

## Analysis of the Correlation between Physical Activity, Nutritional Status, and Learning Achievement with the Health Quality of Adolescents Life in East Bolaang Mongondow Regency

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### Abstract

### Original Research Article

Quality of life is one of the criteria currently used to evaluate healthcare interventions. The aim of this study is to assess the relationship between physical activity, nutritional status, and academic performance with the health-related quality of life of adolescents in East Bolaang Mongondow Regency. This research is a correlational study with a cross-sectional approach conducted in junior high schools and high schools in East Bolaang Mongondow Regency in October 2023, with a total sample size of 430. The instrument used in this study is a questionnaire, and the data were analyzed using univariate and bivariate analysis with the Chi-Square test. The results of the study showed that the variable of physical activity had a p-value < 0.05 in the domains of physical health (p=0.000), psychological health (p=0.000), and environment (p=0.000). However, for the social relationships domain, the p-value was > 0.05 (p=0.100). The variable of nutritional status had a p-value < 0.05 in the domains of physical health (p=0.000), psychological health (p=0.002), social relationships (p=0.000), and environment (p=0.000). The academic performance variable had a p-value > 0.05 for all domains. The conclusion of this study is that physical activity is associated with the quality of life in the domains of physical health, psychological health, and environment. Nutritional status is associated with all domains of quality of life, while academic performance is not associated with the quality of life in any domain.

**Keywords:** Health-Related Quality of Life, Physical Activity, Nutritional Status, Academic Performance.

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## INTRODUCTION

During adolescence, physical activity is associated with fitness, academic achievement, confidence, optimization of growth and development, and other impacts closely linked to the current and future quality of life for adolescents. Conversely, nutritional issues in adolescents can have negative consequences on the overall health of the community, such as a decrease in learning concentration, a decline in physical fitness, social problems, and broader impacts throughout their entire lifespan and that of future generations (Halawa, *et al.*, 2022).

Globally, 77.6% of boys and 84.7% of girls aged 11 to 17 have physical activity levels below the recommended guidelines. Low levels of physical activity

in children and adolescents have numerous adverse health consequences (Suryoadji & Nugrah, 2021). Research conducted by Imperial College London and the World Health Organization (WHO) has indicated a tenfold increase in the number of children and adolescents experiencing obesity worldwide in just 40 years. The obesity rate in children and adolescents globally rose from less than 1 percent (equivalent to five million girls and six million boys) in 1975 to nearly 6 percent in girls (50 million) and almost 8 percent in boys (74 million) in 2016 (Sabiah, *et al.*, 2023). A study conducted in China on the relationship between academic achievement, general health, and health-related quality of life among primary and middle school students found that academic achievement and health status are positively correlated with health-related quality of life among students in China. This relationship

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is not influenced by lifestyle and obesity status (Qi, *et al.*, 2020).

Additionally, Data from Riskesdas 2018 also indicates a prevalence of obesity and overweight in Indonesia at 16.0% among adolescents aged 13–15 years. From this figure, approximately 4.8% of adolescents experience obesity. These numbers reflect the nutritional status of adolescents in Indonesia that needs improvement. The increasing rate of obesity has implications for non-communicable diseases such as heart disease, hypertension, and diabetes (Suha & Rosyada, 2022). The Ministry of Health of the Republic of Indonesia (2019) shows that the proportion of the population in Indonesia aged 10 and above engaging in insufficient physical activity increased from 26.1% in 2013 to 33.5% in 2018. The level of physical activity in the Indonesian population is still a cause for concern; in 2018, 33.5% of the Indonesian population fell into the category of insufficient physical activity.

In North Sulawesi, the proportion of the population aged  $\geq 10$  years with the category of physically less active is 33.70%. The prevalence of nutritional status (height-for-age) in adolescents aged 13–15 years with the category of stunted is 18.20%. The prevalence of nutritional status (height-for-age) in adolescents aged 16–18 years with the category of stunted is 21.72%. The prevalence of nutritional status (BMI-for-age) in adolescents aged 13–15 years with the category of underweight is 4.02%, overweight is 12.97%, and obesity is 6.62%. The prevalence of nutritional status (BMI-for-age) in adolescents aged 16–18 years with the category of underweight is 4.85%, overweight is 11.42%, and obesity is 5.00% (Riskesdas 2018).

