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Development and Effectiveness Test of Physical Literacy-Based School Health Program Model on Healthy Living Behavior and Physical Activity of Elementary School Students

Fakih Gunawan[1]✉ , Harry Pramono[2]

[1] Universitas Negeri Semarang, Indonesia; fakih_gunawan10@students.unnes.ac.id
[2] Universitas Negeri Semarang, Indonesia; hpr4mono@mail.unnes.ac.id

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Abstract

This study aims to develop and test the effectiveness of a physical literacy-based School Health Program (UKS) model on healthy living behavior and physical activity of elementary school students. The research employed a mixed-methods approach using Research and Development (R&D) design adapted from Borg & Gall, combined with a quasi-experimental pretest-posttest control group design. The study involved 45 students (21 experimental, 24 control) from four elementary schools in Semarang City. Data were collected through observation, interviews, Focus Group Discussions, questionnaires (PHBS and PAQ-C), and analyzed using thematic analysis and inferential statistics with significance level $\alpha = 0.05$. The model integrates four domains of physical literacy (physical, affective, cognitive, behavioral) into three pillars of UKS through 12 structured learning sessions. Expert validation showed high feasibility with score of 4.23/5.0 (84.6%, very feasible). Implementation consistency reached 84.7% across schools with 94.6% student participation. The model significantly improved all aspects of healthy living behavior ($p<0.001$) with very large effect sizes (Cohen's d = 1.28-3.10), achieving 100% of experimental group students in "excellent" category versus 8.3% in control group. Physical activity significantly increased (PAQ-C gain score = 0.97, Cohen's d = 1.527, $p<0.001$), with 90.5% of students achieving active or highly active levels compared to 33.3% in control group. The physical literacy-based UKS model is highly feasible and very effective for improving healthy living behavior and physical activity of elementary school students.

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✉ Address correspondence:
Universitas Negeri Semarang, Kampus Sekaran, Gunungpati, Semarang
E-mail: (fakih_gunawan10@students.unnes.ac.id)

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INTRODUCTION

The health of elementary school-aged children constitutes a strategic issue in human resource development in Indonesia. Children aged 6-12 years are in a critical period of growth and development, making the formation of healthy living behaviors from an early age an important foundation for their quality of life in the future (Erda et al., 2025). However, various data show that the health conditions of elementary school students in Indonesia still face complex challenges, including low levels of physical activity, increasing prevalence of childhood obesity, and limited understanding of clean and healthy living behaviors among students.

Research data shows that the prevalence of obesity in children aged 5-12 years in Indonesia reached 9.2%, increasing from 8.0% (Kusol & Kaewpawong, 2025). Additionally, the proportion of insufficient physical activity in school-aged children also shows a concerning trend (Agung et al., 2022). The Global School-based Student Health Survey (GSHS) reported that only about 24.5% of students in Indonesia meet the recommendation of at least 60 minutes of physical activity per day (Hanifah et al., 2023). This condition is exacerbated by changes in children's lifestyles that are increasingly dominated by gadget use and sedentary activities, resulting in reduced time allocated for active play and exercise (Mulyaningsih et al., 2021).

The School Health Program (UKS) has long been a strategic program aimed at improving the health status of students in the context of education in Indonesia (Rianawaty et al., 2021; Syarnubi et al., 2021). The UKS program encompasses three main pillars: health education, health services, and development of healthy school environment (Kontak et al., 2022; Syarnubi et al., 2021). Nevertheless, implementation of the UKS program in the field still faces various obstacles, including limited trained human resources, minimal supporting facilities and infrastructure, low active student involvement, and approaches that are still conventional and less innovative.

The conventional UKS approach tends to be informative and passive, where students receive more health knowledge theoretically without meaningful practical experiences (Makri et al., 2021; O'Brien et al., 2021; Sweeting et al., 2023). Such an approach is less effective in forming sustainable healthy living behaviors because it does not touch aspects of intrinsic motivation, movement competence, and students' self-confidence to engage in physical activity throughout life. Therefore, innovation is needed in developing a more comprehensive, participatory UKS model oriented toward holistic competence development of students.

Physical literacy is an increasingly important concept in physical education and health worldwide. Whitehead (2010) explained that physical literacy is a person's ability to have motivation, confidence, movement skills, knowledge, and understanding that makes them willing and able to perform physical activity throughout life. This concept encompasses four important interrelated aspects: physical aspects (body movement abilities and skills), affective aspects (feelings and positive attitudes toward physical activity), cognitive aspects (knowledge about benefits and ways of physical activity), and behavioral aspects (habits of moving actively every day) (Chen et al., 2024; Eighmy et al., 2022; Li et al., 2022; Lower-Hoppe et al., 2022).

