



INFLUENCE OF BANJAR LOCAL WISDOM ON ADOLESCENTS' PHYSICAL ACTIVITY TO MITIGATE NEGATIVE EFFECTS OF GADGET USE: A HEALTH PROMOTION MODEL APPROACH

Heryyanoor^{1*}, Diana Hardiyanti², Siti Munawaroh³, Siti Faridah⁴, Ahmad Ramadhani⁵

¹Nursing Profession Program, STIKes Intan Martapura, Jl. Samadi No.1, Jawa, Martapura, Banjar, Kalimantan Selatan 71213, Indonesia

²Diploma in Nursing Program, STIKes Intan Martapura, Jl. Samadi No.1, Jawa, Martapura, Banjar, Kalimantan Selatan 71213, Indonesia

³Bachelor of Nursing Program, STIKes Intan Martapura, Jl. Samadi No.1, Jawa, Martapura, Banjar, Kalimantan Selatan 71213, Indonesia

*heryyanoor37@gmail.com

ABSTRACT

Excessive use of gadgets, especially among adolescents, can reduce physical activity (AF) and increase sedentary behavior. This condition causes various physical and psychological health problems. Objective: This study aims to analyze the influence of Banjar local wisdom on adolescent AF in reducing the negative impacts of gadget use through the Health Promotion Model (HPM). A quasi-experimental design with a control group involving 60 adolescents in Banjar Regency, Indonesia. Proportional random sampling was used to determine that the intervention group (n=30) received education and direct practice of traditional Banjar games (Balogo, Egrang, Hadang). In contrast, the control group (n=30) received education through posters. AF, along with personal factors, knowledge, attitudes, and behaviors related to AF (HPM constructs), were measured before and after the intervention using a questionnaire and analyzed with the Wilcoxon Test and the Mann-Whitney Test. The results showed a significant increase in all variables in the intervention group ($p = 0.001$). The control group also showed a substantial increase in AF ($p = 0.001$) and knowledge ($p = 0.001$), but the increase was smaller than that of the intervention group. These findings suggest that integrating Banjar local wisdom into AF interventions can effectively promote a healthy lifestyle among adolescents. The HPM framework provides a valuable approach to understanding and facilitating behavior change. Further research is needed to explore this intervention's long-term effects and broader applicability.

Keywords: banjar local wisdom; gadgets; health promotion model; physical activity; teenagers

How to cite (in APA style)

Heryyanoor, H., Hardiyanti, D., Munawaroh, S., Faridah, S., & Ramadhani, A. (2026). Influence of Banjar Local Wisdom on Adolescents' Physical Activity to Mitigate Negative Effects of Gadget Use: A Health Promotion Model Approach. *Indonesian Journal of Global Health Research*, 8(2), 183–192. <https://doi.org/10.37287/ijghr.v8i2.549>.

INTRODUCTION

Information and communication technology development, particularly in using gadgets such as mobile phones, tablets, and laptops, has brought about significant changes in social, cultural, and public health (Nair et al., 2020; Piores et al., 2024), including among rural adolescents. Excessive gadget use significantly impacts their lifestyle habits, which tend to involve more screen time than physical activity (Górnicka et al., 2020). This habit can lead to long-term health problems such as obesity, sleep disturbances, and decreased social interaction (Rashid et al., 2021), including a decline in interest in applying local wisdom.

According to 2022 World Health Organization (WHO) data, more than 80% of adolescents are not physically active (World Health Organisation, 2022). Adolescents tend to engage in sedentary activities, such as excessive use of gadgets (Piores et al., 2024). Sedentary behavior is an activity that does not require additional energy and is usually performed while sitting or lying down, with an energy expenditure of less than ≤ 1.5 metabolic equivalents (MET) (Rey-Brandariz et al., 2023). According to the Centers for Disease Control and Prevention in the United States, the average child spends approximately 8 hours a day watching electronic screens (Rashid et al., 2021). The results

of a survey by the Indonesian Internet Service Providers Association (APJII) in 2024 showed that internet users in Indonesia were around 79.5% or an increase of 1.31% of the total population of almost 279 million people in 2023. Internet users in cities and rural areas were almost equal at around 74% (APJII, 2024a), even in remote areas, internet connection had reached 82.6% (APJII, 2024b). Internet users on the island of Kalimantan were 77.42%, specifically in South Kalimantan, they were around 71.76% with a national contribution of 1.37% of the total population (APJII, 2024a). The results of an initial study in five villages in the Banjar district area showed that all villages were connected to the internet, and almost all sampled teenagers had mobile phones, which they admitted were primarily used for playing games. The role of parents is not so dominant in forbidding or preventing children; in fact, parents are examples who are less supportive of the excessive use of gadgets.

