JPES 15 (2) (2026)

Journal of Physical Education and Sports

http://journal.unnes.ac.id/sju/index.php/jpes

An Analysis of Physical Activity, Self-Confidence, and Gross Motor Skills of Students in Highlands and Lowlands of Central Java

Wahyuningtyas Widagti[1]✉, Hadi[2]

[1] Universitas Negeri Semarang, Indonesia; widagtiwahyuningtyas@students.unnes.ac.id
[2] Universitas Negeri Semarang, Indonesia; hadi_pabbsi@mail.unnes.ac.id

Article Info

History Articles
Received:
December 2025
Accepted:
January 2026
Published:
June 2026

Keywords:
Elementary school students, Geographical location, Gross motor skills, Physical activity, Self-confidence.

Abstract

This study analyze the relationships between physical activity and self-confidence with gross motor skills among elementary school students living in highland and lowland areas of Central Java, Indonesia. A descriptive quantitative design with a cross-sectional approach was employed. The participants were 80 students in Grades 4–6 (40 from highland schools and 40 from lowland schools). Physical activity was measured using the Physical Activity Questionnaire for Children (PAQ-C), self-confidence using a scale adapted from Lauster, and gross motor skills using the Test of Gross Motor Development-2 (TGMD-2). Data met the assumptions of normality, linearity, and homoscedasticity. Pearson correlation and multiple linear regression analyses were conducted separately for highland and lowland groups. The results showed that physical activity correlated positively and significantly with gross motor skills in both highland ($r = 0.488$, $p = 0.001$) and lowland ($r = 0.518$, $p = 0.001$) groups. Self-confidence also demonstrated a positive and significant correlation with gross motor skills in both regions ($r = 0.410$ and $r = 0.408$, $p = 0.009$). Regression analyses indicated that physical activity and self-confidence together explained 32.9% of the variance in gross motor skills in the highland group and 36.3% in the lowland group, with physical activity emerging as the stronger predictor. These findings suggest that both behavioural and psychological factors jointly support children's gross motor development, and that physical education programs should simultaneously promote active lifestyles and self-confidence, tailored to the specific characteristics of highland and lowland environments.

✉ Address correspondence:
Universitas Negeri Semarang, Kampus Sekaran, Gunungpati, Semarang
E-mail: (widagtiwahyuningtyas@students.unnes.ac.id)

p-ISSN 2252-648X
e-ISSN 2502-4477

INTRODUCTION

The rapid development of digital technology has brought profound changes to everyday life, including for children in elementary school. Digital devices such as smartphones, tablets, and computers have become an integral part of their daily routines, both for entertainment and learning purposes. This shift has significantly altered children's behaviour patterns, particularly in how they allocate time for movement. Data from Syilvani et al. (2024) show that 76.2% of Indonesian students aged 13–17 years are physically inactive, while more than 55% of elementary school children record screen time of more than two hours per day. These figures indicate a serious trend toward sedentary lifestyles that is increasingly worrying among children.

Sedentary habits reduce children's opportunities to engage in physical activities that are essential for healthy growth and development. Children who spend more time with gadgets tend to lose chances to play outdoors, run, jump, or participate in other activities that require whole-body movement. Over time, this condition increases the risk of obesity, reduced muscular strength, and delays in gross motor development (Subagyo & Fithroni, 2022; Wansyaputri et al., 2021). If left unaddressed, these problems may lead to long-term health issues and a decline in quality of life as this generation reaches adulthood.

Physical activity plays a vital role in supporting the development of elementary school-aged children. It not only helps maintain physical fitness, but also supports cognitive, social, and emotional development. Every movement carried out by a child trains coordination, balance, and body control, all of which are important for daily functioning. Gross motor skills, which involve large muscles in activities such as running, jumping, throwing, and maintaining balance, are a fundamental aspect that must be developed during the elementary school years (Gultom et al., 2024). Children with well-developed gross motor skills tend to be more confident in physical education classes, more active in group play, and more capable of establishing social interactions with peers. Adatul'aisy et al. (2023) emphasize that gross motor development is closely related to cognitive, social, and emotional domains and thus forms the foundation of balanced, holistic child development.

