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THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND NUTRITIONAL STATUS AND QUALITY OF LIFE AMONG ADOLESCENTS IN BOLAANG MONGONDOW REGENCY

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ABSTRACT
Adolescents' quality of life is an important indicator of overall health status, encompassing physical, psychological, social, and environmental dimensions. Physical activity and nutritional status are commonly associated with adolescent health; however, their relationship with quality of life remains inconsistent across studies. This study aimed to analyze the relationship between physical activity and nutritional status and adolescents' quality of life in Bolaang Mongondow Regency. This study employed an observational analytic design with a cross-sectional approach, conducted among junior and senior high school adolescents in Bolaang Mongondow Regency in October 2023. A total of 406 adolescents were selected using cluster random sampling. Physical activity was assessed using the Global School-based Health Survey (GSHS) questionnaire, nutritional status was determined using Body Mass Index-for-Age (BMI-for-age), and quality of life was measured using the WHOQOL-BREF instrument. Data were analyzed using univariate and bivariate analyses with the Chi-square test at a 95% confidence level. The results showed that there was no significant relationship between physical activity and adolescents' quality of life across all quality of life domains ($p > 0.05$). Similarly, nutritional status was not significantly associated with adolescents' quality of life ($p > 0.05$). These findings indicate that variations in physical activity levels and nutritional status do not necessarily influence adolescents' perceived quality of life. In conclusion, physical activity and nutritional status are not significantly associated with adolescents' quality of lifein Bolaang Mongondow Regency. Adolescents' quality of life may be more strongly influenced by psychosocial and environmental factors that were not examined in this study. Future research is recommended to incorporate these factors to obtain a more comprehensive understanding of adolescents' quality of life.

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1. INTRODUCTION

Adolescence is a transitional stage from childhood to adulthood characterized by rapid biological, psychological, and social changes. During this period, adolescents experience significant physical growth, emotional development, and social role adjustment, which may influence their health status and overall well-being. As a result, adolescence is considered a critical phase for the establishment of health-related behaviors that can persist into adulthood and affect long-term health outcomes.

Quality of life has become an important concept in public health, particularly in assessing population health beyond morbidity and mortality indicators. Adolescents' quality of life reflects their subjective evaluation of physical health,

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psychological well-being, social relationships, and environmental conditions. Health-related quality of life provides a comprehensive picture of adolescents' perceived health status and daily functioning, rather than focusing solely on the presence or absence of disease.

Physical activity is one of the key health behaviors associated with adolescent health. Regular physical activity contributes to physical fitness, mental health, and social interaction, and is widely recommended as part of a healthy lifestyle. Adolescents who engage in sufficient physical activity are generally expected to have better physical functioning and emotional well-being. However, the relationship between physical activity and quality of life among adolescents is not always straightforward. Adolescents may perceive their quality of life as good despite low levels of physical activity, particularly when they do not experience functional limitations or overt health problems.

In addition to physical activity, nutritional status plays an essential role in adolescent health. Nutritional status reflects the balance between nutrient intake and the body's requirements and is commonly assessed using body mass index-for-age (BMI-for-age) among adolescents. Nutritional problems such as undernutrition, overweight, and obesity remain prevalent in many regions and may affect growth, development, and psychosocial health. Nevertheless, abnormal nutritional status does not always translate into a reduced perception of quality of life, especially in adolescents who have adapted to their physical condition or who are not experiencing immediate health complaints.

Previous studies examining the relationship between physical activity, nutritional status, and adolescents' quality of life have reported inconsistent findings. Some studies have demonstrated significant associations, while others have found no meaningful relationship. These discrepancies indicate that adolescents' quality of life is a subjective construct influenced by multiple factors, including psychosocial conditions, family support, peer relationships, school environment, and cultural context. Consequently, physical activity and nutritional status may not independently determine adolescents' perceived quality of life.