The rise in adolescent gadget use is unstoppable, coupled with technological advances. Excessive gadget use can lead to psychological problems such as insomnia, irritability, and depression, all of which can negatively impact health. Research shows intense gadget use can lead to poor sleep quality and impaired adolescent social interaction (Krisnana et al., 2022). A literature review reveals the impacts of gadget use, including physical changes, mental changes, behavioral changes, and decreased work and activity levels. It even links to cancer, oxidative stress, and neurodegenerative disorders (Akhtar et al., 2023).

Efforts were made to overcome this problem by using the Banjar local wisdom approach to distract teenagers' gadget usage habits with the Health Promotion Model (HPM) approach from Nola J Pander. Based on this theory, behavioral changes can be made by linking personal factors in the form of peer interpersonal influences with activity-related affects where activities are carried out by gathering groups of teenagers and providing education that describes physical activities (Prabowo & Gibran, 2024; Febriana et al., 2021b) based on Banjar local wisdom such as Balogo (Normuliati and Urahmah, 2023), Egrang (Normuliati & Urahmah, 2023; Sulistiyana et al., 2022), and playing Hadang (Amalia et al, 2024) can be done by teenagers to reduce gadget usage activities.

Previous research related to gadget use behavior with physical activity, namely the study by Kumala et al., (2019) in Kendal, showed that 72.1% of adolescents had a high duration of gadget use and 14.8% had low physical activity. Research by Mayyoni et al., (2019) explained a relationship between gadget use and physical activity with the nutritional status of junior high school students in Denpasar City. Research by Rashid et al., (2021) showed an increase in the percentage of gadget use (>6 hours) in adolescents every year, with low levels of physical activity. Meanwhile, Nusi et al., (2025) in Gorontalo found that around 68.3% of adolescents used gadgets with light physical activity activities of 61.1%.

This study has provided education on the importance of physical activity based on Banjar local wisdom and applied the HPM theory to change and improve the knowledge, attitudes, and behavior of adolescent gadget users, which, to the researcher's knowledge from the results of the literature search, has never been done. Therefore, this study is important and urgent to find a solution through the Banjar local wisdom approach by introducing traditional games Balogo, Egrang, and Hadang in distracting and increasing adolescent physical activity while introducing local cultural values that are also in line with the fourth *asta cita* regarding health and strengthening the role of youth, the eighth *asta cita* regarding cultural preservation (Prabowo & Gibran, 2024). This study aims to analyze the influence of Banjar local wisdom on adolescent physical activity in reducing the negative impacts of gadget use through the Health Promotion Model (HPM).

METHOD

The research design was a quasi-experimental study with a pre-test and post-test control group approach. The population in this study was all adolescents in Banjar Regency, with a sample of 60

respondents, 30 respondents in each group, taken using a purposive random sampling technique from 6 villages. The variables were the application and education of Banjar local wisdom, knowledge, attitudes, and behavior of adolescents in reducing the negative impacts of gadget use with the Health Promotion Model. The instrument used was a questionnaire processed based on variables measured by referring to theoretical concepts related to gadget use behavior and physical activity of Banjar local wisdom, including the Physical Activity Questionnaire for adolescents (PAQ-A) questionnaire to measure physical activity. The questionnaire has been tested for validity and reliability and was declared valid and reliable with an average Cronbach's Alpha of 0.735. Data analysis used the Wilcoxon Test and the Mann-Whitney Test as a test for comparison with the control group, with a reference probability value (p) of 5% (0.05).

