study design and setting

A cross-sectional study was conducted in two public and two private primary schools located in Penjaringan district, North Jakarta. These schools were selected based on similar academic accreditation achievements and the number of students.

### Study duration

From July 2019 to September 2019.

### Study participants and sampling

In Indonesia, the education system of primary school is divided into six academic years (grades 1 to 6). In this study, a total of 1335 students were all included and divided into two groups: the younger group (academic years 1–3) and the older group (academic years 4–6).

### Data collection tool and technique

Data were collected using questionnaires, physical examinations, and student report cards. The student's

parents filled out the demographic questionnaire and used it to describe the student's characteristics, such as gender, birth date, and parent's occupation. Health professionals did a physical examination to find visual acuity disturbance (using Snellen chart), middle ear infection (using otoscope), dental caries and calculi, and poor skin, nails, and hair hygiene.

Students' academic achievement index was obtained from students' report cards. Scores for Bahasa and mathematics lessons were used to determine students' academic achievement index among younger students. Additional science lessons were used to assess students' academic achievement index among older students. Students were categorized as high-performed when their grades are above average and as low-performed when their grades are below average.

### Data analysis

Data were analyzed descriptively to show relative frequency and using binomial logistic regression to determine the correlation between health problems and students' academic achievement, using Stata version 15.0 (StataCorp, LLC).

### Ethical consideration

This research has been approved by the Ethics Committee of School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia with clearance number: 13/04/KEP-FKUAJ/2019. All methods were performed using relevant guidelines and regulations.

## Results

The total number of students in this study is 1335. Of the total number of students, 53% were male (n = 705) and 47% were female (n = 630). The health problems found in the physical examination are shown in Table 1 according to students' academic year and performance index. In the younger group, being underweight is more common among low-performing students than any other nutritional status. Low-performing students are also more likely to be stunted (51.4%); have dental caries (34.3%); have ear, hair, and skin problems (40.0%, 43.5%, and 40.8%, respectively); and have refractive and uncorrected refractive errors (36.3% and 43.5%, respectively). Similar to the younger group health problems, in the older group, low-performed students are more likely to be underweight (67.9%); stunted (54.5%); have dental caries (53.5%); and ear, hair, and skin problems (54.2%, 75.0%, and 54.8, respectively).

Multivariate analysis is done on younger and older groups separately to determine any health problems that affect students' achievement independently by

controlling gender and academic year. High-performed students were the reference group for the analysis, and Table 2 showed the result of the multivariate analysis. In the younger group, the stunted students (adjusted odds ratio [AOR] 2.23, 95% CI: 1.11-4.50), having dental caries (AOR 2.16, 95% CI: 1.15-4.04), hair (AOR 2.04, 95% CI: 1.15-3.59), and skin problems (AOR 1.49, 95% CI: 1.01-2.20) were more likely to have a low-performing index. In the older group, students with hair problems tend to have a low-performing index (AOR 2.83, 95% CI: 1.58-5.06). Meanwhile, the students who wear glasses

were more likely to achieve a high-performing index in the older group (AOR 0.51, 95% CI: 0.50-0.29).

## Discussion

This study emphasizes that the student's achievement is related to their health problems, regardless of their academic year. Students who were stunted, had dental caries, and had hair and skin problems were related to below-average grades in the younger group. In the older group, on the other hand, only having hair problems

**Table 1: Health problems characteristics with Student's Academic Achievement Index**

Health Problem	Younger Group Achievement Index				Older Group Achievement Index			
	Low-Performing		High-Performing		Low-Performing		High-Performing	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Nutritional Status								
Normal	139	32.6	288	67.4	204	51.3	194	48.7
Underweight	21	47.7	23	52.3	36	67.9	17	32.1
Overweight	74	30.8	166	69.2	87	50.3	86	49.7
Stunting								
Yes	19	51.4	18	48.6	18	54.5	15	45.5
No	215	31.9	459	68.1	309	52.3	282	47.7
Dental Caries								
Yes	220	34.3	422	65.7	281	53.5	244	46.5
No	14	20.3	55	79.7	46	46.5	53	53.5
Ear Problem								
Yes	12	40.0	18	60.0	13	54.2	11	45.8
No	222	32.6	459	67.4	314	52.3	286	47.7
Hair Problem								
Yes	27	43.5	35	56.5	54	75.0	18	25.0
No	207	31.9	442	68.1	273	49.5	279	50.5
Skin Problem								
Yes	60	40.8	87	59.2	69	54.8	57	45.2
No	174	30.9	390	69.1	258	51.8	240	48.2
Wearing Glasses								
Yes	12	32.4	25	67.6	24	36.4	42	63.6
No	222	32.9	452	67.1	303	54.3	255	45.7
Refractive Error								
Yes	98	36.3	172	63.7	229	52.2	210	47.8
No	136	30.8	452	69.2	98	53.0	87	47.0

**Table 2: Multivariate analysis on correlation between health problems with student's achievement**

Variable	Academic Year Groups			
	Younger Group		Older Group	
	<i>P</i>	OR (95% C.I.)	<i>P</i>	OR (95% C.I.)
Underweight	0.747	0.94 (0.65 – 1.30)	0.713	0.98 (0.71 – 2.65)
Overweight	0.066	0.52 (0.26 – 1.04)	0.222	0.72 (0.09 – 1.89)
Stunted	0.023*	2.23 (1.11 – 4.50)	0.684	0.98 (0.19 – 2.88)
Have dental caries	0.016*	2.16 (1.15 – 4.04)	0.490	1.20 (0.27 – 3.46)
Have ear problem	0.357	1.44 (0.66 – 3.18)	0.888	1.15 (0.20 – 5.78)
Have hair problem	0.013*	2.04 (1.15 – 3.59)	0.000*	3.05 (1.88 – 5.89)
Have skin problem	0.043*	1.49 (1.01 – 2.20)	0.584	1.77 (0.47 – 4.90)
Wearing glasses	0.233	0.87 (0.29 – 0.98)	0.025*	0.60 (0.50 – 0.78)
Having refractive error	0.134	1.30 (0.92 – 1.84)	0.517	2.36 (0.44 – 4.44)

\**P*<0.05

lowered their grade, while students wearing glasses had better grades than their counterparts.