Psychological factors, especially self-confidence, also play a crucial role in gross motor development. In this study, self-confidence is conceptualized as an individual's belief in their own abilities, characterized by optimism, independence, responsibility, and rational thinking, as outlined in Lauster's theoretical framework (Lauster, 2002). This construct differs from Bandura (1977) concept of self-efficacy, which refers to task-specific confidence in performing particular behaviors; self-confidence, as operationalized here, represents a broader, more general sense of self-assurance that influences engagement across various domains, including physical activity. Children with high self-confidence are generally more willing to try new movements, more active during physical education lessons, and more open to social interaction. Conversely, children with low self-confidence often feel afraid of failure, reluctant to participate, or even avoid physical activities altogether. This, in turn, limits their opportunities to practice and refine gross motor skills (Asia et al., 2025). Previous studies have shown that regular participation in physical activity can improve

children's self-confidence, which then supports better motor development (Fahdan & Pratama, 2024; Mahyudi et al., 2025; Yulianto et al., 2025).

Schools, through physical education (PE), hold a strategic position in facilitating both motor and psychological development. National curricula generally state that physical activity should serve as a vehicle for developing students' potential in physical, mental, social, and moral domains. Therefore, physical education should not focus solely on physical performance, but also on building courage, cooperation, and self-confidence. To achieve this, PE teachers are expected to design learning experiences that are varied, enjoyable, and contextual, so that children gain meaningful movement experiences that support both motor and psychological growth (Hoiriya et al., 2020). However, the effectiveness of such programmes is strongly influenced by the broader environment in which children live and go to school.

Geographical environment is one external factor that can shape children's physical activity patterns. Children living in highland areas are exposed to cool air, hilly terrain, and higher elevations which require different physiological and motor adaptations compared to children living in lowland areas. In contrast, children in lowlands often have wider access to sports facilities and open fields. Aliriad et al. (2024) and Balqis & Rosfalia (2024) point out that environmental differences linked to altitude and topography contribute to variations in gross motor development. Bafirman et al. (2023) report that children living in highlands tend to have better endurance and lung capacity due to adaptation to lower oxygen levels, while Gusril et al. (2025) find that lowland children often have advantages in coordination and movement speed because flatter terrain allows more varied free movement. Wallenberg et al. (2023) further show that differences in temperature and air pressure between regions influence movement efficiency and children's play patterns.

Central Java Province offers a particularly interesting context due to its diverse geography. It includes mountainous areas above 1,000 metres above sea level, such as Banjarnegara and Wonosobo, as well as lowland regions like Semarang and Demak. This diversity makes Central Java a suitable setting for examining differences in physical activity patterns and gross motor skills among children based on their geographical environment. Such research can provide a more comprehensive picture of how geographical factors influence motor development in Indonesian children.

Field observations further highlight these differences. At SDN Krobokan Semarang and SDN Tambakreja 04 Cilacap, a school located in a lowland area, students showed strong coordination and enthusiasm in physical activities, likely influenced by greater exposure to active games in a busy, stimulating environment. Their self-confidence tended to manifest as a willingness to try new things, although some students struggled to remain consistent when faced with difficulties. In contrast, observations at SD Ma'arif Tieng and SDN Getasan, located in a highland area, indicated that students had relatively better stamina, presumably due to regular adaptation to thinner air. However, their self-confidence was more often expressed in a positive but somewhat shy attitude, with less overt participation. These preliminary findings suggest that highland and lowland environments may shape distinct patterns of physical activity, self-confidence, and gross motor skills.

A number of studies underline the importance of examining the interplay between physical activity, self-confidence, and gross motor skills. Zannah & Malik (2024) found that physically active children demonstrate better gross motor skills than those who are less active. Satriawan et al. (2024) reported a positive correlation between physical activity and gross motor improvement in elementary school children. Meanwhile, Fahdan & Pratama (2024) showed that children's self-confidence can be enhanced through regular engagement in physical activity. However, most of these studies do not explicitly consider geographical context, and few have examined how physical activity and self-confidence together relate to gross motor skills in both highland and lowland school populations.

Based on the trends of increasing sedentariness, the critical role of gross motor skills and self-confidence in children's development, and the potential influence of geographical environment, there is a clear need for research that integrates these dimensions. Specifically, it is important to investigate how physical activity and self-confidence are associated with gross motor skills among elementary school students living in highland and lowland areas of Central Java. Such research is expected to contribute scientifically to the field of physical education by providing evidence-based insights that are sensitive to local geographical conditions, and to offer practical guidance for schools in designing PE programmes that effectively enhance both gross motor competence and self-confidence in accordance with the environmental characteristics in which children grow and learn.