The research began with a literature review and a preliminary study to identify the problem and a strategic plan for addressing it. Researchers identified the issue of gadget use among adolescents, which was unbalanced with physical activity. The process then involved obtaining research permits, ethical testing, and testing the validity and reliability of the research instruments. The researchers then assessed (pre-test) to determine adolescents' knowledge, attitudes, and behavior regarding the negative impacts of gadget use and the physical activity of the Banjarese local wisdom. The next stage involved interventions in the form of providing health education/counseling on the importance of physical activity and the impact of gadget use on health, and conducting physical activities based on Banjarese local wisdom, such as beloogo, stilts, and hadang games, using both group and individual approaches for each selected respondent. The intervention process took place in stages in the treatment group. In contrast, the control group was not given a similar intervention, but was given education with poster media as a comparison. Post-test data collection was carried out at least 2-4 weeks after the intervention activity was carried out using the same instruments and approaches. The post-test results were analyzed and compared with the previous pre-test results in the intervention and control groups using a t-test, paired simple t-test, or alternative tests. This study has received a certificate of passing ethical testing from the Stikes Intan Martapura research ethics committee with number: 048/KE/YBIP-SI/VI/2025.

RESULT

Table 1.

Respondent Characteristics based on treatment group and control group (n=60)		
Respondent Characteristics	Intervention Group (n= 30); f (%)	Control Group (n= 30); f (%)
Gender		
Male	25 (83%)	21 (70%)
Female	5 (17%)	9 (30%)
Age		
12 Year	4 (13,3%)	5 (16,7%)
13 Year	5 (16,7%)	7 (23%)
14 Year	15 (50%)	12 (40%)
15 Year	3 (10%)	2 (6,7%)
16 Year	1 (3,3%)	1 (3,3%)
17 Year	0 (0%)	1 (3,3%)
18 Year	2 (6,7%)	2 (6,7%)
Mobile Phone Ownership		
Own	30 (100%)	30 (100%)
Do not have	0 (0%)	0 (0%)
School in a Day		
Once (Morning Time)	26 (86,7%)	22 (73%)
Twice (Morning and Evening)	4 (13,3%)	8 (27%)
Duration of playing on a cellphone in a day		
Less than 3 Hours	7 (23,3%)	11 (37%)
More than 3 Hours	18 (60%)	15 (50%)
No Limits	5 (16,7%)	4 (13,3%)

Table 1, most respondents were male, with the intervention group being around 25 respondents (83%) compared to the control group, which had only 21 respondents (70%). The age of the respondents was mostly 14 years old, with a ratio of the intervention group and the control group of 50% and 40%, respectively. School activities were once a day, 86.7% and 73%, respectively. The duration of playing with a cellphone was more than 3 hours, 60% and 50%. There were those without limits of the total of all respondents (100%), and each group had a handphone.

Table 2.

Categorical Frequency Distribution of research variables

Variable	Intervention Group (n= 30); f (%)		Control Group (n= 30); f (%)	
	Before	After	Before	After
Physical Activity				
Very Light	13 (43%)	0 (0%)	14 (46,7%)	1 (3,3%)
Light	17 (57%)	0 (0%)	15 (50%)	29 (96,7%)
Moderate	0 (0%)	30	1 (3,3%)	0 (0%)
Strenuous	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Very Strenuous	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Personal Factors Related to Physical Activity Implementation				
Good	20 (67%)	30 (100%)	21 (70%)	25 (83,3%)
Poor	10 (33%)	0 (0%)	9 (30%)	5 (16,7%)
Knowledge of Physical Activities and Traditional Games				
Good	24 (80%)	30 (100%)	24 (80%)	28 (93,3%)
Poor	6 (20%)	0 (0%)	6 (20%)	2 (6,7%)
Attitudes About Physical Activity and Traditional Games				
Positive	19 (63%)	30 (100%)	17 (56,7%)	19 (63,3%)
Negative	11 (37%)	0 (0%)	13 (43,3%)	11 (36,7%)
Physical Activity Behavior (HPM construct)				
Positive	17 (57%)	30 (100%)	17 (56,7%)	16 (53,3%)
Negative	13 (53%)	0 (0%)	13 (43,3%)	14 (46,7%)

