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ORIGINAL SCIENTIFIC PAPER

The Relationship Between Physical Activity and Quality of Life Among Elementary School Students

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Abstract

Physical activity is widely recognised as an important component of children's physical, psychological, and social well-being, which is closely associated with their overall quality of life. However, empirical evidence regarding this relationship among elementary school students in Indonesia remains limited. This study aimed to examine the association between physical activity and quality of life among elementary school students. A quantitative cross-sectional correlational design was employed, involving 159 students from a public elementary school. Physical activity was measured using the Physical Activity Questionnaire for Older Children (PAQ-C), while quality of life was assessed using the Elementary School Students' Quality of Life (ESQoL) scale, comprising six domains. Data analysis included reliability testing, descriptive statistics, normality testing, Spearman correlation, partial correlation, and multiple regression analyses controlling for grade level and gender. Both instruments demonstrated acceptable internal consistency (PAQ-C $\alpha = 0.853$; ESQoL $\alpha = 0.783$). Results indicated a positive and statistically significant association between physical activity and overall quality of life ($r = 0.254$; $p < 0.01$), which remained significant after controlling for demographic variables. Regression analyses further revealed that physical activity was significantly associated with school functioning and peer relationships domains, but not with other domains. These findings indicate that physical activity is positively associated with specific aspects of elementary school students' quality of life, although causal inferences cannot be drawn due to the cross-sectional design.

Keywords: physical activity · quality of life · Pilates exercise · elementary school students

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Introduction

In recent decades, increasing attention has been directed toward children's health and quality of life, driven by global lifestyle changes characterized by rising sedentary behavior and declining levels of daily physical activity among school-aged children (Guthold et al., 2020; WHO, 2020). Rapid advances in digital technology, urbanization, and shifts in children's play patterns from physically active play to screen-based activities have substantially influenced children's movement behaviors worldwide. This trend raises serious concerns, as childhood is a critical period for establishing active lifestyle habits with long-term implications for health and overall well-being.

The World Health Organization reports that more than 80% of school-aged children and adolescents globally do not meet the recommended levels of physical activity, namely at least 60 minutes of moderate-to-vigorous physical activity per day (WHO, 2020). Similar findings have been reported in multinational studies indicating low levels of physical activity among elementary school children, particularly in developing countries (Guthold et al., 2020). Insufficient physical activity during childhood has been associated with a range of adverse health outcomes, including increased risk of obesity, reduced cardiorespiratory fitness, mental health problems, and lower quality of life both in childhood and later adulthood (Janssen & LeBlanc, 2010; Poitras et al., 2016; Rodriguez-Ayllon et al., 2019).

Children's quality of life is a multidimensional construct reflecting individuals' perceptions of their physical, psychological, social, and environmental well-being in everyday life (Ravens-Sieberer et al., 2006; Wallander et al., 2001). During the elementary school years, quality of life is a particularly important indicator, as this developmental stage is a fundamental period for emotional development, identity formation, and the acquisition of social and academic skills (Varni et al., 2007). Children with higher levels of quality of life tend to demonstrate better health status, more positive social relationships, and greater engagement in school learning activities (Fayed et al., 2012; Morales et al., 2013).

A growing body of international research has demonstrated that physical activity is significantly associated with children's and adolescents' quality of life. Regular participation in physical activity contributes to improvements in physical fitness, emotional regulation, reductions in symptoms of anxiety and depression, and enhanced self-esteem and self-confidence among children (Biddle & Asare, 2011; Eime et al., 2013). Beyond physical and psychological benefits, involvement in physical activity and sports also offers important social benefits, including the development of cooperation skills, interpersonal communication, and a sense of belonging and social acceptance among peers (Eime et al., 2013; Lubans et al., 2016).

In the educational context, schools are considered strategic settings for promoting physical activity and enhancing children's well-being. Physical Education, Sport, and Health (PESH) plays a crucial role in fostering active lifestyles, developing motor competence, and instilling social and emotional values that support students' holistic quality of life (Bailey, 2006; Kirk, 2009). Well-structured, inclusive, and enjoyable physical education programs not only increase students' physical activity levels but also contribute to their psychosocial development and subjective well-being (Bailey et al., 2009; Trudeau & Shephard, 2008).