Based on the theoretical and empirical background presented above, this study proposes three hypotheses. First, it is hypothesized that there is a significant positive relationship between physical activity and gross motor skills among elementary school students in both highland and lowland areas of central java. Second, it is hypothesized that there is a significant positive relationship between self-confidence and gross motor skills among elementary school students in both highland and lowland areas of central java. Third, it is hypothesized that physical activity and self-confidence together have a significant combined relationship with gross motor skills among elementary school students in both highland and lowland areas of central java.

METHODS

This study used a descriptive quantitative design with a cross-sectional approach to examine the relationships between physical activity, self-confidence, and gross motor skills among elementary school students living in highland and lowland areas of Central Java, Indonesia. All variables were measured once at a single time point.

Participants were 80 elementary school students, consisting of 40 students from schools located in highland areas and 40 from schools in lowland areas. This sample size was determined based on both statistical and practical considerations. Statistically, this number exceeds the minimum requirement of 66 participants recommended for multiple regression analysis with two predictors (Tabachnick & Fidell, 2013). Practically, the equal distribution of 40 students per geographical region ensures balanced representation for between-group comparisons, while

remaining feasible given the logistical challenges of accessing schools in highland areas and the time required for administering motor skill assessments to each participant individually. They were enrolled in the upper grades (approximately 10–12 years old). Sampling used a non-probability accidental sampling technique, selecting students who were present, met the inclusion criteria, and had parental consent. Physical activity and self-confidence were treated as independent variables, while gross motor skill was the dependent variable.

Physical activity was measured using the Physical Activity Questionnaire for Children (PAQ-C), which assesses the type and frequency of activities performed during the previous seven days. The instrument yields a 5-point activity index, with higher scores indicating higher levels of physical activity. Self-confidence was assessed using a questionnaire adapted from Lauster's self-confidence scale for children, employing a 4-point Likert format (from strongly agree to strongly disagree) and covering indicators such as belief in one's abilities, optimism, responsibility, and rational thinking. Gross motor skills were evaluated with the Test of Gross Motor Development-2 (TGMD-2), which assesses 12 locomotor and object-control skills through standardized performance criteria. Each skill was performed twice and scored based on observable components.

Data collection was conducted at the schools. After obtaining institutional permission and parental consent, students first completed a brief warm-up and then performed the TGMD-2 tasks on the school field under the supervision of the researcher and the physical education teacher. Subsequently, students moved to the classroom to complete the PAQ-C and the self-confidence questionnaire, assisted by the researcher to clarify item meaning when needed without influencing answers.

Prior to the main study, the PAQ-C and self-confidence scales were piloted on a small group of similar students. Item validity was examined using Pearson correlations between item scores and total scores, and items with significant coefficients were retained. Internal consistency reliability was estimated with Cronbach's alpha, with values ≥ 0.70 considered acceptable. TGMD-2 was used according to its standardized protocol, relying on its established validity and reliability.

Data were analyzed using descriptive and inferential statistics. Descriptive statistics (minimum, maximum, mean, and standard deviation) were calculated for each variable. Assumption testing included Shapiro–Wilk tests for normality and ANOVA tests for linearity between independent and dependent variables. Pearson Product Moment correlations were then used to examine the relationships between physical activity and gross motor skills, and between self-confidence and gross motor skills. Multiple linear regression analysis was applied to determine the combined contribution of physical activity and self-confidence to gross motor skills. All tests used a significance level of $p < 0.05$.

The study adhered to ethical principles for research involving children. Participation was voluntary, based on informed consent from parents or guardians and assent from students. Confidentiality was maintained by using codes instead of names. All motor tests were conducted safely and adapted to the children's abilities, with adequate supervision and rest to minimize physical or psychological risk.

RESULTS AND DISCUSSION

Descriptive Analysis and Assumption Testing

Descriptive statistics for physical activity, self-confidence, and gross motor skills in the highland (Group A) and lowland (Group B) students are presented in Table 1.