Based on the results of Riskesdas 2018, in East Bolaang Mongondow Regency, the prevalence of nutritional status (height-for-age) in adolescents aged 13–15 years was found to be 3.86% in the very short category and 22.47% in the short category. The prevalence of nutritional status (BMI-for-age) in adolescents aged 13–15 years, with the very thin category, was 0.81%, the overweight category was 7.73%, and the obesity category was 13.47%. The prevalence of nutritional status (height-for-age) in adolescents aged 16–18 years, with the very short category, was 7.52%, and the short category was 26.45%. The prevalence of nutritional status (BMI-for-age) in adolescents aged 16–18 years, with the underweight category, was 6.27%, the overweight category was 11.44%, and the obesity category was 1.55%. For the prevalence of nutritional status (BMI-for-age) in adolescents aged 13–15 years, it was 13.47%, with the obesity category ranking second highest among the 15 regencies and cities in North Sulawesi Province. The proportion of the population aged  $\geq 10$  years with physically less active activities is 43.72%, ranking

highest among the 15 regencies and cities in North Sulawesi Province.

The research conducted by Minggu (2022) revealed that physical activity is associated with the health-related quality of life of students in Kotamobagu City, where students engaged in good physical activity demonstrated good health-related quality of life. Porajow's (2021) study indicated that the health-related quality of life of adolescents in Manado City is correlated with physical activity, while poor nutritional status adversely affects the environmental aspect of adolescents. Khodijah, Lukman, & Munigar's (2013) research on junior high school adolescents showed a significant relationship between nutritional status and quality of life, with overweight and obese subjects tending to have lower quality of life compared to those with normal nutritional status. Evel's (2022) study indicated no correlation between academic achievement and health-related quality of life in the physical, psychological, social, and environmental domains in North Minahasa Regency. Porajow's (2021) research showed that the health-related quality of life of adolescents in Manado City has a positive linear relationship with increasing academic achievement. Academic abilities are linked to the health-related quality of life of adolescents. This suggests that improved academic performance in adolescents correlates with an improvement in the health-related quality of life of adolescents in Manado City, particularly in the psychological and environmental domains.

Research on the health-related quality of life in East Bolaang Mongondow Regency has not been conducted, so there is no data available regarding physical activity, nutritional status, and academic achievement in East Bolaang Mongondow Regency. Based on preliminary observations, it was found that there are a total of 40 schools in East Bolaang Mongondow Regency, consisting of 5 high schools (SMA), 11 vocational schools (SMK), and 24 junior high schools (SMP). The total number of junior high, high school, and vocational school students is 5,361. There are 2,446 junior high school students, 1,149 high school students, and 1,766 vocational school students. To sum up, the researchers are interested in conducting a study on the correlation analysis between physical activity, nutritional status, and academic achievement with the health-related quality of life of adolescents in East Bolaang Mongondow Regency.

## EXPERIMENTAL SECTION / MATERIAL AND METHODS

This research is a quantitative observational analytical study, utilizing a cross-sectional research approach. Data collection was conducted only once for each selected respondent to assess independent and dependent variables. The study was carried out from

September 2023 to January 2024 in East Bolaang Mongondow Regency.

The population in this study consists of adolescents attending public junior high schools (SMP), vocational schools (SMK), and high schools (SMA) in East Bolaang Mongondow Regency. The sample in this study includes junior high school and high school students aged between 10 and 19 years in East Bolaang Mongondow Regency who meet the inclusion and exclusion criteria. Those involved in this study must obtain parental consent if they are under 17 years old or express willingness to participate in the research. The sampling technique in this study was conducted using simple random sampling.