Nevertheless, empirical evidence also suggests that the relationship between physical activity and quality of life in children is not always strong and may be influenced by various contextual factors, including family environment, school conditions, social support, socioeconomic status, and individual characteristics (Ravens-Sieberer et al., 2006; Upton et al., 2008; Wallander et al., 2001). These findings highlight that children's quality of life emerges from a complex interaction of behavioral, environmental, and psychosocial factors, in which physical activity represents an important, but not exclusive, determinant.

In Indonesia, research specifically examining the relationship between physical activity and quality of life among elementary school students remains limited. Most existing studies have focused primarily on physical fitness, nutritional status, or academic achievement, while investigations that position quality of life as a primary outcome within the context of elementary education are relatively scarce. Moreover, the use of standardized instruments and systematic quantitative approaches to measure both constructs remains limited. Ongoing changes in children's activity patterns, driven by increased screen time, reduced access to physical play spaces, and growing academic demands, further underscore the urgency of research examining the role of physical activity in supporting elementary school students' well-being.

Based on this background, the present study aims to analyze the relationship between physical activity and quality of life among elementary school students. The findings of this study are expected to provide empirical contributions to the fields of

education and child health, particularly within the context of elementary education in Indonesia, and to inform the development of physical education practices and school policies that promote active lifestyles and holistic student well-being.

Method

Research Design

This study employed a quantitative, correlational, cross-sectional design. The correlational design was used to examine the relationship between two variables, namely physical activity as the independent variable and quality of life as the dependent variable, without providing any specific intervention to the participants.

Participants

The participants of this study were 159 elementary school students enrolled in a public elementary school in Bandung City, West Java, Indonesia. The students were drawn from Grades 5 to 6. The participants' age range was approximately 11–12 years, consistent with the typical age range for these grade levels. Both male and female students participated in the study. The school where the study was conducted is a public (government-funded) elementary school.

A purposive sampling technique was employed, in which participants were selected based on predefined criteria, such as being actively enrolled as students and willing to participate in the study (Etikan et al., 2016). This sampling technique was deemed appropriate because the study focused on specific characteristics relevant to the research objectives.

Inclusion criteria for participation were: (1) being an actively enrolled elementary school student, (2) regularly participating in physical education classes, and (3) providing informed consent from parents or guardians as well as assent from the students. Exclusion criteria included students who were absent during data collection or who did not complete the questionnaires.

Data on body mass index (BMI), socioeconomic status, and other health-related indicators were not collected in this study. Therefore, these variables were not included in the analysis and are acknowledged as limitations.

Prior to data collection, permission was obtained from the school authorities, and informed consent was secured from the students' parents or guardians. All participants took part in the study voluntarily. The research procedures adhere to ethical principles in educational research, including ensuring data confidentiality and participant anonymity (Israel & Hay, 2006).

Research Instruments

Physical activity was measured using the Physical Activity Questionnaire for Older Children (PAQ-C), which assesses general levels of moderate-to-vigorous physical activity among children aged 8–14 years (Kowalski et al., 2004). The PAQ-C consists of 9 items, including one summary item that assesses overall physical activity over the previous 7 days. Responses are rated on a 5-point Likert scale, with higher scores indicating greater levels of physical activity.

In this study, the Indonesian version of the PAQ-C, as validated by Andriyani et al. (2024) was used. The instrument has demonstrated acceptable psychometric properties in Indonesian children. The overall physical activity score (PAQ_mean) was calculated as the mean across all PAQ-C items, in accordance with the original scoring guidelines. Higher mean scores reflect higher physical activity levels.

The reliability analysis in the present study yielded a Cronbach's Alpha coefficient of 0.853, indicating excellent internal consistency ($\alpha > 0.80$) and confirming that the physical activity instrument is suitable for research purposes (Hair et al., 2019).

Quality of Life

Quality of life was assessed using the Elementary School Students' Quality of Life (ESQoL) scale, developed and validated by Huang et al. (2017). The ESQoL is specifically designed for elementary school students and consists of 21 items covering School function, Family function, Environmental life, Vitality for life, Learning ability, and Peer Relationships.