Table 1. Descriptive statistics

Variable	N	Mean	SD	Min
Physical Activity (A)	40	91.70	14.10	60
Self-Confidence (A)	40	94.78	10.11	72
Gross Motor Skills (A)	40	73.98	11.17	55
Physical Activity (B)	40	82.83	14.01	55
Self-Confidence (B)	40	100.73	9.70	76
Gross Motor Skills (B)	40	75.58	11.65	54

Highland students showed a higher mean level of physical activity than lowland students, whereas lowland students reported higher self-confidence. Mean gross motor skill scores were similar between groups, indicating that geographic context appears more clearly in behavioural (activity) and psychological (self-confidence) patterns than in the final motor outcome.

Normality was tested using the Shapiro–Wilk test. All p-values were greater than 0.05 (Table 2), indicating that the distributions of all variables in both groups do not deviate significantly from normality.

Table 2. Shapiro–Wilk normality test

Variable – Group	Sig. Shapiro–Wilk
Physical Activity A	0.419
Self-Confidence A	0.827
Gross Motor Skills A	0.157
Physical Activity B	0.721
Self-Confidence B	0.199
Gross Motor Skills B	0.134

Linearity between the independent variables (physical activity, self-confidence) and the dependent variable (gross motor skills) was examined using ANOVA Test for Linearity. All "Deviation from Linearity" p-values were greater than 0.05 (Table 3), so the relationships can be treated as linear.

Table 3. Linearity test results

Pair of Variables	Sig. (p)
Physical Activity A – Gross Motor A	0.592
Self-Confidence A – Gross Motor A	0.051
Physical Activity B – Gross Motor B	0.960
Self-Confidence B – Gross Motor B	0.071

Homoscedasticity was tested using the Glejser method. All significance values were above 0.05 (Table 4), indicating no heteroscedasticity; the variance of residuals can be considered constant across predictor values.

Table 4. Heteroscedasticity test

Predictor	B	Sig.
Physical Activity (A)	-0.116	0.071
Self-Confidence (A)	0.022	0.805
Physical Activity (B)	-0.108	0.092
Self-Confidence (B)	-0.082	0.367

Overall, the assumption tests (normality, linearity, and homoscedasticity) support the use of Pearson correlation and linear regression for hypothesis testing.

Hypothesis 1: Relationship Between Physical Activity and Gross Motor Skills

Hypothesis 1 states that there is a relationship between physical activity and gross motor skills in elementary school students in highland and lowland areas of Central Java.

The Pearson correlation coefficients between physical activity and gross motor skills are shown in Table 5.

Table 5. Pearson correlations between predictors and gross motor skills

Group	Variable Pair	r Pearson	Sig.
Highland (A)	Physical Activity – Gross Motor Skills	0.488	0.001
Lowland (B)	Physical Activity – Gross Motor Skills	0.518	0.001

In the highland group, physical activity shows a moderate, positive, and significant correlation with gross motor skills ($r = 0.488$; $p = 0.001$). In the lowland group, the correlation is slightly stronger but still moderate ($r = 0.518$; $p = 0.001$). These results indicate that, in both geographical contexts, students with higher levels of physical activity tend to have better gross motor skill performance.

The multiple regression analysis (see coefficients in Table 6 below) also confirms that physical activity has a significant positive effect on gross motor skills in both groups, with standardized beta coefficients of 0.414 ($p = 0.005$) in the highlands and 0.453 ($p = 0.002$) in the lowlands.

These findings are consistent with previous research showing that more physically active children generally exhibit better locomotor and object-control skills, especially when physical activity involves varied, structured movement experiences (Faßbender et al., 2022; Nobre et al., 2020; Wang & Zhou, 2024; Wu Yang, 2025) Therefore, Hypothesis 1 is supported.

Hypothesis 2: Relationship Between Self-Confidence and Gross Motor Skills

Hypothesis 2 states that there is a relationship between self-confidence and gross motor skills in elementary school students in highland and lowland areas.

As shown in Table 5, self-confidence also correlates positively and significantly with gross motor skills in both regions. In the highland group, the correlation is $r = 0.410$ ($p = 0.009$), and in the lowland group $r = 0.408$ ($p = 0.009$). Both correlations fall in the low-to-moderate range, indicating that higher self-confidence is associated with better gross motor performance, but with a weaker strength than physical activity.