International research shows that physical literacy approaches are effective in increasing physical activity and healthy behaviors in children. Research by Farwati et al. (2021) showed that physical literacy-based programs can significantly improve basic movement competence and children's physical activity levels. Similarly, research by Smith et al. (2021) proved that physical literacy interventions in elementary schools

positively impact health knowledge, intrinsic motivation, and participation in physical activity. However, research on integration of physical literacy concepts in UKS programs in Indonesia is still very limited.

The identified research gaps include: (1) the absence of a UKS model that explicitly integrates the concept of physical literacy as the basic framework for program development, (2) minimal empirical studies on the effectiveness of physical literacy approaches on healthy living behaviors and physical activity of elementary school students in the Indonesian context, (3) unavailability of comprehensive and standardized UKS models that can serve as references for elementary schools in implementing physical literacy-based health programs. Therefore, this study aims to develop and test the effectiveness of a physical literacy-based UKS model on healthy living behavior and physical activity of elementary school students.

METHODS

This study used a mixed-methods approach combining quantitative and qualitative approaches in an integrated research framework. The research design adapted the Research and Development (R&D) model from Borg & Gall (2003) which was modified and combined with quasi-experimental design at the effectiveness testing stage. The mixed-methods approach was chosen because this research involves two main stages that complement each other: the model development stage requiring qualitative and quantitative data, and the effectiveness testing stage requiring experimental quantitative data (Creswell, J. W., & Plano Clark, 2018).

The research consisted of three main stages. The first stage was preliminary study (exploration) aimed at analyzing the factual conditions of UKS program implementation and students' current physical literacy levels in elementary schools. At this stage, data were collected through qualitative approaches including observation, in-depth interviews, and documentation studies, as well as quantitative approaches through questionnaire surveys. The second stage was model development aimed at producing a valid and practical physical literacy-based UKS model through several systematic stages: drafting the model, expert validation, limited trial, revision, and large-scale trial. The third stage was effectiveness testing aimed at testing the effectiveness of the physical literacy-based UKS model on healthy living behavior and physical activity using quasi-experimental design with pretest-posttest control group design.

The population in this study was all grade IV and V elementary school students aged 9-11 years in Semarang City. The selection of grades IV and V was based on consideration that students at these levels have sufficient cognitive maturity to understand health concepts, adequate literacy skills to complete research instruments, and are at the optimal motor development stage to participate in structured physical activity programs. At the effectiveness testing stage, samples were selected using cluster random sampling technique. Based on inclusion criteria including having operational UKS programs, school willingness to participate, availability of physical activity support facilities, and good research location accessibility, four elementary schools were selected: SDN Bojong Salaman 02, SDN Karangayu 03, SDN Tawang Mas 01, and SDN Kembangarum 01. The final sample for effectiveness testing consisted of 45 students (21 experimental group, 24 control group).

Research instruments included: (1) structured observation guidelines, (2) semi-structured interview guidelines, (3) physical literacy questionnaire adapted from Canadian Assessment of Physical Literacy (CAPL), (4) healthy living behavior questionnaire developed based on PHBS indicators consisting of 45 items measuring 6 aspects of healthy living behavior, (5) Physical Activity

Questionnaire for Children (PAQ-C) adapted and translated into Indonesian with Cronbach's alpha value of 0.84 and good construct validity (CFI = 0.92, RMSEA = 0.05), and (6) expert validation sheets using a Likert scale of 1-5. Validity of quantitative instruments was tested through content validity (CVI ≥ 0.78), construct validity using CFA, and item validity (r ≥ 0.30). Instrument reliability was tested using Cronbach's Alpha (α ≥ 0.70).

Qualitative data were analyzed using thematic analysis techniques from Braun & Clarke (2006) consisting of six steps: familiarizing with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing reports. Quantitative data were analyzed using descriptive and inferential statistics. Hypothesis testing used Independent Samples t-test and Paired Samples t-test with significance level α = 0.05 using IBM SPSS Statistics version 26.0.

The developed model integrates four domains of physical literacy (physical, affective, cognitive, and behavioral) into three pillars of UKS systematically and comprehensively. The implementation strategy was designed in 12 structured learning sessions conducted over one month with a frequency of three sessions per week, each session lasting 70 minutes. The approach used experiential learning, collaborative learning, and reflective learning to help students understand the meaning of their movement and health experiences.