Each item is rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating better perceived quality of life. The total quality of life score (QoL_mean) was calculated by computing the mean score of all 21 items, resulting in a composite score representing overall perceived quality of life.

The reliability analysis showed a Cronbach's Alpha value of 0.783, indicating good internal consistency and meeting the accepted reliability criteria for research instruments (Hair et al., 2019).

Data Collection Procedure

Data were collected by administering physical activity and quality-of-life questionnaires directly to students at school. Prior to data collection, the

researcher provided a brief explanation of the study's purpose and instructions for completing the questionnaires. All participants were asked to complete the questionnaires independently, with assistance from teachers when necessary to ensure students' understanding of each item. The completed questionnaires were checked for completeness before being processed for further analysis.

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS). The data analysis procedures included the following steps:

1. Instrument reliability testing uses Cronbach's Alpha to assess the internal consistency of the questionnaire items.
2. Descriptive statistics to summarize the minimum, maximum, mean, and standard deviation values for each research variable.
3. Normality testing using the Kolmogorov–Smirnov and Shapiro–Wilk tests.
4. The Spearman Correlation Test between Physical Activity and Quality of Life.
5. Partial Correlation between Physical Activity and Quality of Life Controlling for Grade and Gender.
6. Multiple Regression Analysis of Physical Activity Predicting Quality of Life Dimensions (Controlling for Grade and Gender).

The results of the normality tests indicated that the quality-of-life data were not normally distributed ($p < 0.05$). Therefore, the relationship between variables was analyzed using the nonparametric Spearman's rho correlation test (Field, 2018). Spearman's correlation was selected because it is appropriate for non-normally distributed data and effectively measures the strength and direction of relationships between variables (Gibbons & Chakraborti, 2010).

Results

Descriptive statistical analysis was conducted to describe the levels of physical activity and quality of life among elementary school students. The results of the analysis are presented in Table 1.

Table 1. Descriptive statistics of research variables

Variable	N	Min	Max	Mean	SD
(PAQ mean)	159	1.30	4.80	2.97	0.68
(QoL mean)	159	2.30	3.90	3.22	0.32

PAQ mean = students' mean physical activity score
QoL mean = students' mean quality of life score

Based on Table 1, the mean score of elementary school students' physical activity was 2.97 with a standard deviation of 0.68. According to the PAQ-C interpretation guidelines proposed by Andriyani et al. (2024) and Kowalski et al. (2004), this score indicates that students' physical activity levels fall within the moderate category. The relatively wide score range reflects variability in students' physical activity levels.

Meanwhile, the mean score of students' quality of life was 3.22 with a standard deviation of 0.32, indicating that, in general, students perceived their quality of life as fairly good. The categorization was determined based on the Likert scale interval approach described by Azwar (2022), in which scores ranging from 2.51 to 3.25 are classified as fairly good. The relatively small variation in quality-of-life scores suggests that students' perceptions of their quality of life are relatively homogeneous.

Reliability testing was conducted to ensure the internal consistency of the research instruments. The results of the reliability analysis are presented in Table 2.

Table 2. Results of the instrument reliability test

Variable	Number of Items	Cronbach's Alpha	Category
Physical Activity	9	0.853	Very good
Quality of Life	21	0.783	Good

Based on Table 2, the physical activity instrument demonstrated a Cronbach's Alpha of 0.853, which falls in the good range, while the quality of life instrument demonstrated a Cronbach's Alpha of 0.783, which is acceptable. Referring to the reliability interpretation criteria proposed by Darren George (2011), both values indicate that the instruments used possess adequate to good internal consistency, and therefore are suitable for use in this study.

A normality test was conducted to determine the appropriate statistical analysis technique. The results of the Shapiro–Wilk normality test are presented in Table 3.

Table 3. Results of the Shapiro–Wilk normality test

Variable	Statistics	df	Sig.	Description
PAQ mean	0.991	159	0.420	Normal
QoL mean	0.976	159	0.007	Abnormal

Based on Table 3, the physical activity data were normally distributed ($p > 0.05$), whereas the quality-of-life data were not ($p < 0.05$). Therefore, the relationship between physical activity and quality of life was analyzed using a non-parametric correlation test, namely Spearman's rho.