The regression coefficients (Table 6) show that self-confidence is a significant predictor of gross motor skills in both groups: $\beta = 0.310$ ($p = 0.032$) in the highlands and $\beta = 0.315$ ($p = 0.024$) in the lowlands. Thus, even after controlling for physical activity, self-confidence contributes uniquely to explaining variation in gross motor skills.

Table 6. Regression coefficients for physical activity and self-confidence

Predictor	B	Beta	t	Sig.
Physical Activity (A)	0.328	0.414	2.984	0.005
Self-Confidence (A)	0.343	0.310	2.235	0.032
Physical Activity (B)	0.377	0.453	3.380	0.002
Self-Confidence (B)	0.378	0.315	2.348	0.024

These results suggest that students with higher self-confidence are more willing to try new movements, participate actively in physical activities, and persist when facing difficulty, which supports motor learning over time. The similarity of the coefficients across highland and lowland groups indicates that the role of self-confidence as a psychological facilitator of motor performance is relatively stable across different environmental contexts. This is in line with findings that self-efficacy and self-esteem are positively associated with children's motor and academic performance

(Yang, 2024; Zhou et al., 2023) although environmental opportunities and family resources remain crucial (Han et al., 2024; Kwon & O'Neill, 2020). Therefore, Hypothesis 2 is supported.

Hypothesis 3: Joint Effect of Physical Activity and Self-Confidence on Gross Motor Skills

Hypothesis 3 states that physical activity and self-confidence together have a significant relationship with gross motor skills in elementary school students in highland and lowland Central Java.

The multiple linear regression model summaries are presented in Table 7.

Table 7. Multiple regression model summary for gross motor skills

Group	R^2	Adj. R^2	F	Sig.
Highland (A)	0.329	0.293	9.078	0.001
Lowland (B)	0.363	0.328	10.533	0.000

In the highland group, physical activity and self-confidence together explain 32.9% of the variance in gross motor skills ($R^2 = 0.329$; $F = 9.078$; $p = 0.001$). In the lowland group, they explain 36.3% of the variance ($R^2 = 0.363$; $F = 10.533$; $p < 0.001$). Both models are statistically significant, indicating that the combination of physical activity and self-confidence is an important predictor of gross motor skills in both geographical settings.

Combined with the coefficients in Table 6, these results show that physical activity is the stronger predictor, while self-confidence adds a significant incremental contribution. This supports evidence from international studies that interventions which simultaneously increase movement opportunities and strengthen psychological resources (such as self-confidence, motivation, and social support) produce greater improvements in gross motor competence than approaches focusing on only one aspect (Gallotta et al., 2022; Nobre et al., 2020; Ostermeier et al., 2024; Ulset et al., 2025; Zhu & Li, 2024).

Accordingly, Hypothesis 3 is supported: physical activity and self-confidence jointly show a significant and meaningful relationship with gross motor skills among elementary school students in both highland and lowland areas of Central Java.

CONCLUSION

This study examined the relationships between physical activity, self-confidence, and gross motor skills among elementary school students living in highland and lowland areas of Central Java. The findings show that, although highland students reported higher physical activity and lowland students higher self-confidence, gross motor skill levels were relatively similar in both regions. Physical activity demonstrated a moderate, positive, and significant association with gross motor skills in both contexts and emerged as the strongest predictor in the regression models, while self-confidence showed a weaker but still significant positive relationship and contributed additional explanatory power. Together, physical activity and self-confidence accounted for roughly one-third of the variance in gross motor skills in both highland and lowland samples, indicating that behavioural and psychological factors jointly underpin children's motor development regardless of geographical context. These results contribute to the scientific literature by integrating environmental, behavioural, and psychological dimensions in one model, and by showing that the functional roles of physical activity and self-confidence are robust across contrasting geographical

settings. For physical education practice, the findings imply that effective programs should not only increase children's opportunities to be physically active, but also deliberately foster self-confidence in movement contexts, with context-sensitive strategies that optimize the natural activity patterns and resources available in highland and lowland schools.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the principals, physical education teachers, and students of SDN Krobokan, SDN Tambakreja 04, SD Ma'arif Tieng and SDN Getasan for their cooperation and active participation in this study. Special thanks are also extended to the parents and guardians who kindly provided consent and support, enabling their children to take part in the data collection process.