Table 2, categorically based on the frequency distribution table, before the intervention, the majority of respondents in the intervention group had light physical activity, 17 respondents (57%), while the control group had 15 respondents (50%). Personal factors related to the implementation of physical activity were almost comparable to the good category, namely 20 respondents (67%) and 21 respondents (70%), knowledge about physical activity and traditional games with a good category, namely 24 respondents (80%) and 24 respondents (80%), attitudes about physical activity and traditional games with a positive attitude category, namely 19 respondents (63%) and 17 respondents (56.7%), and behavior in physical activity (HPM construct) with a positive behavior category, namely 17 respondents (56.7%). Then, after being given intervention in the form of education and direct practice of traditional games (belogo, stilts, and hadang) in the intervention group and the control group only given education using poster media, in terms of categories, there was an increase in the physical activity variable with the physical activity category of all respondents increasing to moderate activity (100%). At the same time, in the control group, the majority of respondents increased to light activity, as many as 29 respondents (96.7%). Furthermore, in personal factors related to the implementation of physical activity, attitudes about physical activity and traditional games, and behavior in physical activity (HPM construct) in the intervention group, all respondents experienced an increase towards the good and positive category as many as 30 respondents (100%), while in the control group there was also an increase in each variable as many as 25 respondents (83.3%), 28 respondents (93.3%), 19 respondents (63.3%) and 16 respondents (53.3%).

Table 3.
Statistical test results between research variables

Statistical test results between research variables				
Variabel	Intervention Group (n= 30); f (%)		Control Group (n= 30); f (%)	
	Sebelum	Sesudah	Sebelum	Sesudah
Physical Activity				
Mean	45,6	56,5	47,5	50,7
Mean Increase	10,9		3,2	
Wilcoxon Test	p = 0,001		p = 0,001	
Mann-Whitney Test	p = 0,001			
Personal Factors Related to Physical Activity Implementation				
Mean	25	30,9	24,2	24,9
Mean Increase	5,9		0,7	
Wilcoxon Test	p = 0,001		p = 0,021	
Mann-Whitney Test	p = 0,001			
Knowledge of Physical Activity and Traditional Games				
Mean	21,5	29,4	21,6	24,4
Mean Increase	7,5		2,8	
Wilcoxon Test	p = 0,001		p = 0,001	
Mann-Whitney Test	p = 0,001			
Attitudes About Physical Activity and Traditional Games				
Mean	35,6	42,4	32,6	32,8
Mean Increase	6,8		0,2	
Wilcoxon Test	p = 0,001		p = 0,263	
Mann-Whitney Test	-			
Physical Activity Behavior (HPM construct)				
Mean	57,3	67,2	54	54,6
Mean increase	6,8		0,6	
Wilcoxon Test	p = 0,001		p = 0,004	
Mann-Whitney Test	p = 0,001			

Table 3 shows a difference in the average score before and after the intervention in the intervention group and the control group. The difference in the average increase in physical activity of the intervention group and the control group is 7.7 (10.9 with 3.2), the personal factor variable related to the implementation of physical activity of the intervention group and the control group is 5.2 (5.9 with 0.7), knowledge about physical activity and traditional games of the intervention group and the control group is 4.7 (7.5 with 2.8), attitudes about physical activity and traditional games of the intervention group and the control group are 6.6 (6.8 with 0.2), and behavior in physical activity (HPM construct) of the intervention group and the control group is 6.2 (6.8 with 0.6). The results of the Wilcoxon test statistical test in the intervention group before and after being given intervention in the form of education and direct practice of traditional games (belogo, stilts and hadang) obtained a p value = 0.001 for all variables, namely physical activity, personal factors related to the application of physical activity, knowledge about physical activity and traditional games, attitudes about physical activity and traditional games, and behavior in physical activity (HPM construct). In the control group that was given education using posters, the results of the Wilcoxon statistical test on the variables of physical activity, as well as knowledge about physical activity and traditional games had a p value = 0.001, personal factors related to the implementation of physical activity with a p value = 0.021, behavior in physical activity (HPM construct) with a p value = 0.004. In contrast, the control group's attitude variable about physical activity and traditional games obtained a p-value = 0.263. The results of the difference test with the Mann-Whitney test in the form of the final results after being given intervention in the intervention group and the control group in each variable obtained results of each p = 0.001 in physical activity, personal factors related to the implementation of physical activity, knowledge about physical activity and traditional games, and behavior in physical activity (HPM construct). Graphically, the changes in the average value between variables in the intervention group and the control group are as follows:

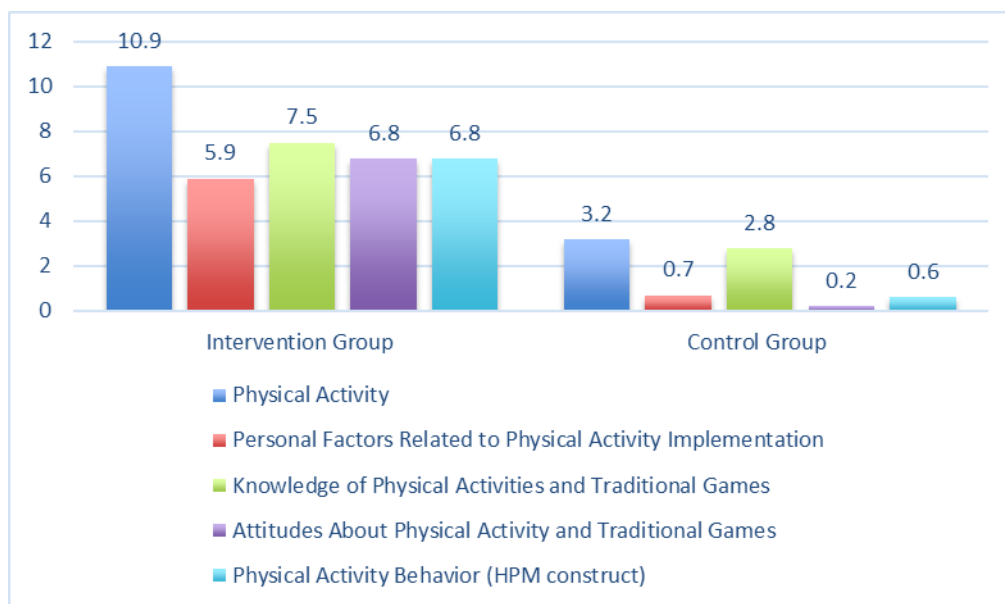


Figure 1. Comparison chart of the mean value of each variable in the intervention group and the control group of the study

DISCUSSION

This study has analyzed the influence of Banjar local wisdom on adolescent physical activity in reducing the negative impact of gadget use through the Health Promotion Model (HPM) approach. The main findings show that educational interventions and direct practice of traditional Banjar games (Balogo, Egrang, Hadang) significantly increased adolescent physical activity, personal factors, knowledge, attitudes, and behavior related to physical activity compared to the control group that only received education through posters. These results indicate that local wisdom can effectively increase physical activity and promote a healthy lifestyle among adolescents.

The significant increase in physical activity in the intervention group aligns with previous research demonstrating the effectiveness of culture-based interventions in increasing physical activity. For example, a review by Tao et al., (2022) found that intervention programs integrating traditional dances increased physical activity and reduced adolescent sedentary behavior. This may be explained by the fact that culture-based physical activities are more engaging and enjoyable for participants, increasing their motivation, competitive spirit, and participation (Oyibo, 2020; Sivan et al., 2020). Furthermore, traditional Banjar games such as Balogo, Egrang, and Hadang involve diverse and challenging physical movements, which can help improve cardiovascular fitness, muscle strength, and coordination. This aligns with research by Dube et al., (2025), which confirms that physically demanding and traditional games are good for health, including heart health.

Further analysis revealed a link between respondent characteristics and intervention outcomes. Male adolescents, who constituted the majority in this study, showed a greater increase in physical activity than female adolescents. This is due to a gender preference for more competitive, strength-oriented traditional games, such as Balogo and Hadang. Research by Martínez-Santos et al., (2020) also demonstrated a greater male dominance in physically demanding activities. Furthermore, adolescents with higher levels of prior knowledge about traditional Banjar games also responded better to the intervention. Consistent with research by Azlan et al., (2021), these findings demonstrate the importance of considering participants' prior knowledge and interests when designing culture-based intervention programs. Programs need to be tailored to the specific characteristics and needs of the target population to be more effective.