The results of the Spearman correlation analysis between physical activity and quality of life among elementary school students are presented in Table 4.

Table 4. Results of the Spearman correlation test between physical activity and quality of life

Variable	PAQ mean	QoL_mean
PAQ mean	1.000	0.254**
QoL mean	0.254**	1.000

Significance (2-tailed) = 0.001; N = 159; Correlation is significant at the 0.01 level.

Based on Table 4, the analysis indicates a positive and significant relationship between physical activity and quality of life among elementary school students, with a Spearman correlation coefficient of $r = 0.254$ and a p-value of 0.001. These findings suggest that higher levels of physical activity are associated with better perceived quality of life among students.

According to Cohen (2013) criteria for correlation strength, the obtained correlation coefficient falls within the weak (small effect size) category, although it approaches the moderate level. Despite the relatively weak relationship, the statistically significant results indicate that physical activity still makes a meaningful contribution to the quality of life of elementary school students.

To examine whether the relationship between physical activity and quality of life was influenced by potential confounding variables, a partial correlation analysis was conducted. Grade level and Gender were included as control variables because they are commonly associated with differences in physical activity patterns and perceived quality of life among elementary school students. This analysis aimed to determine whether the association between physical activity and quality of life remains significant after statistically controlling for these variables in Table 5.

Table 5. Partial correlation between physical activity and quality of life controlling for grade and gender

Control Variables	Variables	r	p	N
Grade level & Gender	PAQ/QoL mean	0.254	0.001	159

The results of the partial correlation analysis indicated that physical activity remained positively and significantly associated with quality of life after controlling for grade level and gender ($r = 0.254$, $p = 0.001$). The magnitude of the correlation coefficient was identical to the zero-order (Spearman) correlation, indicating that controlling for grade level and gender did not substantially alter the strength of the relationship. This suggests that the association between physical activity and quality of life is relatively independent of these demographic variables. Although the correlation was classified as small, it remains statistically significant.

Table 6. Multiple Regression Analysis of Physical Activity Predicting Quality of Life Dimensions (Controlling for Grade and Gender)

Dependent Variable	B (PAQ)	SE	β	t	p	95% CI
School Function	0.220	0.053	.313	4.148	.000	[0.115, 0.325]
Family Function	0.060	0.057	.084	1.045	.297	[-0.053, 0.172]
Environmental Life	0.053	0.072	.059	0.739	.461	[-0.089, 0.196]
Vitality for Life	0.139	0.072	.154	1.939	.054	[-0.003, 0.280]
Learning Ability	0.056	0.063	.070	0.890	.375	[-0.068, 0.180]
Peer Relationships	0.129	0.059	.172	2.168	.032	[0.011, 0.247]

Note: Grade and gender were included as control variables in all models.

Regression Analysis of Physical Activity and Quality-of-Life Dimensions. To further examine the relationship between physical activity and quality of life, multiple regression analyses were conducted for each quality-of-life dimension, controlling for grade level and gender. This approach was used to determine whether physical activity remained a significant predictor after accounting for basic demographic variables.

School Function

The regression model indicated that physical activity was a significant positive predictor of School Function (B = 0.220, β = .313, t = 4.148, p < .001, 95% CI [0.115, 0.325]). After controlling for grade and gender, higher levels of physical activity were associated with better perceived school functioning. The standardised coefficient (β = .313) suggests a small-to-moderate effect size, indicating that physical activity contributes meaningfully to students' perceptions of their academic engagement and school-related well-being. Grade (p = .117) and gender (p = .170) were not significant predictors in this model.

Family Function

For the Family Function dimension, physical activity was not a significant predictor (B = 0.060, β = .084, t = 1.045, p = .297). The confidence interval included zero, indicating no statistically reliable association between physical activity and family-related quality of life. Grade and gender were also non-significant predictors.

Environmental Life

Similarly, physical activity did not significantly predict Environmental Life (B = 0.053, β = .059, t = 0.739, p = .461). Neither grade nor gender significantly contributed to the model. These findings suggest that students' physical activity levels were not strongly associated with their perceptions of environmental or contextual life quality.