The authors acknowledge the valuable assistance of colleagues and enumerators who helped in administering the motor skill tests and questionnaires, as well as in organizing the fieldwork in both highland and lowland areas of Central Java.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Contributors who are not mentioned as authors should be acknowledged, and their particular contribution should be described. All sources of funding for the work must be acknowledged, both the research funder and the grant number (if applicable) should be given for each source of funds.

REFERENCES

Adatul'aisy, R., Puspita, A., Abelia, N., Apriliani, R., & Noviani, D. (2023). Perkembangan Kognitif dan Motorik Anak Usia Dini melalui Pendekatan Pembelajaran. *Khirani: Jurnal Pendidikan Anak Usia Dini*, *1*(4), 82–93. https://doi.org/10.47861/khirani.v1i4.631

Aliriad, H., S, A., Saputro, D. P., Fahmi, D. A., & Waskito, S. Y. (2024). Memperkuat keterampilan motorik anak usia dini melalui pengalaman eksplorasi aktivitas di luar ruangan. *Jurnal Olahraga Pendidikan Indonesia (JOPI)*, *3*(2), 126–141. https://doi.org/10.54284/jopi.v3i2.363

Asia, Cinta, Y., & Kristiani. (2025). Dampak Pola Asuh Otoriter Orang Tua Terhadap Kepercayaan Diri Anak Didik. *JURNAL GRAFTA STT Baptis Indonesia*, *5*(Fitriani), 26–38.

Bafirman, B., Wahyuri, A. S., Vellya, V., Zarya, F., & Munir, A. (2023). Comparison of VO2Max Capacity and Lung Vital Capacity of Junior High School Students: Highlands and Lowlands. *JOSSAE (Journal of Sport Science and Education)*, *8*(1), 69–76. https://doi.org/10.26740/jossae.v8n1.p69-76

Balqis, R. R., & Rosfalia, N. A. (2024). Motor Development in Early Children in Various Cultures in Indonesia. *Proceeding of International Conference on Education and Sharia*, *1*, 54–61. https://doi.org/10.62097/ices.v124.9

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.

https://doi.org/10.1037/0033-295X.84.2.191

Fahdan, N. A., & Pratama, R. S. (2024). Strategi Meningkatkan Partisipasi Anak dalam Kegiatan Olahraga di PAUD. *Khirani: Jurnal Pendidikan Anak Usia Dini*, *3*(1), 01–15. https://doi.org/10.47861/khirani.v3i1.1463

Faßbender, D. M., Kreffter, K., Götz, S., Hagemeister, M., Lisak-Wahl, S., Nguyen, T. H., Stemper, T., & Weyers, S. (2022). Is the Level of Motor Development at School Entry Related to the Use of Municipal Exercise Programs? A Social-Differential Analysis. *International Journal of Environmental Research and Public Health*, *19*(5), 3047. https://doi.org/10.3390/ijerph19053047

Gallotta, M. C., Zimatore, G., Falcioni, L., Migliaccio, S., Lanza, M., Schena, F., Biino, V., Giuriato, M., Bellafiore, M., Palma, A., Battaglia, G., Baldari, C., & Guidetti, L. (2022). Influence of Geographical Area and Living Setting on Children's Weight Status, Motor Coordination, and Physical Activity. *Frontiers in Pediatrics*, *9*. https://doi.org/10.3389/fped.2021.794284

Gultom, A. U. A. G., Surbakti, D. S. K., Nazwa, N., Syarafina, D., & Siddik, F. (2024). Pengaruh Olahraga Terhadap Kemampuan Motorik Kasar Anak Usia Sekolah Dasar. *ALFIHRIS : Jurnal Inspirasi Pendidikan*, *2*(3), 205–214. https://doi.org/10.59246/alfihris.v2i3.897

Gusril, bin Aman, M. S., Komaini, A., Mutohir, T. C., Ihsan, N., Mokhtar, A. H., Chaeroni, A., Rahmadhani, F., & Abdullah, M. F. (2025). Children's Motor Skills Based on Geographical Location | Habilidades motrices de los niños en función de su ubicación geográfica. *Retos*, *63*(3), 936–948.