In addition to increased physical activity, this study also found significant improvements in personal factors, knowledge, attitudes, and behavior related to physical activity in the intervention group. This improvement can be explained by the HPM approach, which emphasizes personal and environmental factors as determinants of health behavior. The results of a review by Ismoyo et al., (2024) and research by Azlan et al., (2021) generally explain that education about the benefits of physical activity and knowledge about traditional games, including traditional Banjar cultural games, can increase participants' awareness and understanding of the importance of a healthy lifestyle, including reducing the impact of gadget use. Direct practice of traditional games can also increase self-confidence (Ismoyo et al., 2024) and positive perceptions of physical activity (Bessa et al., 2021; (Azlan et al., 2021). Social support from peers and family can also strengthen participants' intentions and motivation to remain physically active (Peng et al., 2025). Therefore, this comprehensive and multidimensional intervention is more effective in changing health behavior than focusing solely on one aspect.

The results of this study are also very interesting, as the control group, which only received education through posters, also showed significant increases in physical activity and knowledge. This suggests that education alone can have a positive impact on health behaviors. However, the improvement in the intervention group was significantly greater than in the control group, indicating, as in the review by Ismoyo et al., (2024) and the study by Azlan et al., (2021), that hands-on practice and real-life experience in traditional games have significant added value. Direct experience allows participants to experience the benefits of physical activity firsthand, build motor skills, and develop a love for local culture (Martínez-Santos et al., 2020). Furthermore, the social interaction and enjoyment gained from traditional games can increase intrinsic motivation and make participants more likely to remain physically active in the long term (Fernandez-Rio et al., 2020).

Although it addressed the research objectives and several important aspects of the variables studied, this study also has several limitations. First, the study design involved only one intervention group and one control group, making it difficult to generalize the findings to a broader population. Second, physical activity was measured solely through a questionnaire, which is susceptible to self-report bias. Third, this study did not evaluate the long-term impact of the intervention. Future research should utilize a more robust design (e.g., a randomized controlled trial with a more rigorous control group), more objective measures of physical activity, and a longer follow-up period. Research should also explore other factors influencing adolescent physical activity, such as family support, the school environment, and public policy.

This research's important contribution lies in understanding the potential of local wisdom as a strategy to increase physical activity and promote a healthy lifestyle among adolescents, including efforts to distract from gadget addiction. These findings can be used to develop more effective and sustainable intervention programs that integrate local cultural values and empower adolescents to be physically active. The results of this study also support the Fourth and Eighth Goals of Youth, namely improving health and preserving culture (Prabowo & Gibran, 2024). This program can be replicated in other regions by adapting traditional games to local cultures. Implementing this program requires collaboration between local governments, schools, families, and communities to create an environment that supports adolescent physical activity.

CONCLUSION

This study proves that interventions based on Banjar local wisdom are effective in increasing adolescent physical activity, as well as the factors that influence it, such as knowledge, attitudes, personal factors, and behavior, per the Health Promotion Model (HPM) principles. Direct practice of traditional games (Balogo, Egrang, Hadang) has a more significant impact than education through posters alone, because the HPM emphasizes the importance of direct experience and environmental factors in shaping health behavior. Further analysis shows that respondent

characteristics, such as gender and initial knowledge level, influence response to the intervention. This also aligns with the HPM, which considers individual factors in behavior change. These findings underscore the potential of local wisdom as a promising strategy to promote healthy lifestyles among adolescents by integrating local cultural values into intervention programs based on HPM as a more relevant, engaging, and sustainable solution to address the problems of physical inactivity and the negative impacts of gadget use. To maximize the program's impact and sustainability, it is recommended to integrate traditional Banjar games into the school curriculum, train teachers to facilitate the games, establish partnerships with the community, promote the program through the media, and conduct regular evaluations, while still paying attention to HPM principles at every stage. This research provides an important contribution to efforts to promote health and preserve local culture, as well as supporting government programs related to health and the role of youth. It is important to replicate this program in other regions and adapt it to local cultures, as well as adapt interventions based on HPM principles to create a healthy, active, and proud young generation of cultural heritage.