Vitality for Life

Physical activity showed a positive but marginally non-significant association with Vitality for Life (B = 0.139, β = .154, t = 1.939, p = .054). Although the result approached statistical significance, the confidence interval slightly crossed zero, indicating that the association should be interpreted cautiously. Grade and gender were not significant predictors in this model.

Learning Ability

In the Learning Ability dimension, physical activity was not a significant predictor (B = 0.056, β = .070, t = 0.890, p = .375). However, gender emerged as a significant predictor (B = 2.195, β = .203, p = .011), suggesting differences in perceived learning ability between boys and girls. Grade was not significant.

Peer Relationships

Physical activity was positively and significantly associated with Peer Relationships (B = 0.129, β = .172, t = 2.168, p = .032, 95% CI [0.011, 0.247]). After controlling for grade and gender, students with higher levels of physical activity reported better peer relationships. The standardised coefficient (β = .172) indicates a small but meaningful effect size. Grade (p = .982) and gender (p = .310) were not significant predictors in this model.

Overall, the regression analyses demonstrated that physical activity was significantly associated with two key dimensions of quality of life: School Function and Peer Relationships. A marginal association was observed for Vitality for Life, while no significant relationships were found for Family Function, Environmental Life, or Learning Ability. These findings suggest that physical activity may be particularly relevant to school- and peer-related aspects of elementary school students' quality of life, rather than to family- or environmental-related domains.

Discussion

This study examined the relationship between physical activity and quality of life among elementary school students using both bivariate correlation and multiple regression analyses. The results revealed a positive and statistically significant association between physical activity and overall quality of life (r = 0.254; p < 0.01). Although the strength of the correlation can be categorised as small according to Cohen (2013), the association remains meaningful in the context of child health and educational research, where behavioural variables often yield modest but practically relevant effects.

Importantly, when controlling for grade level and gender, physical activity remained a significant predictor of specific quality-of-life dimensions, particularly School Function and Peer Relationships. This indicates that the association between physical activity and these domains is not merely explained by demographic differences but reflects a consistent pattern linking active behaviour with school-related engagement and social well-being. Similar findings have been reported in recent systematic reviews showing that physical activity is positively associated with children's health-related quality of life independent of age and sex (Lubans et al., 2016; Marker et al., 2018; Rodriguez-Ayllon et al., 2019).

The strongest association in the present study was observed in the School Function dimension (β = .313, p < .001). This suggests that physically active students tend to perceive better functioning in academic and school-related contexts. This finding aligns with growing evidence indicating that physical activity is linked to improved cognitive functioning, attention, and classroom behaviour (Alvarez-Bueno et al., 2017; Donnelly et al., 2016). Mechanistically, regular physical activity has been shown to enhance executive function, self-regulation, and neurocognitive development, which may contribute to improved academic engagement and school satisfaction (Hillman et al., 2008; Singh et al., 2019).

A significant association was also found between physical activity and Peer Relationships (β = .172, p = .032). This result supports previous research suggesting that participation in physical activity and sports fosters social integration, peer acceptance, and interpersonal skills among children (Eime et al., 2013; Poitras et al., 2016). Physical activity contexts, particularly in school settings, provide structured opportunities for cooperation, teamwork, and social interaction, which may strengthen peer bonds and social connectedness. Recent research has further emphasised that physically active children often report better social functioning and lower levels of loneliness (O'Brien et al., 2024).

Interestingly, physical activity did not significantly predict the Family Function, Environmental Life, or Learning Ability dimensions after controlling for grade and gender. This pattern suggests that the influence of physical activity may be domain-specific rather than global. Quality of life is widely recognised as a multidimensional construct influenced by complex interactions among physical, psychological, social, and environmental factors (Ravens-Sieberer et al., 2006; Wallander et al., 2001). Family dynamics, environmental conditions, and perceived learning competence may depend more strongly on contextual, socioeconomic, and structural factors beyond individual physical activity behaviour (Gaspar et al., 2012). Thus, while physical activity contributes to certain aspects of well-being, it does not function as a universal determinant across all life domains.