RESULTS AND DISCUSSION

Feasibility of Physical Literacy-Based UKS Model

Expert Validation Results

The physical literacy-based UKS model was validated by an expert panel consisting of: Dr. Agus Widodo, M.Pd; Trisiani, S.Pd., M.Pd; and Sri Padmiati, S.Pd. Expert validation assessment results showed that the model has very good feasibility with an overall average score of 4.23 on a scale of 5.0 or equivalent to 84.6%, which falls into the "very feasible" category.

Table 1. Expert Validation Results of Physical Literacy-Based UKS Model

Assessment Aspect	Average Score	Percentage	Category
A. Conceptual Foundation	4.33	86.6%	Very Feasible
B. Component Completeness	4.22	84.4%	Feasible
C. Model Content/Substance	4.21	84.2%	Feasible
D. Practicality	4.14	82.8%	Feasible
E. Effectiveness (Potential)	4.29	85.8%	Very Feasible
F. Presentation/Display	4.20	84.0%	Feasible
Overall Average	4.23	84.6%	Very Feasible

The conceptual foundation aspect obtained the highest score of 4.33 (86.6%), indicating that the model has a solid theoretical foundation with proper integration between physical literacy theory, health behavior theory, and UKS concepts. The potential effectiveness aspect also obtained a high score of 4.29 (85.8%), indicating that the model has great potential to achieve established objectives. The practicality aspect obtained a relatively lower score of 4.14 (82.8%), but still in the feasible category. Validators provided input in the form of adding more detailed and systematic usage instructions to improve ease of implementation.

Field Trial Results

Limited trials were conducted at SDN Karangayu 03 involving 28 students. Observation results showed an average implementation score of 78.9% which falls into the good category. Students' positive responses reached 81.3%, with 93% stating activities were very enjoyable and different from conventional UKS. Teacher performance reached 84.4% and active student participation was 90%.

Table 2. Limited Trial Results (n=28 students, 2 sessions)

Measured Aspect	Result	Category
Model Implementation	78.9%	Good
Students' Positive Response	81.3%	Very Good
Implementing Teacher Performance	84.4%	Very Good
Active Student Participation	90%	Very Good

Large-scale trials were conducted at four schools involving 110 students. Implementation analysis results showed good consistency between schools with an average implementation score of 84.7% which falls into the very good category.

Table 3. Large-Scale Trial Results Between Schools

School	Implementation Score	Category
SDN Bojong Salaman 02	88.2%	Very Good
SDN Karangayu 03	82.1%	Good
SDN Tawang Mas 01	86.5%	Very Good
SDN Kembangarum 01	81.8%	Good
Average	84.7%	Very Good

Teacher satisfaction level reached 89.2%, indicating that the model could be well accepted by practitioners in the field. Students showed very high enthusiasm during model implementation, with average student attendance reaching 94.6%, significantly higher compared to attendance levels in conventional UKS programs which usually ranged between 75-80%.

Discussion of Model Feasibility

The developed physical literacy-based UKS model proved to have high feasibility based on comprehensive expert assessment and field trials. Expert validation scores of 4.23 on a scale of 5.0 showed that the model had a solid theoretical foundation, complete components, and high effectiveness potential. The model's theoretical feasibility was supported by systematic integration of four domains of physical literacy including physical competence, motivation, confidence, and knowledge aligned with multidimensional physical literacy construction (Barnett et al., 2023; Carl et al., 2026).

Integration of four physical literacy domains into three UKS pillars created a holistic approach aligned with findings by Grauduszus et al. (2024) and Hadier et al. (2025) showing that comprehensive physical literacy interventions in schools can improve physical competence, enjoyment, and motivation. The developed model accommodated physical, affective, cognitive, and behavioral aspects in an integrated manner in each learning session, different from conventional UKS models that tended to be partial.

The model's practical feasibility was demonstrated through field trial results showing consistent implementation levels across schools (84.7%). This implementation consistency confirmed findings by Santos et al. (2023)) that school-based interventions can be effective if they last for adequate duration, involve parents, and teachers receive adequate training. Student attendance reaching 94.6% during the program also indicated high engagement levels, aligned with research by Efthymiou et al. (2021) on self-efficacy in multicomponent school programs.

Effectiveness of Physical Literacy-Based UKS Model on Healthy Living Behavior

Baseline Measurement and Post-Test Results

Baseline measurement results showed no significant differences between experimental group and control group in all aspects of healthy living behavior ($p>0.05$), confirming equivalent baseline conditions. After implementation of the physical literacy-based UKS model for 12 sessions, post-test measurements showed significant differences between groups in all aspects.

