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Interactive Human Ludo Game to Elevate PHBS Knowledge in School-Age Kids

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Abstract:
School-age children face various health challenges due to the suboptimal implementation of Clean and Healthy Living Behavior (PHBS), including irregular handwashing with soap and improper waste disposal. A lack of awareness regarding PHBS is one of the main contributing factors. This study aims to evaluate the effectiveness of an interactive educational approach using the Human Ludo game to enhance PHBS knowledge among school-age children. This research employed a one-group pretest-posttest design, with data analysis conducted using the Wilcoxon test. The results revealed a statistically significant increase in knowledge following the intervention (p-value = 0.000, significance level = 0.005), demonstrating the effectiveness of the Human Ludo game. Its interactive nature fosters active engagement, allowing children to better comprehend and retain health-related concepts. In conclusion, the Human Ludo game significantly improves children's knowledge of PHBS, providing an innovative, engaging, and effective learning method that can be widely applied in school-based health education programs. This game-based learning approach encourages participation, enhances knowledge retention, and promotes healthy behaviors. Future studies should explore the long-term effects of the Human Ludo game on knowledge retention and its potential applications across broader educational topics.

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INTRODUCTION

Health problems among school-age children frequently stem from the suboptimal implementation of Clean and Healthy Living Behavior (PHBS). One critical issue is the low adherence to handwashing practices, which remains underemphasized in school environments (Riastawaty, 2021). Limited awareness of hygiene's importance leads children to overlook its impact on health. For instance, during recess, they engage in play, eat without washing their hands, and improperly dispose of food waste (Maelissa & Ukru, 2020). According to Dyna, Putri, and Indrawati (2018), diarrhea remains one of the most common illnesses affecting elementary school children, closely associated with low PHBS awareness. Several challenges hinder PHBS implementation in schools, including the lack of active teacher involvement in delivering hygiene and health-related lessons.

Epidemiological data reinforce the urgency of addressing this issue. In 2023, Indonesia recorded over 4 million diarrhea cases. In East Java Province, according to BPS (2022), 183 thousand diarrhea cases were documented, with Sidoarjo Regency ranking second highest,

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reporting 12 thousand cases. A preliminary survey conducted at SDN Medaeng 2 Sidoarjo revealed that, within one week, 5–7 students were absent due to PHBS-related illnesses, including diarrhea, typhoid fever, and flu. Interviews with five fourth-grade students indicated infrequent handwashing before eating or after playing and a tendency to litter near classroom windows or inside desk drawers. These behaviors highlight a lack of understanding among students regarding the benefits, proper methods, and appropriate timing for handwashing and waste disposal.

Schools play a pivotal role in cultivating healthy habits and increasing students' awareness of PHBS. The implementation of PHBS in schools is a key government initiative aimed at promoting healthy lifestyles through education (Bur & Septiyani, 2020). Collaboration between schools and healthcare centers is essential for reinforcing PHBS education and promotion (Sinaga & Fidorova, 2023). Additionally, teachers hold a critical responsibility in instilling values of cleanliness and health (Ikadarny & Syafruddin, 2023). One effective approach for enhancing PHBS awareness involves engaging and interactive health education methods. Various educational tools, including lectures, animated videos, posters, flip charts, and games, have been widely implemented in learning environments (Kusmiati & Sumarno, 2018). Among these strategies, Ludo—a strategic board game that fosters interaction among players—has gained attention as an effective educational medium (Ningsih & Pritandhari, 2019).

Beyond entertainment, Ludo contributes to skill development, enhancing fine motor coordination, patience, accuracy, sportsmanship, analytical thinking, and social interaction. Research by Normaya, Zaman, and Muknim (2024) suggests that integrating Ludo into health education significantly improves children's understanding of healthy snacks. Building upon this foundation, the present study aims to evaluate the impact of the Human Ludo game on improving school-age children's understanding of PHBS. This study employs a quasi-experimental design, comparing the knowledge acquired by children engaging with the Human Ludo game against those receiving traditional health education methods. By measuring changes in PHBS awareness, this research seeks to provide insights into the effectiveness of interactive learning through games in promoting health consciousness among young learners.

METHOD

This study employed a pre-experimental design with a one-group pretest-posttest approach to measure changes in PHBS knowledge among school-aged children following the Human Ludo intervention. The study was conducted in March 2024 at Medaeng 2 Elementary School, Sidoarjo. The study population consisted of 4th-grade students, and participants were selected using simple random sampling to ensure a representative and diverse sample. A total of 20 students participated in the study, in accordance with the rules of the Human Ludo game. The inclusion criteria were children aged 9–12 years who had received parental consent to participate. Prior to data collection, ethical approval was obtained, as documented in the Ethics Eligibility Test Letter No. 05-Reg/STIKES-WB/ETIK/IV/2024, along with permissions from the school and parents.