ACKNOWLEDGEMENTS

The authors would like to thank the Ministry of Higher Education, Science, and Technology, Directorate General of Research and Development of the Republic of Indonesia, for funding this research based on Decree Number 0070/C3/AL.04/2025 and Agreement/Contract Number 132/C3/DT.05.00/PL/2025. The authors would also like to thank the Head of Stikes Intan Martapura, the Head of the Research and Community Service Unit, and the lecturers and students of Stikes Intan Martapura who have supported and assisted in the research grant application process. Furthermore, the authors would like to thank the village heads, respondents, staff, and general assistants who have assisted in various stages of data collection and intervention activities.

REFERENCES

- Akhtar, F. et al. (2023) 'Smartphone addiction among students and its harmful effects on mental health, oxidative stress, and neurodegeneration towards future modulation of anti-addiction therapies: a comprehensive survey based on slr, Research questions, and network visualization', *CNS & Neurological Disorders-Drug Targets-CNS & Neurological Disorders*), 22(7), pp. 1070–1089.
- Amalia et al (2024) 'Pelatihan Peningkatan Permainan Tradisional untuk Melestarikan Kearifan Lokal Di Kalimantan Selatan Pada Guru KKG PJOK Tapin Tengah', *Indonesian Journal of Community Engagement (IJCE)*, 5(2), pp. 129–135. Available at: <https://doi.org/https://doi.org/10.37471/ijce.v5i2.1039>.
- Asosiasi Penyelenggara Jasa Internet Indonesia (2024a) *Internet Indonesia, Survei Penetrasi Internet Indonesia*. Available at: <https://survei.apjii.or.id/survei/group/9>.
- Asosiasi Penyelenggara Jasa Internet Indonesia (2024b) *Pengguna Internet Di Daerah Tertinggal Tahun 2024*. Available at: <https://survei.apjii.or.id/>.
- Azlan, A. et al. (2021) 'Playing traditional games vs. Free-play during physical education lesson to improve physical activity: A comparison study', *Pedagogy of Physical Culture and Sports*, 25(3), pp. 178–187. Available at: <https://doi.org/10.15561/26649837.2021.0306>.
- Bessa, C. et al. (2021) 'Sport education and traditional teaching: Influence on students' empowerment and self-confidence in high school physical education classes', *Sustainability (Switzerland)*, 13(2), pp. 1–14. Available at: <https://doi.org/10.3390/su13020578>.
- Dube, A. et al. (2025) 'Impact of Traditional Dance and Games on Cardiovascular Health: A Scoping Review of Outcomes Across Diverse Low- and Middle-Income Countries',