The marginal association observed in the Vitality for Life dimension (p = .054) suggests a potential trend that may become more evident in larger or longitudinal samples. Previous longitudinal research has shown that sustained physical activity is associated with improvements in vitality, energy levels, and mental health indicators over time (Biddle et al., 2019; Rodriguez-Ayllon et al., 2019). The cross-sectional nature of the present study may limit the detection of stronger associations in this domain.

The overall moderate level of physical activity observed in this sample, alongside a fairly good quality of life rating, suggests that even non-optimal activity levels may still contribute positively to children's perceived well-being. This finding is particularly relevant given global concerns regarding insufficient physical activity among children (Guthold et al., 2020; WHO, 2020). In this context, even small improvements in population-level physical activity may translate into meaningful benefits for the school-related and social dimensions of well-being.

The relatively small effect sizes identified in this study should not be interpreted as trivial. In public health and educational research, small but consistent associations can have substantial implications when applied across large populations (Strong et al., 2005). Moreover, children's quality of life is shaped by multiple interacting systems, including family, school, and community contexts, consistent with ecological models of child development (Bronfenbrenner & Morris, 2007). Therefore, it is expected that physical activity represents one of several contributing factors rather than a dominant determinant. From an educational perspective, these findings reinforce the strategic role of Physical Education, Sport, and Health (PESH) programs in promoting students' holistic development. High-quality physical education that is inclusive, engaging, and competence-oriented may support not only physical fitness but also psychosocial development and school engagement (Bailey et al., 2009; Kirk, 2009). Given the observed association with school functioning and peer relationships, strengthening the quality and frequency of physical education may represent a feasible school-based strategy to enhance specific dimensions of students' quality of life.

Several limitations should be acknowledged. First, due to the cross-sectional design, causal inferences cannot be drawn. The findings indicate association rather than directionality. Second, physical activity and quality of life were assessed through self-report instruments, which may introduce reporting bias. Third, although the sample size was adequate for correlational and regression analyses, the number of participants was relatively limited and drawn from a specific school context. Therefore, the generalizability of the findings to broader populations of elementary school students may be constrained. Future studies should involve larger, more diverse samples across regions and school types to enhance external validity. Future research should also employ longitudinal or experimental

designs and incorporate objective physical activity measurements, such as accelerometers, to better clarify temporal and causal relationships.

Overall, the findings suggest that physical activity is positively associated with specific domains of elementary school students' quality of life, particularly school functioning and peer relationships. These results contribute to the growing body of evidence supporting the role of active lifestyles in promoting children's multidimensional well-being and highlight the importance of strengthening physical education and school-based physical activity initiatives.

Conclusion

Based on this study's results, a positive, statistically significant association was found between physical activity and quality of life among elementary school students. Students who reported higher levels of physical activity also tended to report better perceptions of their quality of life. Importantly, this association remained significant after controlling for grade level and gender, suggesting that the relationship is not solely attributable to basic demographic differences. However, given the study's cross-sectional design, the findings reflect a statistical association rather than a causal direction. It is therefore not possible to determine whether higher physical activity is associated with better quality of life, whether better quality of life is associated with greater physical activity engagement, or whether both are influenced by other contextual factors. Although the magnitude of the association was small to moderate, it remains meaningful within the context of behavioural and educational research, where multiple interrelated factors typically contribute to children's well-being. Overall, the level of physical activity among students in this study was categorised as moderate, while their quality of life was considered fairly good. These findings highlight the importance of continued efforts to promote supportive school environments that encourage active lifestyles, while recognising that physical activity is one of several interrelated dimensions of children's multidimensional well-being.

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References

Alvarez-Bueno, C., Pesce, C., Cavero-Redondo, I., Sanchez-Lopez, M., Martínez-Hortelano, J. A., & Martinez-Vizcaino, V. (2017). The effect of physical activity interventions on children's cognition and metacognition: A systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, *56*(9), 729-738. https://doi.org/10.1016/j.jaac.2017.06.012

Andriyani, F. D., Indra, E. N., Priambadha, A. A., & Monnaatsie, M. (2024). Validity and reliability of the Indonesian version of Physical Activity Questionnaire for adolescents (PAQ-A) and older children (PAQ-C). *Jurnal Pendidikan Jasmani Indonesia*, *20*(1), 18-31. https://doi.org/10.21831/jpji.v20i1.73750

Azwar, S. (2022). *Penyusunan skala psikologi edisi 2*. Pustaka pelajar.

Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of school health*, *76*(8), 397-401. https://doi.org/10.1111/j.1746-1561.2006.00132.x

Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., Sandford, R., & Education, B. P. (2009). The educational benefits claimed for physical education and school sport: an academic review. *Research papers in education*, *24*(1), 1-27. https://doi.org/10.1080/02671520701809817

Biddle, S. J., & Asare, M. (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British journal of sports medicine*, *45*(11), 886-895. https://doi.org/10.1136/bjsports-2011-090185

Biddle, S. J., Ciaccioni, S., Thomas, G., & Vergeer, I. (2019). Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychology of sport and exercise*, *42*, 146-155. https://doi.org/10.1016/j.psychsport.2018.08.011

Bronfenbrenner, U., & Morris, P. A. (2007). The bioecological model of human development. *Handbook of child psychology*, *1*. https://doi.org/10.1002/9780470147658.chpsy0114

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2 ed.). Routledge. https://doi.org/10.4324/9780203771587

Darren George, P. M. (2011). *SPSS for Windows Step by Step: A Simple Guide and Reference 18.0 Update* (11 ed.). Allyn & Bacon/Pearson.

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., Lambourne, K., & Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review. *Medicine and science in sports and exercise*, *48*(6), 1197. https://doi.org/10.1249/MSS.0000000000000901

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International journal of behavioral nutrition and physical activity*, *10*(1), 98. https://doi.org/10.1186/1479-5868-10-98

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), 1-4. https://doi.org/10.11648/j.ajtas.20160501.11

Fayed, N., De Camargo, O. K., Kerr, E., Rosenbaum, P., Dubey, A., Bostan, C., Faulhaber, M., Raina, P., & Cieza, A. (2012). Generic patient-reported outcomes in child health research: a review of conceptual content using World Health Organization definitions. *Developmental Medicine & Child Neurology*, *54*(12), 1085-1095. https://doi.org/10.1111/j.1469-8749.2012.04393.x

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5 ed.). SAGE Publications.

Gaspar, T., Ribeiro, J. P., de Matos, M. G., Leal, I., & Ferreira, A. (2012). Health-related quality of life in children and adolescents: subjective well being. *The Spanish journal of psychology*, *15*(1), 177-186. https://doi.org/10.5209/rev_SJOP.2012.v15.n1.37306

Gibbons, J., & Chakraborti, S. (2010). *Nonparametric Statistical Inference* (5 ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781439896129

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1· 6 million participants. *The lancet child & adolescent health*, *4*(1), 23-35. https://doi.org/10.1016/S2352-4642(19)30323-2

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis* (8 ed.). Cengage learning Hampshire.

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: exercise effects on brain and cognition. *Nature reviews neuroscience*, *9*(1), 58-65. https://doi.org/10.1038/nrn2298

Huang, C.-H., Wang, T.-F., Tang, F.-I., Chen, I.-J., & Yu, S. (2017). Development and validation of a Quality of Life Scale for elementary school students. *International journal of clinical and health psychology*, *17*(2), 180-191. https://doi.org/10.1016/j.ijchp.2017.01.001

Israel, M., & Hay, I. (2006). *Research Ethics for Social Scientists*. SAGE Publications, Ltd. https://doi.org/10.4135/9781849209779

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International journal of behavioral nutrition and physical activity*, *7*(1), 40. https://doi.org/10.1186/1479-5868-7-40

Kirk, D. (2009). *Physical education futures*. Routledge. https://doi.org/10.4324/9780203874622

Kowalski, K. C., Crocker, P., & Donen, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *College of kinesiology, university of saskatchewan*, *87*(1), 1-38.