Table 4. Baseline Measurement Results of Healthy Living Behavior

Aspect	Experimental	Control	p-value
Personal Hygiene	3.03 ± 0.24	3.02 ± 0.25	0.764
Healthy Eating Pattern	3.06 ± 0.25	2.97 ± 0.23	0.548
Physical Activity and Exercise	2.85 ± 0.31	2.99 ± 0.32	0.784
Rest and Sleep	3.10 ± 0.42	2.90 ± 0.45	0.560
Environmental Hygiene	3.06 ± 0.34	2.94 ± 0.28	0.204
Disease Prevention	3.02 ± 0.29	2.89 ± 0.42	0.057

Table 5. Post-Test Score Comparison of Healthy Living Behavior Between Groups

Aspect	Experimental	Control	p-value	Cohen's d
Personal Hygiene	3.54 ± 0.17	2.97 ± 0.19	<0.001	3.10
Healthy Eating Pattern	3.44 ± 0.16	3.03 ± 0.21	<0.001	2.17
Physical Activity	3.50 ± 0.25	3.06 ± 0.29	<0.001	1.63
Rest and Sleep	3.52 ± 0.24	3.01 ± 0.38	<0.001	1.60
Environmental Hygiene	3.48 ± 0.23	2.95 ± 0.34	<0.001	1.79
Disease Prevention	3.48 ± 0.32	3.08 ± 0.31	<0.001	1.28

All aspects showed statistically significant differences ($p<0.001$) with very large effect sizes (Cohen's $d = 1.28$-3.10). The greatest increase occurred in the personal hygiene aspect with Cohen's $d = 3.10$, indicating "very large effect". Pre-post change analysis showed the largest gain score in the physical activity aspect (+0.33 points), which had the lowest baseline score, indicating substantial room for improvement.

Table 6. Pre-Post Change Analysis of Experimental Group

Aspect	Pre-Test	Post-Test	Gain Score	p-value
Personal Hygiene	3.03 ± 0.24	3.54 ± 0.17	+0.51 ± 0.30	<0.001
Healthy Eating Pattern	3.06 ± 0.25	3.44 ± 0.16	+0.38 ± 0.30	<0.001
Physical Activity	2.85 ± 0.31	3.50 ± 0.25	+0.65 ± 0.39	<0.001
Rest and Sleep	3.10 ± 0.42	3.52 ± 0.24	+0.42 ± 0.47	<0.001
Environmental Hygiene	3.06 ± 0.34	3.48 ± 0.23	+0.42 ± 0.41	<0.001
Disease Prevention	3.02 ± 0.29	3.48 ± 0.32	+0.46 ± 0.43	<0.001

Category distribution analysis showed extraordinary achievement with 100% of experimental group students reaching "very good" category versus only 8.3% in control group.

Table 7. Distribution of Post-Test Healthy Living Behavior Categories

Category	Experimental (n=21)	Control (n=24)
Very Good (81-100%)	21 students (100.0%)	2 students (8.3%)
Good (61-80%)	0 students (0%)	22 students (91.7%)
Fair (41-60%)	0 students (0%)	0 students (0%)
Poor/Very Poor (<40%)	0 students (0%)	0 students (0%)

Overall healthy living behavior gain score showed Cohen's $d = 3.85$ ($p<0.001$), indicating extraordinary intervention effectiveness.

Discussion of Effectiveness on Healthy Living Behavior

The physical literacy-based UKS model proved very effective in improving students' healthy living behavior. Research results showed significant increases in all aspects ($p<0.001$) with very large effects (Cohen's d = 1.28-3.10). These findings aligned with research by Norito et al. (2025) which found that school health activation programs can increase elementary students' physical activity by 35% and health knowledge from 40% to 85%.

The highest increase occurred in the physical activity aspect (+0.65 points), supporting findings by Tapia-Serrano et al. (2022) that school interventions can increase physical activity and dietary compliance. The dramatic increase in personal hygiene aspect (Cohen's d = 3.10) supported findings by Fakhrurozi et al. (2024) proving that school UKS programs significantly influence elementary students' clean and healthy living behaviors.

The extraordinary achievement where 100% of experimental group students reached the "very good" category showed the effectiveness of comprehensive health literacy approaches. These findings supported research by Prihanto et al. (2021) showing that good health literacy closely relates to hand washing behavior, physical activity, and prevention of risky behaviors. The very large effect (Cohen's d = 3.85) exceeded results of research by Nagy-(Nagy-Pénzes et al., 2022) in Hungary. The superiority of these results could be explained by holistic physical literacy approaches systematically integrating physical, cognitive, and emotional learning, according to recommendations by Jerebine et al. (2024).