In the Indonesian context, adolescents face various health challenges related to lifestyle changes, including reduced physical activity and nutritional imbalances. However, empirical evidence regarding adolescents' quality of life and its associated factors remains limited, particularly in non-urban and semi-rural areas. Bolaang Mongondow Regency represents a region with diverse social and environmental characteristics, where adolescents may experience different health conditions and lifestyle patterns compared to those living in urban settings.

Despite the importance of understanding adolescents' quality of life, studies focusing on the relationship between physical activity, nutritional status, and quality of life in Bolaang Mongondow Regency are still scarce. Most available data focus on physical health indicators, while adolescents' subjective perceptions of their well-being receive less attention. Therefore, research that explores these relationships using a population-based approach is necessary to provide local evidence and support adolescent health planning.

Based on these considerations, this study aimed to analyze the relationship between physical activity and nutritional status with adolescents' quality of life in Bolaang Mongondow Regency. By employing an observational analytic design with a cross-sectional approach and bivariate analysis, this study seeks to provide an empirical description of whether differences in physical activity levels and nutritional status are associated with variations in adolescents' perceived quality of life. The findings of this study are expected to contribute to a better understanding of adolescent health and serve as a reference for the development of comprehensive and context-appropriate adolescent health programs.

2. LITERATURE REVIEW

Adolescents and Quality of Life

Adolescence is a critical transitional period from childhood to adulthood, characterized by rapid physical, psychological, and social changes. According to the World Health Organization (WHO), adolescents are individuals aged 10–19 years. During this phase, adolescents begin to form health-related behaviors and perceptions that may persist into adulthood and influence long-term health outcomes (Sawyer et al., 2012).

Quality of life has become an important indicator in public health research, particularly for assessing well-being beyond traditional morbidity and mortality measures. WHO defines quality of life as individuals' perceptions of their position in life in the context of culture and value systems, and in relation to their goals, expectations, and concerns (WHO, 1997). Health-related quality of life (HRQoL) encompasses four domains: physical health, psychological well-being, social relationships, and environmental conditions. Among adolescents, HRQoL is highly subjective and influenced by a combination of physical, psychosocial, and environmental factors.

Physical Activity among Adolescents

Physical activity refers to any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2010). Regular physical activity is associated with numerous health benefits, including improved cardiovascular fitness, better mental health, and enhanced social functioning. WHO recommends that adolescents engage in at least 60 minutes of moderate-to-vigorous physical activity daily.

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Despite these recommendations, insufficient physical activity among adolescents remains a global public health concern. Globally, approximately 81% of adolescents aged 11–17 years do not meet the recommended level of physical activity (WHO, 2019). In Indonesia, data from the 2018 Basic Health Research (Riskesdas) reported that 33.5% of the population aged 10 years and above had insufficient physical activity, indicating that physical inactivity among adolescents is also a significant issue at the national level (Ministry of Health of Indonesia, 2018).

Several studies have suggested that higher levels of physical activity are associated with better HRQoL, particularly in physical and psychological domains. However, evidence remains inconsistent. A systematic review and meta-analysis by Marker et al. (2018) found that the relationship between physical activity and HRQoL among children and adolescents was generally weak to moderate and varied across study settings and measurement tools. This suggests that physical activity alone may not be a dominant determinant of adolescents' perceived quality of life.

Nutritional Status among Adolescents

Nutritional status reflects the balance between nutrient intake and the body's physiological requirements. Among adolescents, nutritional status is commonly assessed using body mass index-for-age (BMI-for-age) based on WHO growth reference standards (WHO, 2007). Nutritional problems during adolescence include undernutrition, overweight, and obesity, which may affect physical growth, psychosocial development, and future health risks.

In Indonesia, adolescents face a dual burden of malnutrition. According to Riskesdas 2018, among adolescents aged 13–15 years, 8.7% were underweight, while 16.0% were overweight or obese. Among those aged 16–18 years, 9.3% were underweight, and 13.5% were overweight or obese (Ministry of Health of Indonesia, 2018). These data highlight that nutritional problems among Indonesian adolescents remain prevalent and pose ongoing public health challenges.