Data collection began with a pretest, during which respondents completed a 20-item multiple-choice questionnaire assessing knowledge related to handwashing with soap and proper waste disposal. The students were then divided into four groups of five. Before the sessions started, the researcher explained the game rules clearly to all participants. Each game session lasted 30 minutes and was conducted twice on separate days. On the second day, following the final session, a posttest was administered to evaluate improvements in the students' understanding of PHBS. The Wilcoxon signed-rank test was used for statistical analysis, as it is suitable for assessing differences in paired non-parametric data, such as pretest and posttest scores.

RESULT

Table 1. Characteristics of Respondents (n=40)

Characteristics	Frequency	Percentage (%)
Gender		
Male	23	57.5
Female	17	42.5
Father's Last Education		
Junior High School	3	7.5
High School	31	77.5
Higher Education	6	15.0
Mother's Last Education		
Elementary School	7	17.5
Junior High School	4	10.0
High School	24	60.0
Higher Education	5	12.5

The study participants were categorized based on various characteristics. Based on table 1 it can be concluded that of the 40 respondents, it is known that the majority were male (57.5%), almost all of their fathers' last education was high school (77.5%), most of their mothers' last education was high school (60%), most of their fathers' jobs were private employees (72.5%), and most of their mothers' jobs were housewives (65%).

Table 2. Level of PHBS Knowledge in School-Age Children Pre-Intervention Playing Human Ludo (n=40)

Category	Frequency	Percentage(%)
Poor	1	2.5 %
Adequate	26	65 %
Good	13	32.5 %
Total	40	100 %

Based on Table 2, it can be concluded that of the 40 respondents, on average, 65% have a sufficient level of knowledge.

Table 3. Level of PHBS Knowledge in School-Age Children Post-Intervention Playing Human Ludo (n=40)

Category	Frequency	Percentage(%)
Poor	0	0 %
Adequate	0	0 %
Good	40	100 %
Total	40	100 %

Based on Table 3, it can be concluded that out of 40 respondents, all (100%) had good knowledge after playing the Human Ludo game.

Table 4. PHBS Knowledge Level in School-Age Children Pre-Post Intervention Playing Human Ludo (n=40)

Knowledge Level	Pre-Intervention		Post-Intervention		p-value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Good	13	32,5	40	100	0.000
Adequate	26	65	0	0	
Poor	1	2,5	0	0	
Total	40	100	40	100	

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Based on Table 4, the Wilcoxon test analysis results indicate that the p-value is 0.000, which means $p < 0.05$. Thus, it can be concluded that health education delivered through the Human Ludo game has a significant influence on PHBS knowledge among school-age children at SDN Medaeng 2 Sidoarjo.

DISCUSSION

PHBS Knowledge Level in School-Age Children: Pre-Intervention Playing Human Ludo

It was found that, prior to playing the Human Ludo game, most respondents had a sufficient level of PHBS knowledge. Various factors can influence the level of student knowledge, which can be categorized into two types: internal and external factors. Internal factors include intelligence, motivation, attitude, interest, talent, and concentration (Natasya, 2019). Meanwhile, external factors encompass influences from family, school, and society (Marganingsih, 2018).

Most fathers and mothers had a high school education as their last level of formal education. This aligns with the study by Jati and Ichsan (2021), which revealed that children with fathers holding a high school education or higher displayed better creativity, intelligence, memory, and school achievement compared to children whose fathers had an education level below high school. Similarly, children with mothers educated to the high school level also demonstrated better achievements than those with mothers educated below high school (Rahmadana & Ichsan, 2021). Parental education significantly influences their approach to parenting, including how they educate, care for, and pay attention to their children (Baiti, 2020). Parents with higher education levels are often more confident in providing learning assistance from school to their children, making their involvement crucial in their children's educational process (Mujahiduddin, 2019). Higher parental education is associated with greater awareness of the importance of their children's education, whereas lower levels of education tend to result in less focus on this aspect (Emor et al., 2019).

Researchers propose that the last level of parental education significantly impacts children's knowledge of PHBS. Limited parental education may lead to ineffective parenting strategies, which in turn hinder the development of children's cognitive abilities and their capacity to understand new information.