Effectiveness of Physical Literacy-Based UKS Model on Physical Activity

Baseline and Post-Test Results

Baseline measurement using PAQ-C showed no significant differences between groups. Both groups fell into "fairly active" category (Experimental: 2.80±0.67; Control: 2.73±0.71, $p=0.720$). After 12 sessions of intervention, dramatic changes occurred in the experimental group.

Table 8. Baseline Measurement Results of Physical Activity

Indicator	Experimental	Control	p-value
PAQ-C (score 1-5)	2.80 ± 0.67	2.73 ± 0.71	0.720

Table 9. PAQ-C Post-Test Score Comparison Between Groups

Aspect	Experimental	Control	p-value	Cohen's d
PAQ-C (score 1-5)	3.78 ± 0.65	2.73 ± 0.71	<0.001	1.527

The experimental group's PAQ-C score reached 3.78 ± 0.65, while the control group remained at 2.73 ± 0.71, with a difference of 1.05 points ($p<0.001$). Effect size showed Cohen's d = 1.527, falling into "very large effect" category.

Table 10. PAQ-C Pre-Post Comparison and Between Groups

Group	Pre-Test	Post-Test	Gain Score	p-value	Cohen's d
Experimental	2.80 ± 0.67	3.78 ± 0.65	0.98 ± 0.04	<0.001	1.47
Control	2.73 ± 0.71	2.73 ± 0.71	0.00 ± 0.00	0.328	0.00

The experimental group experienced dramatic increase with gain score of 0.98 points, shifting from "fairly active" to "active" category. The control group showed no change (gain score 0.00), confirming that improvement was due to the intervention.

Category distribution analysis showed remarkable shifts in physical activity levels.

Table 11. PAQ-C Post-Test Category Distribution

Category	Experimental (n=21)	Control (n=24)

Very Active (>3.5)	10 students (47.6%)	2 students (8.3%)
Active (3.0-3.5)	9 students (42.9%)	6 students (25%)
Fairly Active (2.5-2.9)	2 students (9.5%)	12 students (50%)
Less/Very Less (<2.5)	0 students (0%)	4 students (16.7%)

Results showed 90.5% of experimental group students achieved active or very active levels compared to only 33.3% in control group.

Discussion of Effectiveness on Physical Activity

The success of the physical literacy-based UKS model in increasing students' physical activity was remarkable. The PAQ-C score increase of 0.98 points with very large effect size (Cohen's d = 1.527) showed extraordinary impact. These findings aligned with research by Zhang et al. (2023) proving that physical literacy interventions in schools can increase moderate-vigorous physical activity and help more children achieve WHO recommendations.

The validity of using the PAQ-C instrument was supported by various studies showing good reliability and validity. Makai et al. (2023) and Monacis et al. (2024) confirmed good internal consistency and test-retest reliability of PAQ-C. Meta-analysis by Marasso et al. (2021) showed significant moderate correlation ($r \approx 0.34$) between PAQ-C scores and moderate-vigorous physical activity measured with accelerometers.

The category shift from "fairly active" to "active" with 90.5% of students achieving active or very active category confirmed the effectiveness of holistic physical literacy approaches. These results were superior compared to findings by Rajkovic Vuletic et al. (2026) which reported physical literacy-based interventions can maintain or increase daily physical activity. The developed model not only maintained, but significantly increased students' physical activity levels.

The very large effect size supported findings by Moeller et al. (2024) and Moon et al. (2024) that multicomponent, structured school programs supported by expert training produce larger effects compared to conventional programs. Systematic reviews by Grauduszus et al. (2024) and Jerebine et al. (2024) concluded that physical literacy programs generally provide small-medium effects, but the developed model successfully exceeded these standards.

The superiority could be explained by multicomponent approaches systematically integrating physical, cognitive, and affective aspects. The absence of changes in the control group (gain score 0.00) strengthened evidence that increased physical activity occurred as a direct result of implementing the physical literacy-based UKS model, confirming the model's effectiveness and supporting recommendations by Neil-Sztramko et al. (2021) on the importance of structured school programs.

CONCLUSION

Based on research results and discussions, it can be concluded that: First, the developed physical literacy-based UKS model has very high feasibility for implementation in elementary schools. This is proven through expert validation scores of 4.23 on a scale of 5.0 (84.6%) falling into the "very feasible" category. The model successfully integrated four domains of physical literacy systematically into three UKS pillars. Field trials showed good implementation consistency with average levels of 84.7% and student participation reaching 94.6%, far higher than conventional UKS programs.