Nutritional status is often associated with quality of life because it is related to physical condition and body image. Several studies have reported that adolescents with obesity tend to have lower quality of life, particularly in the psychological and social domains. However, other studies have shown that nutritional status does not have a significant relationship with adolescents' quality of life (Porajow et al., 2021).

These differing findings indicate that adolescents' perceptions of quality of life are not solely determined by nutritional status, but are also influenced by psychosocial factors such as self-acceptance, social support, and a supportive environment (Sawyer et al., 2012).

Research Framework

With reference of previous researches and literature review the framework of the research had been identified as below:

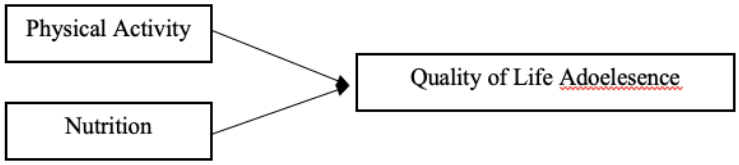

Figure 1. Research Framework
Source: Research Data (2021)

H_{01}: There is no statistically significant relationship between physical activity and health-related quality of life among adolescents in Bolaang Mongondow Regency.

H_{02}: There is no statistically significant relationship between nutritional status and health-related quality of life among adolescents in Bolaang Mongondow Regency.

H_{11}: There is a statistically significant relationship between physical activity and health-related quality of life among adolescents in Bolaang Mongondow Regency.

H_{12}: There is a statistically significant relationship between nutritional status and health-related quality of life among adolescents in Bolaang Mongondow Regency.

3. METHODS

This study employed an observational analytic design with a cross-sectional approach. This design was used to analyze the relationship between physical activity and nutritional status and adolescents' quality of life at a single point in time, without providing any intervention to the study subjects.

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The cross-sectional approach was chosen because the study aimed to examine the relationships between variables rather than to determine causal relationships. The study was conducted in Bolaang Mongondow Regency, North Sulawesi Province, october 2023.

The study population consisted of all junior and senior high school adolescents in Bolaang Mongondow Regency. A total of 406 respondents were included in the study. The sampling technique used was cluster random sampling, with schools serving as the cluster units.

4. FINDING AND DISCUSSION

Characteristics of Respondents

School Of Origin	N	%
Senior High School 1 Lolak	109	27
Junior High School 1 Lolak	96	23
Vocational High School 1 Bolaang	49	12
Junior High School 5 Bolaang	32	8
Senior High School 1 Poigar	120	30
TOTAL	406	100

Figure 2. Distribution of Respondents by School of Origin

Based on Figure 2, it can be observed that the majority of respondents were from SMA N 1 Poigar, with 120 respondents (30%), while the smallest proportion of respondents came from SMP N 5 Bolaang, with 32 respondents (8%).

1. Univariat Analytic

a.Physical Activity

Physical Activity	N	%
Good	216	53,2
Moderate	155	38,2
Low	35	8,6
Total	406	100

Figure 3: Univariat Data of Physical Activity

As shown in Figure 3, most respondents had a good level of physical activity (53.2%), followed by a moderate level(38.2%), while only 8.6% had a low level of physical activity.

b. Nutrions (BMI)

Body Mass Index	N	%
Under	45	11,1
Ideal	326	80,3
Overweight	35	8,6
Total	406	100

Figure 4 : Univariat Data of Nutrition

Based on figure 4, the majority of respondents had an ideal body mass index, with 326 respondents (80.3%), followed by those who were underweight, totaling 45 respondents (11.1%), while 35 respondents (8.6%) were classified as overweight.

c. Quality Of Life

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Domain	High	Moderate	Low	Total
Physical Domain	237	168	1	406
Physichological Domain	206	179	21	406
Sosial Domain	139	234	33	406
Environmental Domain	204	194	8	406

Figure 5 : Domain Quality of Life

Based on the results presented in figure 5, most respondents in the **physical domain** had a **high level of quality of life**, totaling **237 respondents**. In the **psychological domain**, the majority of respondents also reported a **high quality of life**(**206 respondents**). For the **social domain**, most respondents had a **moderate level of quality of life**, with **234 respondents**. In the **environmental domain**, the majority of respondents reported a **high quality of life**, totaling **204 respondents**.