PHBS Knowledge Level in School-Age Children: Post-Intervention Playing Human Ludo

After playing Human Ludo, all respondents demonstrated good knowledge. Factors influencing knowledge include age, experience, intelligence, and gender. This study was predominantly composed of respondents aged 10 years. Psychologically, 10 is an age characterized by heightened curiosity and a tendency to view things from their perspective. This developmental stage affects their way of thinking and ability to process and retain information. Additionally, at this age, rapid brain development occurs, making it easier for children to absorb and remember the information provided (Safa, Khoirun, Sabrina, & Nailal, 2021).

Researchers assume that the primary factor influencing good knowledge about PHBS is the child’s age. At the age of 10, curiosity levels are exceptionally high, making children more eager to learn about PHBS through the Human Ludo game while engaging with their peers. The Human Ludo game was chosen because it aligns with the developmental characteristics of 10-year-olds, who are naturally drawn to exploratory activities, enjoy building concepts of cooperation, and have a strong competitive spirit. As a group-based game, the Human Ludo game matches the social and interactive nature of the respondents. Post-test interviews revealed that children found the Human Ludo game highly enjoyable and engaging to play together, and they appreciated receiving new information in an interesting and fun way.

Most respondents were male. Gender is often regarded as a predisposing factor for PHBS. However, research by Fadhila & Rangkuti (2021) indicates no significant relationship between gender and PHBS (p-value = 0.176; p > 0.005). While discrepancies between research findings and existing theories exist, this is not considered an issue, as other factors may influence the relationship. The gap in this study could be attributed to the higher number of male respondents compared to females. Additionally, the Human Ludo game appears to be more popular among males, potentially due to social and cultural factors influencing play preferences. Men also tend to be more open and enthusiastic about recreational activities, such as the Human Ludo game, which may be shaped by gender-based social norms.

The Impact of Human Ludo Game-Based Education on PHBS Among School-Age Children at Medaeng 2 State Elementary School, Sidoarjo.

Based on Table 4, education through Human Ludo has a significant influence on students' knowledge of PHBS. Game-based learning methods are often used to improve children's cognitive abilities because they convey new information in a fun and easy-to-understand way (Minasari et al., 2021). Other studies also support that an interactive game-based educational approach can improve information retention and students' active participation in health education (Putri & Hartono, 2023). Human Ludo is an interesting and easy-to-play educational game, so students can participate in educational sessions without feeling trapped in a formal learning environment (Silfia, I.G.A. Kusuma, & Isnanto, 2022).

Game-based learning methods help children develop by stimulating imagination, improving communication skills, and fostering solidarity. In addition, the emotional and social involvement created during play also helps strengthen the formation of positive behaviors, including clean and healthy living behaviors (Santoso & Wibowo, 2022). The application of Human Ludo in health education has been shown to increase children's interest and involvement in learning sessions.

This game also encourages students to be more confident and active in the learning process, including in answering questions given during the session. Using Human Ludo as a learning method has been proven to motivate children, making them more enthusiastic in understanding PHBS (Nissa & Ariani, 2021). Research by Nisa (2019) also shows that the use of Ludo media in health education significantly improves children's cognitive learning outcomes and shows very good psychomotor results. Human Ludo has been shown to effectively increase student motivation and their enthusiasm during the learning process.

Education with Human Ludo game media has been shown to increase children's knowledge of PHBS, especially in terms of washing hands with soap and disposing of garbage properly. This game is equipped with challenge cards and information cards obtained in special zones, so that children become accustomed to these habits after playing this game twice. This increase in knowledge strengthens the effectiveness of Human Ludo as a learning medium in improving children's understanding of PHBS. Human Ludo media is designed to increase children's curiosity, competitive spirit, and cooperation in reaching the finish line, while providing health education through play activities.

This study is among the first in Indonesia to examine Human Ludo as a health education tool for elementary students. Unlike traditional lecture-based methods, Human Ludo combines play and learning to enhance children’s knowledge. Results suggest game-based interventions like Human Ludo can be effectively used in school health promotion, offering nurses and educators a creative, child-friendly approach to hygiene education. The success of Human Ludo highlights the value of age-appropriate, engaging methods that boost knowledge and active participation.

Limitations include a small sample size (20 students), a single school setting, and a short intervention period without long-term follow-up. Future research should involve larger, more diverse groups and assess sustained outcomes.

CONCLUSION

This study demonstrates that before playing the Human Ludo game, most participants possessed a sufficient level of knowledge. Following the intervention, there was a significant improvement in their understanding. The findings suggest that using the Human Ludo game as an educational tool is effective in enhancing students' knowledge of PHBS. Therefore, it is recommended to continue utilizing game-based approaches to strengthen health education and sustain knowledge improvement among students.

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CONFLICT OF INTEREST

The author stated that they have no conflict of interest related to the creation of this manuscript.

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