Second, the physical literacy-based UKS model proved very effective in improving students' healthy living behavior. All aspects experienced statistically significant increases ($p<0.001$) with very large effect sizes (Cohen's d = 1.28-3.10). The extraordinary achievement showed 100% of experimental group students successfully

achieving "very good" healthy living behavior category, compared to only 8.3% in the control group, with overall effect Cohen's d = 3.85.

Third, the model showed extraordinary effectiveness in increasing students' physical activity. PAQ-C scores increased dramatically with gain score of 0.98 points ($p<0.001$) and very large effect size (Cohen's d = 1.527). This shifted students' category from "fairly active" to "active", with 90.5% achieving active or very active levels compared to only 33.3% in control group.

Based on research findings, it is recommended that the physical literacy-based UKS model be widely implemented in elementary schools with comprehensive teacher training. Longitudinal research is needed to measure sustainability of effects. Replication research in various school contexts is needed to test generalizability. Development of more comprehensive physical literacy measurement instruments for Indonesian context should be prioritized. It is suggested that the Ministry of Education include physical literacy concepts in UKS curriculum and develop physical literacy-based teacher training programs as part of professional development policies.

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REFERENCES

Agung, F. H., Sekartini, R., Sudarsono, N. C., Hendarto, A., Dhamayanti, M., Werdhani, R. A., & Sawyer, S. M. (2022). The barriers of home environments for obesity prevention in Indonesian adolescents. *BMC Public Health*, *22*(1), 2348. https://doi.org/10.1186/s12889-022-14669-6

Barnett, L. M., Jerebine, A., Keegan, R., Watson-Mackie, K., Arundell, L., Ridgers, N. D., Salmon, J., & Dudley, D. (2023). Validity, Reliability, and Feasibility of Physical Literacy Assessments Designed for School Children: A Systematic Review. *Sports Medicine*, *53*(10), 1905–1929. https://doi.org/10.1007/s40279-023-01867-4

Carl, J., Mazzoli, E., De Silva, C., Herfet, M., Arundell, L., Sahlqvist, S., Veitch, J., Lander, N., Timperio, A., & Barnett, L. M. (2026). Deriving and validating a short version of the Physical Literacy in Children Questionnaire. *Journal of Science and Medicine in Sport*, *29*(5), 535–542. https://doi.org/10.1016/j.jsams.2025.11.018

Chen, W., Zhou, B., Wang, X., & Li, L. (2024). Research on the relationship between physical literacy and demographic variables and interpersonal support for physical exercise among adolescents in China. *PLOS ONE*, *19*(10), e0311793. https://doi.org/10.1371/journal.pone.0311793

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research (3rd ed.)*. Sage.

Efthymiou, V., Charmandari, E., Vlachakis, D., Tsitsika, A., Pałasz, A., Chrousos, G., & Bacopoulou, F. (2021). Adolescent Self-Efficacy for Diet and Exercise Following a

School-Based Multicomponent Lifestyle Intervention. *Nutrients*, *14*(1), 97. https://doi.org/10.3390/nu14010097

Eighmy, K. E., Lightner, J. S., Grimes, A. R., & Miller, T. (2022). Physical Literacy of Marginalized Middle School Adolescents in Kansas City Public Schools. *Pediatric Exercise Science*, *34*(4), 169–174. https://doi.org/10.1123/pes.2021-0075

Erda, R., Hamidi, D., Desmawati, D., Rasyid, R., & Sarfika, R. (2025). Evaluating socio-demographic, behavioral, and maternal factors in the dual burden of malnutrition among school-aged children in Batam, Indonesia. *Narra J*, *5*(1), e2049. https://doi.org/10.52225/narra.v5i1.2049

Fakhrurozi, Z. A., Suherman, W. S., Sumarjo, S., Kriswanto, E. S., Amajida, A., & Annasai, F. (2024). Clean and healthy living behavior. Impact of the school health clinic program for elementary school students. *Fizjoterapia Polska*, *24*(2), 94–100. https://doi.org/10.56984/8ZG56082ZS

Farwati, R., Metafisika, K., Sari, I., Sitinjak, D. S., Solikha, D. F., & Solfarina, S. (2021). STEM Education Implementation in Indonesia: A Scoping Review. *International Journal of STEM Education for Sustainability*, *1*(1), 11–32. https://doi.org/10.53889/ijses.v1i1.2