In the first stage, representatives from junior high schools (SMP), high schools (SMA), and vocational schools (SMK) in East Bolaang Mongondow Regency were selected. The school selection was carried out using purposive sampling techniques, considering factors such as accessibility and the school's willingness to participate in the research. At the school level, the students were then divided into three groups based on their grade levels: grades 7, 8, 9 for junior high school, and grades 10, 11, 12 for high school and vocational school. Subsequently, these groups were randomly shuffled to select the samples that would represent the population. All selected students were included as research samples. The determination of the sample size was done according to the calculation formula by Lemeshow *et al.*, with a precision of 0.05 using a significance level of 95% for population proportion estimation of 50%, assuming the population is known. Therefore, it was established that the number of secondary school students would be 430. The sampling will be conducted at SMP Negeri 1 Modayag, SMP Negeri 2 Tutuyan, SMP Negeri Daerah Kotabunan, SMA Negeri 1 Modayag, SMA Negeri 1 Tutuyan, SMK Negeri 1 Matongkat, and SMK Negeri 1 Tutuyan in East Bolaang Mongondow Regency.

This study will use the Indonesian version of the WHOQoL-BREF questionnaire and the Indonesian version of the GSHS 2015 questionnaire, which have been standardized and previously employed in other research studies.

In this study, the variables used are Independent Variables and Dependent Variables. There are three independent variables: Physical Activity, Nutritional Status, and Academic Achievement. The dependent variable is Health-Related Quality of Life based on the WHOQOL-BREF instrument, which consists of four domains: physical health, psychological, social relationships, and environmental. Health-related quality of life is the assessment of adolescents' quality of life based on personal values covering physical health, psychological well-being, individual relationships with factors, and the environment influencing their daily activities. The measurement of health-related quality of

life is conducted using the WHOQOL-BREF instrument. Measurements are made in four domains, and the scores of each domain are summed to obtain a raw score, which is then converted to a scale of 100. The categories are Very good if the score is 81-100, Good if the score is 61-80, Moderate if the score is 41-60, and Poor if the score is  $\leq 40$ .

Physical activity is measured using the GSHS 2015 instrument, Indonesian version. Adolescents are expected to engage in physical activity for at least 60 minutes every day, five days a week, and participate in sports one day a week at school. The categories are (Good) if physical activity is  $\geq 5$  days for 60 minutes per week, (Sufficient) if physical activity is 3-4 days for 60 minutes per week, and (Insufficient) if physical activity is  $< 3$  days for 60 minutes per week. Additionally, nutritional status measurement is based on BMI-for-age with the criteria: Undernutrition (thinness),  $-3 \text{ SD} < -2 \text{ SD}$ ; Normal Nutrition  $-2 \text{ SD} +1 \text{ SD}$ ; Overnutrition (overweight)  $+1 \text{ SD} +2 \text{ SD}$ ; and Obesity  $> +2 \text{ SD}$ .

The data collection process consists of four stages: preparation, implementation, measurement through instruments, and completion. The data analysis process involves processing the collected data and conducting data analysis, including descriptive analysis, bivariate analysis, and multivariate analysis.

## RESULTS

**Table 4: Distribution of Respondents Based on Physical Activity**

Physical Activity	N	%
Good	66	15,3
Enough	12	2,8
Less	352	81,9
Total	430	100

The results of the univariate analysis indicate that in Table 4, most of respondents are in the category of insufficient physical activity, totaling 352 respondents (81.9%). Following this, the good category consists of 66 respondents (15.3%), and the least number of respondents engage in sufficiently active physical activities, totaling 12 respondents (2.8%). Furthermore, the bivariate analysis results show that the p-value is less than 0.05 in the physical, psychological, and environmental domains. This suggests that physical activity is correlated with the quality of health in the physical, psychological, and environmental domains. However, there is not a significant correlation between physical activity and the social domain, as indicated by the p-value of 0.100.