2. Bivariat Analytic

a. Physical Activity and Quality of Life

Quality of Life							
Physical Health			Low	Moderate	High	N	P
Physical Activity	Good	Total (n)	1	86	129	216	
		Persentase (%)	2	21,2	31,8	53,2	
	Moderate	Total (n)	0	62	93	155	
		Persentase (%)	0	15,3	22,9	38,2	0,313
	Low	Total (n)	0	20	15	35	
		Persentase (%)	0	4,9	3,7	8,6	
	Total	Total(n)	1	168	237	406	
		Persentase (%)	2	41,5	48,4	100	
Physchological							
	Good	Total (n)	11	93	112	216	
		Persentase (%)	2,7	22,9	27,6	53,2	
	Moderate	Total (n)	7	67	81	155	
		Persentase (%)	1,7	16,5	20,0	38,2	0,522
	Low	Total (n)	3	19	13	35	
		Persentase (%)	7	4,7	3,2	8,6	
	Total	Total (n)	21	179	206	406	
		Persentase (%)	5,2	44,1	50,7	100	
Social							
	Good	Total (n)	18	126	72	216	
		Persentase (%)	4,4	31	17,7	53,2	
	Moderate	Total (n)	14	81	60	155	
		Persentase (%)	3,4	20	14,8	38,2	0,112
	Low	Total (n)	1	27	7	35	
		Persentase (%)	2	6,7	1,7	8,6	
	Total	Total(n)	33	234	139	406	
		Persentase (%)	8,1	57,6	34,2	100	
Environmental							
	Good	Jumlah (n)	6	98	112	216	
		Persentase (%)	1,5	24,1	27,6	53,2	
	Moderate	Total (n)	0	77	78	155	
		Persentase (%)	0	19	19,2	38,2	0,100
	Low	Total (n)	2	19	14	35	
		Persentase (%)	5	4,7	3,4	8,6	
	Total	Total (n)	8	194	204	406	
		Persentase (%)	2	47,8	50,2	100	

Figure 6. Relationship between Physical Activity and Health-Related Quality of Life

Based on figure 6, the analysis showed that the relationship between physical activity and the physical health domainhad a p-value of 0.313, indicating that $p > 0.05$, which means there was no significant relationship between physical activity and health-related quality of life in the physical health domain. The relationship between physical

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activity and the psychological domain yielded a p-value of 0.522, indicating p > 0.05, which suggests that there was no significant relationship between physical activity and health-related quality of life in the psychological domain. Furthermore, the relationship between physical activity and the social domain showed a p-value of 0.112, indicating p > 0.05, meaning that there was no significant relationship between physical activity and health-related quality of life in the social domain. Lastly, the relationship between physical activity and the environmental domain resulted in a p-value of 0.100, indicating p > 0.05, which means that there was no significant relationship between physical activity and health-related quality of life in the environmental domain.