Grauduszus, M., Koch, L., Wessely, S., & Joisten, C. (2024). School-based promotion of physical literacy: a scoping review. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1322075

Hadier, S. G., Yinghai, L., Long, L., Hamdani, S. D., & Hamdani, S. M. Z. H. (2025). Assessing physical literacy and establishing normative reference curves for 8–12-year-old children from South Punjab, Pakistan: The PAK-IPPL cross-sectional study. *PLOS ONE*, *20*(2), e0312916. https://doi.org/10.1371/journal.pone.0312916

Hanifah, L., Nasrulloh, N., & Sufyan, D. L. (2023). Sedentary Behavior and Lack of Physical Activity among Children in Indonesia. *Children*, *10*(8), 1283. https://doi.org/10.3390/children10081283

Jerebine, A., Arundell, L., Watson-Mackie, K., Keegan, R., Jurić, P., Dudley, D., Ridgers, N. D., Salmon, J., & Barnett, L. M. (2024). Effects of Holistically Conceptualised School-Based Interventions on Children's Physical Literacy, Physical Activity, and Other Outcomes: A Systematic Review. *Sports Medicine - Open*, *10*(1), 105. https://doi.org/10.1186/s40798-024-00766-w

Kontak, J. C., Caldwell, H. A. T., Kay-Arora, M., Hancock Friesen, C. L., & Kirk, S. F. L. (2022). Peering in: youth perspectives on Health Promoting Schools and youth engagement in Nova Scotia, Canada. *Health Promotion International*, *37*(3). https://doi.org/10.1093/heapro/daac081

Kusol, K., & Kaewpawong, P. (2025). Relationship Between Family Factors, Food Consumption Behaviors, and Nutritional Status Among Muslim School-Age Students in Rural Southern Thailand. *Journal of Multidisciplinary Healthcare*, *Volume 18*, 1615–1627. https://doi.org/10.2147/JMDH.S514601

Li, M. H., Kaioglou, V., Ma, R. S., Choi, S. M., Venetsanou, F., & Sum, R. K. W. (2022). Exploring physical literacy in children aged 8 to 12 years old: a cross-cultural comparison

between China and Greece. *BMC Public Health*, *22*(1), 2102. https://doi.org/10.1186/s12889-022-14507-9

Lower-Hoppe, L. M., Kim, A. C. H., Brgoch, S. M., Zwolski, C. M., Schmitt, L., Paponetti, M. K., & Quatman-Yates, C. C. (2022). Investigating the Social Network Structure of Physical Literacy Scholars to Advance a Paradigm for Physical Activity Promotion. *Frontiers in Sports and Active Living*, *4*. https://doi.org/10.3389/fspor.2022.809946

Makai, A., Prémusz, V., Dózsa-Juhász, O., Fodor-Mazzag, K., Melczer, C., & Ács, P. (2023). Examination of Physical Activity Patterns of Children, Reliability and Structural Validity Testing of the Hungarian Version of the PAQ-C Questionnaire. *Children*, *10*(9), 1547. https://doi.org/10.3390/children10091547

Makri, A., Vlachopoulos, D., & Martina, R. A. (2021). Digital Escape Rooms as Innovative Pedagogical Tools in Education: A Systematic Literature Review. *Sustainability*, *13*(8), 4587. https://doi.org/10.3390/su13084587

Marasso, D., Lupo, C., Collura, S., Rainoldi, A., & Brustio, P. R. (2021). Subjective versus Objective Measure of Physical Activity: A Systematic Review and Meta-Analysis of the Convergent Validity of the Physical Activity Questionnaire for Children (PAQ-C). *International Journal of Environmental Research and Public Health*, *18*(7), 3413. https://doi.org/10.3390/ijerph18073413

Moeller, N. C., Oestergaard, L., Rasmussen, M. G. B., Schmidt-Persson, J., Larsen, K. T., & Juhl, C. B. (2024). How to get children moving? The effectiveness of school-based interventions promoting physical activity in children and adolescents – A systematic review and meta-analysis of randomized controlled- and controlled studies. *Health & Place*, *89*, 103333. https://doi.org/10.1016/j.healthplace.2024.103333

Monacis, D., Annoscia, S., Colella, D., & Limone, P. (2024). Measuring validity and reliability of the Italian version of Physical Activity Questionnaire for Older Children in overweight and obese children. *Frontiers in Education*, *9*. https://doi.org/10.3389/feduc.2024.1414126