**Table 5: Distribution of Respondents Based on Nutritional Status**

Nutritional Status	N	%
Malnutrition	35	8,1

Good Nutrition	340	79,1
Over Nutrition	34	7,9
Obesity	21	4,9
Total	430	100

Based on the results of the univariate analysis in Table 5, it is evident that most of respondents have a good nutritional status, totaling 340 respondents (79.1%), while the least number of respondents have an obese nutritional status, totaling 21 respondents (4.9%). Subsequently, the bivariate analysis results indicate that all domains, namely physical, psychological, social, and environmental, have p-values less than 0.05. This implies a significant relationship between nutritional status and the health-related quality of life across all domains investigated in this study.

**Table 6: Distribution of Respondents Based on Learning Achievement**

Learning Achievement	N	%
Good	350	81,4
Bad	80	18,6
Total	430	100

The univariate results in Table 6 indicate that the majority of respondents have good academic performance, totaling 350 respondents (81.4%), while those with poor academic performance amount to 80 respondents (18.6%). Subsequently, the bivariate results show that the academic performance variable does not have a significant relationship with the health-related quality of life across all domains investigated. This is evidenced by the obtained p-value being greater than 0.05.

**Table 7: Distribution of Respondents Based on the Quality of Life**

Domain	Very Good	Good	Fair	Bad	Very Bad	Total
Physical domain	38	226	125	37	4	430
Psychological domain	89	199	129	10	3	430
Social domain	62	178	135	14	41	430
Environmental domain	66	230	91	39	4	430

From the research findings in Table 7, it is evident that most of respondents in the physical domain have good quality of life, totaling 226 respondents. Similarly, in the psychological domain, the majority of respondents have good quality of life, amounting to 199

respondents. In the social domain, most respondents have a good quality of life, totaling 178 respondents. Lastly, in the environmental domain, the majority of respondents have a good quality of life, totaling 230 respondents.

**Table 11: Bivariate Selection Results the Independent Variable on the Quality of Life in Each Domain**

Variable	Health Quality of Life			
	Physical Domain	Psychological Domain	Social Domain	Domain Lingkungan
Physical activity	0,000	0,000	0,100	0,000
Nutritional status	0,000	0,002	0,000	0,000
Learning achievement	0,639	0,492	0,754	0,581

Based on the results of bivariate selection in Table 11, some variables in the physical, psychological, social, and environmental domains cannot proceed to multivariate analysis. It is because in the bivariate

selection results, several variables in each domain do not show a significant relationship with the chi-square test or have p-values greater than 0.05.

**Table 12: Multivariate Analysis Results**

Variable		Sig.	Exp (B)
Physical Domain	Physical activity	0,000	37,693
	Nutritional status	0,000	38,337
Psychological Domain	Physical activity	0,000	47,105
	Nutritional status	0,006	27,797
Domain Lingkungan	Physical activity	0,000	29,939
	Nutritional status	0,003	28,750

According to Table 12, the nutritional status variable appears to be more dominantly associated with the physical domain, with a relationship strength 38,337 times stronger. The physical activity variable seems to be more dominantly associated with psychological status, with a relationship strength 47,105 times stronger.

Furthermore, the physical activity variable appears to be more dominantly associated with the environmental domain, with a relationship strength 29,939 times stronger.

## DISCUSSION

### Physical Activity

The results of this research indicate that there is a relationship between physical activity and the health-related quality of life among adolescents in East Bolaang Mongondow Regency in the physical, psychological, and environmental domains. These findings reinforce the results of other studies; Porajow *et al.*'s (2021) research found that physical activity in adolescents is associated with an improvement in health-related quality of life. Parental and peer support will have a positive impact on the physical activity of adolescents.