b. Nutrition and Quality of Life

Quality of Life							
Nutrition by BMI			Rendah	Sedang	Tinggi	N	P
Physical Activity	Under	Total (n)	0	17	28	45	0,376
		Percentase (%)	0	4,2	6,9	11,1	
	Ideal	Total (n)	1	131	194	326	
		Percentase (%)	2	32,3	47,8	80,3	
	Overweight	Total (n)	0	20	15	35	
		Percentase (%)	0	4,9	3,7	8,6	
	Total	Total (n)	1	168	237	406	
		Percentase (%)	2	41,5	48,4	100	
Psychological							
	Under	Total (n)	3	24	18	45	0,547
		Percentase (%)	7	5,9	4,4	11,1	
	Ideal	Total (n)	17	138	171	326	
		Percentase (%)	4,2	34	42,1	80,3	
	Overweight	Total (n)	1	17	17	35	
		Percentase (%)	7	4,2	4,2	8,6	
	Total	Total (n)	21	179	206	406	
		Percentase (%)	5,2	44,1	50,7	100	
Social							
	Under	Total (n)	4	23	18	45	0,686
		Percentase (%)	1	5,7	4,4	11,1	
	Ideal	Total (n)	25	189	11	326	
		Percentase (%)	6,2	46,6	27,6	80,3	
	Overweight	Total (n)	4	22	9	35	
		Percentase (%)	1	5,4	2,2	8,6	
	Total	Total (n)	33	234	139	406	
		Percentase (%)	8,1	57,6	34,2	100	
Environmental							
	Under	Total (n)	2	21	22	45	0,199
		Percentase (%)	5	5,2	5,4	11,1	
	Ideal	Total (n)	4	154	168	326	
		Percentase (%)	1	37,9	41,4	80,3	
	Overweight	Total (n)	2	19	14	35	
		Percentase (%)	5	4,7	3,4	8,6	
	Total	Total (n)	8	194	204	406	
		Percentase (%)	2	47,8	50,2	100	

Figure 7 : Nutrition and Quality of Life

As shown in figure, Nutrition by body mass index (BMI) was not significantly associated with health-related quality of lifeacross all domains. The p-values for the physical, psychological, social, and environmental domains were 0.376, 0.547, 0.686, and 0.199, respectively (all p > 0.05).

Discussion

This study found no significant association between physical activity and adolescents' health-related quality of life in Bolaang Mongondow Regency, indicating that there were no differences in quality of life among adolescents with low, moderate, or high levels of physical activity. This finding is consistent with the study by Kumayas (2022) in South Minahasa, which also reported no relationship between physical activity and adolescents' quality of life. However, the results differ from several previous studies. McGuine et al. (2021) reported that reduced physical activity was associated with decreased health-related quality of life among 12th-grade student-athletes during periods of restricted school attendance and sports activities, leading to increased anxiety and depression. Similarly, Porajow (2021) found that physically active adolescents in Manado had better quality of life, particularly in the psychological and social domains, with a stronger effect observed among female adolescents. Although this study did not find a significant relationship between physical activity and quality of life, physical activity remains essential for daily functioning and overall health. In addition, this study also found no significant relationship between nutritional status and adolescents' quality of life, which aligns with the findings of Mira Kumayas but contrasts with several studies reporting that abnormal nutritional status, including underweight, overweight, and obesity, is associated with lower quality of life (Khodijah et al., 2013; Susmiati et al., 2019; Muros & Jose, 2017). Conversely, Sakti (2019) reported no association between obesity and quality of life among adolescents in Manado, suggesting that improvements in lifestyle may enhance quality of life even among obese adolescents (Hoedjes et al., 2018). These inconsistent findings indicate that adolescents' quality of life is influenced not only by physical activity and nutritional status but also by broader factors such as psychosocial conditions, dietary patterns, rapid growth during adolescence, exposure to modern food marketing through social media, and technological developments that promote sedentary behavior. Increased gadget use may reduce physical activity and increase caloric intake, contributing to nutritional problems and long-term health risks among adolescents.

5. CONCLUSION

This study concludes that there was no significant relationship between physical activity and nutritional status (body mass index) with adolescents' health-related quality of life in Bolaang Mongondow Regency. The bivariate analysis showed that physical activity was not significantly associated with the physical ($p = 0.313$), psychological ($p = 0.522$), social ($p = 0.112$), or environmental domains ($p = 0.100$) of quality of life. Similarly, nutritional status measured by body mass index did not show a significant relationship with the physical ($p = 0.376$), psychological ($p = 0.547$), social ($p = 0.686$), or environmental domains ($p = 0.199$) of adolescents' quality of life. These findings indicate that adolescents' perceived quality of life is not solely influenced by physical activity levels or nutritional status, but may also be shaped by other psychosocial and environmental factors beyond those examined in this study.

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