Lubans, D., Richards, J., Hillman, C., Faulkner, G., Beauchamp, M., Nilsson, M., Kelly, P., Smith, J., Raine, L., & Biddle, S. (2016). Physical activity for cognitive and mental health in youth: a systematic review of mechanisms. *Pediatrics*, *138*(3), e20161642. https://doi.org/10.1542/peds.2016-1642

Marker, A. M., Steele, R. G., & Noser, A. E. (2018). Physical activity and health-related quality of life in children and adolescents: A systematic review and meta-analysis. *Health Psychology*, *37*(10), 893-903. https://doi.org/10.1037/hea0000653

Morales, P. F., Sánchez-López, M., Moya-Martínez, P., García-Prieto, J. C., Martínez-Andrés, M., García, N. L., & Martínez-Vizcaíno, V. (2013). Health-related quality of life, obesity, and fitness in schoolchildren: the Cuenca study. *Quality of Life Research*, *22*(7), 1515-1523. https://doi.org/10.1007/s11136-012-0282-8

O'Brien, W., Belton, S., Fitzpatrick, B., Shannon, S., Brennan, D., Chambers, F., O'Donovan, K., & Breslin, G. (2024). Relationship between gender, physical activity, screen time, body mass index and wellbeing in Irish children from social-disadvantage. *Child Care in Practice*, *30*(3), 220-234.

https://doi.org/10.1080/13575279.2021.1887815

Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J.-P., Janssen, I., Katzmarzyk, P. T., Pate, R. R., Connor Gorber, S., & Kho, M. E. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism*, *41*(6), S197-S239. https://doi.org/10.1139/apnm-2015-0663

Ravens-Sieberer, U., Erhart, M., Wille, N., Wetzel, R., Nickel, J., & Bullinger, M. (2006). Generic health-related quality-of-life assessment in children and adolescents: methodological considerations. *Pharmacoeconomics*, *24*(12), 1199-1220. https://doi.org/10.2165/00019053-200624120-00005

Rodriguez-Ayllon, M., Cadenas-Sánchez, C., Estévez-López, F., Muñoz, N. E., Mora-Gonzalez, J., Migueles, J. H., Molina-García, P., Henriksson, H., Mena-Molina, A., & Martínez-Vizcaíno, V. (2019). Role of physical activity and sedentary behavior in the mental health of preschoolers, children and adolescents: a systematic review and meta-analysis. *Sports Medicine*, *49*(9), 1383-1410. https://doi.org/10.1007/s40279-019-01099-5

Singh, A. S., Saliasi, E., Van Den Berg, V., Uijtdewilligen, L., De Groot, R. H., Jolles, J., Andersen, L. B., Bailey, R., Chang, Y.-K., & Diamond, A. (2019). Effects of physical activity interventions on cognitive and academic performance in children and adolescents: a novel combination of a systematic review and recommendations from an expert panel. *British journal of sports medicine*, *53*(10), 640-647. https://doi.org/10.1136/bjsports-2017-098136

Strong, W. B., Malina, R. M., Blimkie, C. J., Daniels, S. R., Dishman, R. K., Gutin, B., Hergenroeder, A. C., Must, A., Nixon, P. A., & Pivarnik, J. M. (2005). Evidence based physical activity for school-age youth. *The Journal of pediatrics*, *146*(6), 732-737. https://doi.org/10.1016/j.jpeds.2005.01.055

Trudeau, F., & Shephard, R. J. (2008). Physical education, school physical activity, school sports and academic performance. *International journal of behavioral nutrition and physical activity*, *5*(1), 10. https://doi.org/10.1186/1479-5868-5-10

Upton, P., Lawford, J., & Eiser, C. (2008). Parent–child agreement across child health-related quality of life instruments: a review of the literature. *Quality of Life Research*, *17*(6), 895-913. https://doi.org/10.1007/s11136-008-9350-5

Varni, J. W., Burwinkle, T. M., Limbers, C. A., & Szer, I. S. (2007). The PedsQL™ as a patient-reported outcome in children and adolescents with fibromyalgia: an analysis of OMERACT domains. *Health and quality of life outcomes*, *5*(1), 9. https://doi.org/10.1186/1477-7525-5-9

Wallander, J. L., Schmitt, M., & Koot, H. M. (2001). Quality of life measurement in children and adolescents: issues, instruments, and applications. *Journal of clinical psychology*, *57*(4), 571-585. https://doi.org/10.1002/jclp.1029

WHO. (2020). *WHO Guidelines on Physical Activity and Sedentary Behaviour. Geneva: World Health Organization.*