Moon, J., Webster, C. A., Stodden, D. F., Brian, A., Mulvey, K. L., Beets, M., Egan, C. A., McIntosh, L. I. F., Merica, C. B., & Russ, L. (2024). Systematic review and meta-analysis of physical activity interventions to increase elementary children's motor competence: a comprehensive school physical activity program perspective. *BMC Public Health*, *24*(1), 826. https://doi.org/10.1186/s12889-024-18145-1

Mulyaningsih, T., Mohanty, I., Widyaningsih, V., Gebremedhin, T. A., Miranti, R., & Wiyono, V. H. (2021). Beyond personal factors: Multilevel determinants of childhood stunting in Indonesia. *PLOS ONE*, *16*(11), e0260265. https://doi.org/10.1371/journal.pone.0260265

Nagy-Pénzes, G., Vincze, F., & Bíró, É. (2022). A School Intervention's Impact on Adolescents' Health-Related Knowledge and Behavior. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.822155

Neil-Sztramko, S. E., Caldwell, H., & Dobbins, M. (2021). School-based physical activity

programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database of Systematic Reviews*, *2021*(9). https://doi.org/10.1002/14651858.CD007651.pub3

Norito, T. B., Aman, M. S., Waldo, K., Pratiwi, A. S., & Pradana, C. (2025). Healthy School Activation Program: A Physical Activity Education and Intervention Strategy to Reduce Sedentary Behaviour in Elementary Students. *Jurnal Karya Abdi Masyarakat*, *9*(1), 109–120. https://doi.org/10.22437/jkam.v9i1.45900

O'Brien, E.-M., O' Donnell, C., Murphy, J., O' Brien, B., & Markey, K. (2021). Intercultural readiness of nursing students: An integrative review of evidence examining cultural competence educational interventions. *Nurse Education in Practice*, *50*, 102966. https://doi.org/10.1016/j.nepr.2021.102966

Prihanto, J. B., Nurhayati, F., Wahjuni, E. S., Matsuyama, R., Tsunematsu, M., & Kakehashi, M. (2021). Health Literacy and Health Behavior: Associated Factors in Surabaya High School Students, Indonesia. *International Journal of Environmental Research and Public Health*, *18*(15), 8111. https://doi.org/10.3390/ijerph18158111

Rianawaty, I., Suyata, S., Dwiningrum, S. I. A., & Yanto, B. E. (2021). Model of Holistic Education-Based Boarding School: A Case Study at Senior High School. *European Journal of Educational Research*, *volume-10-*(volume-10-issue-2-april-2021), 567–580. https://doi.org/10.12973/eu-jer.10.2.567

Santos, F., Sousa, H., Gouveia, É. R., Lopes, H., Peralta, M., Martins, J., Murawska-Ciałowicz, E., Żurek, G., & Marques, A. (2023). School-Based Family-Oriented Health Interventions to Promote Physical Activity in Children and Adolescents: A Systematic Review. *American Journal of Health Promotion*, *37*(2), 243–262. https://doi.org/10.1177/0890117122111383 6

Smith, C., Goss, H. R., Issartel, J., & Belton, S. (2021). Health Literacy in Schools? A Systematic Review of Health-Related Interventions Aimed at Disadvantaged Adolescents. *Children*, *8*(3), 176. https://doi.org/10.3390/children8030176

Sweeting, H., Thomson, H., Wells, V., & Flowers, P. (2023). Evolution of 'whole institution' approaches to improving health in tertiary education settings: a critical scoping review. *Research Papers in Education*, *38*(4), 661–689. https://doi.org/10.1080/02671522.2021.1961302

Syarnubi, S., Mansir, F., Purnomo, M. E., Harto, K., & Hawi, A. (2021). Implementing Character Education in Madrasah. *Jurnal Pendidikan Islam*, *7*(1), 77–94. https://doi.org/10.15575/jpi.v7i1.8449

Tapia-Serrano, M. A., Sevil-Serrano, J., Sánchez-Oliva, D., Vaquero-Solís, M., & Sánchez-Miguel, P. A. (2022). Effects of a school-based intervention on physical activity, sleep duration, screen time, and diet in children. *Revista de Psicodidáctica (English Ed.)*, *27*(1), 56–65. https://doi.org/10.1016/j.psicoe.2021.06.001

Whitehead, M. (2010). *Physical literacy: Throughout the lifecourse*. Routledge.

Zhang, D., Shi, L., Zhu, X., Chen, S., & Liu, Y. (2023). Effects of intervention integrating

physical literacy into active school recesses on physical fitness and academic achievement in Chinese children. *Journal of Exercise Science & Fitness*, *21*(4), 376–384. https://doi.org/10.1016/j.jesf.2023.09.004