Han, T. H., Chae, K. Y., Han, B., Kim, J. H., Ha, E. K., Rhie, S., & Han, M. Y. (2024). Early onset and increasing disparities in neurodevelopmental delays from birth to age 6 in children from low socioeconomic backgrounds. *Journal of Neurodevelopmental Disorders*, *16*(1), 60. https://doi.org/10.1186/s11689-024-09577-2

Hoiriya, H., Sumiharsono, M. R., Kognitif, P., & Motorik, P. F. (2020). Pengaruh Model Pembelajaran Kontekstual the Influence of Contextual Learning Model on Cognitive and Motoric Physical Development of Children in Pgri Bhakti Lestari Kindergarten. *Journal of Education Technology and Inovation*, *3*.

Kwon, S., & O'Neill, M. (2020). Socioeconomic and Familial Factors Associated with Gross Motor Skills among US Children Aged 3–5 Years: The 2012 NHANES National Youth Fitness Survey. *International Journal of Environmental Research and Public Health*, *17*(12), 4491. https://doi.org/10.3390/ijerph17124491

Lauster, P. (2002). *Tes kepribadian (alih bahasa: DH Gulo). Edisi Bahasa Indonesia. Cetakan Ketigabelas*. Bumi Aksara.

Mahyudi, Y. V., Widyawan, D., Tya, D., & Ningrum, M. (2025). Pengaruh program

pembelajaran renang terstruktur terhadap perkembangan motorik dan kepercayaan diri siswa sekolah dasar The effect of structured swimming learning programs on elementary school students ' motor development and self-confidence Universitas N. *MULTILATERAL : Jurnal Pendidikan Jasmani Dan Olahraga*, *24*(2), 330–342.

Nobre, F. S. S., Valentini, N. C., & Rusidill, M. E. (2020). Applying the bioecological theory to the study of fundamental motor skills. *Physical Education and Sport Pedagogy*, *25*(1), 29–48. https://doi.org/10.1080/17408989.2019.1688772

Ostermeier, E., Gilliland, J., Irwin, J. D., Seabrook, J. A., & Tucker, P. (2024). Developing community-based physical activity interventions and recreational programming for children in rural and smaller urban centres: a qualitative exploration of service provider and parent experiences. *BMC Health Services Research*, *24*(1), 1017. https://doi.org/10.1186/s12913-024-11418-w

Satriawan, R., Farhan, Agung Pratama, B., Yuliawan, D., Prasetya Kurniawan, W., Studi Pendidikan Jasmani Kesehatan dan Rekreasi, P., Ilmu Kesehatan dan Sains, F., & Nusantara PGRI Kediri, U. (2024). Hubungan Aktivitas Fisik Terhadap Kebugaran Jasmani Dan Keterampilan Motorik Peserta Didik Sekolah Dasar the Relationship of Physical Activity To the Physical Fitness and Motor Skills of Students Elementary School. *Jambura Journal of Sports Coaching*, *6*(1), 45–52.

Subagyo, R. U., & Fithroni, H. (2022). Identifikasi Perilaku Kurang Gerak (Sedentary Behavior) pada Siswa Sekolah Dasar di SDN 195. *Jurnal Kesehatan Olahraga*, *10*(03), 195–202.

Syilvani, S., Sukaesih, N. S., & Ningrum, D. (2024). Durasi Screen Time dengan Gangguan Tidur Remaja. *Jurnal Keperawatan Profesional (KEPO)*, *5*(1), 70–77. https://doi.org/10.36590/kepo.v5i1.941

Ulset, V. S., Oppici, L., Hamre, K., Rudd, J. R., Stornæs, A. V., Haraldsen, H. M., & Säfvenbom, R. (2025). Inclusion in Motion: Promoting Equitable Physical Activity and Health in Childhood and Adolescence. *Children*, *12*(7), 942. https://doi.org/10.3390/children12070942

Wallenberg, N., Lindberg, F., Thorsson, S., Jungmalm, J., Fröberg, A., Raustorp, A., & Rayner, D. (2023). The effects of warm weather on children's outdoor heat stress and physical activity in a preschool yard in Gothenburg, Sweden. *International Journal of Biometeorology*, *67*(12), 1927–1940. https://doi.org/10.1007/s00484-023-02551-y

Wang, X., & Zhou, B. (2024). Motor development-focused exercise training enhances gross motor skills more effectively than ordinary physical activity in healthy preschool children: an updated meta-analysis. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1414152

Zed, M. (2014). *Metode Penelitian Kepustakaan*. Yayasan Pustaka Obor Indonesia.