Stunted students were more likely to have below-average grades. Consistent with Maghaireh (2019)<sup>[16]</sup> and Asmare (2018),<sup>[9]</sup> students with underweight, stunting, and wasting were negatively correlated with academic achievement. Nutrition is a vital component of brain development; therefore, undernutrition will delay and impair brain development, resulting in lower cognitive and academic performance. Stunted children are also easily sick because of their vulnerability to infection, resulting in a higher student absence and lower concentration. Stunting in younger children is more likely caused by malnutrition between infancy and preschool. During this age, children are going through rapid development of neurons; malnutrition might cause delay in the development of neurons, reduce brain size, and alter the function of neurotransmitters. Therefore, malnutrition could cause a decrease in concentration, memory, and perception.<sup>[9,17]</sup> If possible, malnutrition problem should be prevented at an early age, which is from early gestation.

Students with dental caries also were shown to have lower grades. Dental caries can lead to a gingival infection that causes the gum to swell, resulting in pain and uneasiness. A study in Los Angeles showed that the academic achievement of those with dental caries was four times lower than those without. Supported by a study by Seirawan (2012),<sup>[13]</sup> children with dental caries were six times more likely to be absent than their counterparts. In this research, however, there were no attendance list data to support the student's absence. In this study, the prevalence of dental caries of the younger group was higher than the older group. Although in this study, the location of dental caries was not divided into primary or permanent tooth, this result is similar to a study by Seth (2016)<sup>[18]</sup> and Youssefi (2020),<sup>[19]</sup> who found that dental caries in primary teeth was decreased as age progresses; as it is natural that the primary teeth exfoliate during the age of older group students.

Problems with hair and skin also are shown in this study as a factor that renders the children to have lower grades. The most common hair problem seen in school children was head lice (*pediculosis capitis*). Head lice decreases students' academic performance because it causes students to scratch heads more often, sleepiness during daytime caused by impaired sleep quality, and impaired concentration caused by anemia.<sup>[11]</sup> The same thing happened to a skin problem, where skin problem can impair study concentration caused by scratching and impaired sleep quality.<sup>[18]</sup> In this study, the skin problem's prevalence in the younger group was higher

than the older group. However, this result was contrary to the result of the Egyptian study done in 2012, as they found the prevalence of skin problems was higher in older group students.<sup>[20]</sup> This difference might be due to geographic and socio-culture differences. Another factor was the awareness level toward skin hygiene of younger children, which was lower compared to older children.

This study shows that the older group who wore glasses excelled more in grades compared to the younger group. This study also found the fact that many of students with refractive errors (270 students in the younger group and 439 students in the older group) had not been diagnosed; therefore, they did not wear eye glasses. Among students who had refractive errors, only 10.4% of them in the younger age group and 15% of them in the older age group, who had been diagnosed and wore eyeglasses. Vision is important for the learning process. Study from Dudovitz (2015) found that visual problems can affect not only students' focus, perseverance, class participation, and academic grades, but can also trigger stress. Dudovitz (2015)<sup>[21]</sup> also showed that visual correction could improve them. Additionally, this study is also in line with the studies done in the USA, where they found that giving glasses to those who had a refractive error as an intervention in primary school students benefited them in terms of increase in academic achievement.<sup>[10,22]</sup> Considering the result and previous studies, there is a need for eye health program to be included or prioritized in Indonesia's school health program. The school eye program can provide regular eye and vision examination and facilitate visual correction to increase learning capacity of students.

### Limitation and recommendation

We acknowledge some limitations of the study. First, this cross-sectional study cannot assess the temporal effect between independent and dependent variables. Thus, longitudinal health monitoring and research for students might be developed. Second, we cannot control another confounding related to the student's home environment due to the time limitation of the study that might affect the student's academic achievement, such as parenting style and support system. The advantages of this study are that it describes the health of school children in Jakarta and shows more health problems that affect health, which previous researchers have not done. In addition, this study shows the prevalence difference between two groups of students in elementary school. The results suggest that health education on personal hygiene needs to be conducted and monitored regularly by teachers. Another recommendation is that eye and vision examinations should be included as routine examinations in the school health program.

## Conclusion

Academic performance is better in students in the younger group if they do not have hair, skin, or dental problems and are not stunted, while in the older group, they do not have hair problems or refractive errors. This study shows the importance of regular examinations or screenings of elementary school students at least once a year and health education to keep personal hygiene away from health problems that can affect academic performance and to treat health problems in a timely manner.

## Ethical approval

This research has been approved by the Ethics Committee of School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia with clearance number: 13/04/KEP-FKUAJ/2019. All methods were performed using relevant guidelines and regulations.

## Acknowledgments

We are grateful for all the support given from headmaster of the schools. Special thanks to all doctors who participated in the school medical examinations.

## Health Status and Academic Achievement

## Financial support and sponsorship

Atma Jaya Catholic University of Indonesia.

## Conflicts of interest

There are no conflicts of interest.

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