- International Journal of Environmental Research and Public Health, 22(3), pp. 1–16. Available at: <https://doi.org/10.3390/ijerph22030440>.
- Febriana, A., Mulyono, S. and Widyatuti, W. (2021) ‘Family support on utilization of adolescent reproduction health service at the area of public health service (Puskesmas) of Martapura’, *Enfermería Clínica*, 31, pp. S135–S138. Available at: <https://doi.org/https://doi.org/10.1016/j.enfcli.2020.12.008>.
- Fernandez-Rio, J. et al. (2020) ‘Gamification and physical education. Viability and preliminary views from students and teachers’, *Physical Education and Sport Pedagogy*, 25(5), pp. 509–524. Available at: <https://doi.org/10.1080/17408989.2020.1743253>.
- Górnicka, M. et al. (2020) ‘Activity–inactivity patterns, screen time, and physical activity: The association with overweight, central obesity and muscle strength in Polish teenagers. report from the ABC of healthy eating study’, *International Journal of Environmental Research and Public Health*, 17(21), pp. 1–21. Available at: <https://doi.org/10.3390/ijerph17217842>.
- Ismoyo et al. (2024) ‘Health benefits of traditional games - a systematic review’, *Retos*, 59, pp. 843–856. Available at: <https://doi.org/10.47197/retos.v59.107467>.
- Krisnana, I. et al. (2022) ‘The use of gadgets and their relationship to poor sleep quality and social interaction on mid-adolescents: a cross-sectional study’, 34(1). Available at: <https://doi.org/doi:10.1515/ijamh-2019-0101>.
- Kumala, A.M., Margawati, A. and Rahadiyanti, A. (2019) ‘Hubungan Antara Durasi Penggunaan Alat Elektronik (Gadget), Aktivitas Fisik Dan Pola Makan Dengan Status Gizi Pada Remaja Usia 13-15 Tahun’, *Journal of Nutrition College*, 8(2), p. 73. Available at: <https://doi.org/10.14710/jnc.v8i2.23816>.
- Martínez-Santos, R. et al. (2020) ‘Sports Teaching, Traditional Games, and Understanding in Physical Education: A Tale of Two Stories’, *Frontiers in Psychology*, 11(September). Available at: <https://doi.org/10.3389/fpsyg.2020.581721>.
- Mayyoni, N., Suiroaka, I. and Widarti, I. (2019) ‘Hubungan Penggunaan Gadget dan Aktivitas Fisik dengan Status Gizi Siswa SMP di Kota Denpasar’, *Journal of Nutrition Science*, 8(3), pp. 172–178.
- Nair, A. et al. (2020) ‘Gadgets it’s use and stress on lifestyle’, *Journal of Datta Meghe Institute of Medical Sciences University*, 15(2). Available at: https://journals.lww.com/dmms/fulltext/2020/15020/gadgets_it_s_use_and_stress_on_lifstyl e.6.aspx.
- Normuliati, S. and Urahmah, N. (2023) ‘Permainan Tradisional Balogo Pada Masyarakat Kalimantan Selatan Dalam Karya Sastra’, *Tashwir*, 11(1), pp. 31–43. Available at: <https://doi.org/10.18592/jt.v11i1.9476>.
- Nusi, I. et al. (2025) ‘Hubungan Durasi Penggunaan Alat Elektronik (Gadget), Aktivitas Fisik dan Pola Makan dengan Status Gizi Pada Remaja Di SMP Negeri 1 Kota Gorontalo’, *Jurnal Kolaboratif Sains*, 8(1), pp. 377–389. Available at: <https://doi.org/10.56338/jks.v8i1.6686>.
- Oyibo, K. (2020) *Designing culture-tailored persuasive technology to promote physical activity*. University of Saskatchewan.
- Peng, B. et al. (2025) ‘From physical self-esteem to sports participation: The mediating role of exercise motivation and social support in adolescents’, *PLoS ONE*, 20(5 May), pp. 1–20. Available at: <https://doi.org/10.1371/journal.pone.0324588>.

- Piores, V. et al. (2024) 'Gadget Use and Physical Activity Among Children: Involvement Process Theory', *Journal of Physical Education (Maringa)*, 34(1), pp. 1–16. Available at: <https://doi.org/10.4025/jphyseduc.v34i1.3456>.
- Prabowo & Gibran (2024) *Asta Cita Visi, Misi dan Program Kerja Prabowo-Gibran*. Jakarta.
- Rashid, S.M.M. et al. (2021) 'Prevalence and impact of the use of electronic gadgets on the health of children in secondary schools in Bangladesh: A cross-sectional study', *Health Science Reports*, 4(4), pp. 1–9. Available at: <https://doi.org/10.1002/hsr2.388>.
- Rey-Brandariz, J. et al. (2023) 'Sedentary behavior and physical inactivity from a comprehensive perspective', *Gaceta Sanitaria*, 37, p. 102352. Available at: <https://doi.org/10.1016/j.gaceta.2023.102352>.
- Sivan, A. et al. (2020) 'Adolescents' self-exploration in leisure experience', *Leisure/ Loisir*, 44(4), pp. 441–468. Available at: <https://doi.org/10.1080/14927713.2020.1815561>.
- Sulistiyana, Rachmayanie, R. and Alamarani, N.A. (2022) 'Bimbingan Kelompok dengan Permainan Egrang Batok Kelapa Meningkatkan Karakter Kerja Keras Generasi Z', *Indonesian Journal Guidance and Counseling: Theory and Application*, 11(2), pp. 51–61. Available at: <http://journal.unnes.ac.id/sju/index.php/jbk>.
- Tao, D. et al. (2022) 'The Physiological and Psychological Benefits of Dance and its Effects on Children and Adolescents: A Systematic Review', *Frontiers in Physiology*, 13(June), pp. 1–13. Available at: <https://doi.org/10.3389/fphys.2022.925958>.
- World Health Organisation (2022) *Global Status Report on Physical Activity 2022*. Available at: <https://www.who.int/teams/health-promotion/physical-activity/global-status-report-on-physical-activity-2022> (Accessed: 15 March 2025).