Due to the increased use of screen-based electronic devices (such as laptops and smartphones) and the widespread availability of the internet, children and adolescents have engaged in more sedentary activities over the last ten years. To improve health, some countries have implemented regulations for physical activity among children and adolescents in schools. The World Health Organization recommends that children and adolescents (aged 5 to 17 years) engage in moderate to vigorous physical activity for at least 60 minutes per day. However, most of adolescents in many countries do not meet the recommended amount of physical activity. In addition to helping address specific health issues (such as obesity), increasing physical activity among adolescents and reducing sedentary behavior can also enhance their mental and physical health. Promoting physical activity is a crucial element of strategies aimed at improving the health-related quality of life for students (Bull *et al.*, 2020).

A study conducted in the US (McGuine *et al.*, 2021) found that low levels of physical activity reduce the health-related quality of life for 12th-grade students, particularly athletes, during periods of face-to-face school restrictions and limited sports activities. Adolescent athletes in the 12th grade experienced increased anxiety and depression due to the decline in physical activity caused by restrictions on sports activities.

### Nutritional Status

The results of this study indicate that there is a relationship between nutritional status and quality of life, especially in the domains of physical health and psychological health. Other research findings also state that the health-related quality of life for adolescents with excess nutritional status is not significantly different from that of adolescents with normal nutrition. In comparison to underweight adolescents, obese adolescents have better health-related quality of life (Porajow *et al.*, 2021). Adolescents with a larger body size may adapt to their surroundings and social interactions more comfortably due to feeling at ease with their physical appearance. Adolescents who feel comfortable with themselves, including their body weight, tend to have good health and high quality of life, according to a study conducted in Iran (Jalali-Farahani, Abbasi, & Daniali, 2019). How society perceives and

accepts an individual's body, including body weight and the ideal body shape, may also be crucial.

Therefore, preventive efforts are necessary as part of the health improvement initiatives recently launched in Indonesia by the Minister of Health in May 2022. These initiatives include six types of transformations: Primary Service transformation, Referral Service transformation, Health Resilience System, Health Financing System, Health Human Resources, and Health Technology. This signifies the initiation of transformations in the health sector in Indonesia (Ministry of Health RI, 2022).

### Academic Achievement

The research results indicate that the respondents have good academic achievement. Statistical analysis shows that there is no relationship between academic achievement and the quality of life of adolescents in East Bolaang Mongondow Regency. This study suggests that, despite having good academic achievement, the respondents generally do not experience disturbances in physical health, psychological health, social relationships, and the environment.

The data above indicates that adolescents in East Bolaang Mongondow Regency have academic achievements that are considered good. This is evident from most of adolescents having average scores ranging from 75-90. The overall quality of life for adolescents in East Bolaang Mongondow Regency is generally rated as good. There are a few adolescents with poor and very poor quality of life in some domains, but their number is very small. Interestingly, these adolescents have good academic achievements. It means that there are factors other than academic factors contributing to the decrease in their quality of life.

A study conducted in China on the relationship between academic achievement, overall health, and health-related quality of life among primary and middle school students found that academic achievement and health status are positively associated with health-related quality of life among students in China. This relationship is not influenced by lifestyle and obesity status (Qi *et al.*, 2020). The health-related quality of life for adolescents in Manado City has a positive linear relationship with improved academic achievement.

## CONCLUSION

In conclusion, physical activity is associated with the health-related quality of life of adolescents in East Bolaang Mongondow Regency. Adolescents with good physical activity tend to have a better quality of life compared to those with less physical activity. Similarly, nutritional status is highly correlated with the health-related quality of life of adolescents in East Bolaang Mongondow Regency. Adolescents with good

nutritional status are likely to have better health and quality of life compared to those with either excess or inadequate nutritional status. However, this is not the case for academic achievement, as it does not show a significant relationship with the health-related quality of life of adolescents. Based on data interpretation, academic achievement has a limited impact on the health-related quality of life of adolescents in East Bolaang Mongondow Regency.

Therefore, it can be concluded that the health-related quality of life of adolescents is more influenced by other indicators, such as physical activity, and possibly other unexplored indicators in this study. The research results indicate that the variable of physical activity is more dominant in having a close relationship with the psychological health domain, especially considering that nutritional status is more dominant in relation to the physical domain.

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