From Play to Practice: Designing the Menararia Board Game for Promoting Clean and Healthy Living Behavior Among School-Aged Children

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Abstract

Clean and Healthy Living Behavior in schools serves as a foundational step toward cultivating healthy and high-quality human resources for national development. This study aimed to develop a health promotion medium in the form of a board game called Menararia, designed to enhance knowledge and engagement among school-aged children. This research employed a qualitative research and development (R&D) design. Informants were selected purposively and consisted of three experts (a media specialist, a public health expert, and a practitioner) and three elementary school students. Data were collected through direct observation and in-depth interviews. The development process comprised strategic design, media development, and initial testing. During the strategic design phase, the team defined communication objectives using the SMART framework, launched a school-based improvement program called ARSHAT (Anak Bersih, Sehat, Kuat or Clean, Healthy, and Strong Children), identified key implementation partners (e.g., Jember Health Office, Semboro Health Center, and UNICEF Indonesia), and established an implementation timeline (March–May 2023). The development phase included creating educational materials based on eight indicators, designing game components (board, cards, and rules), and producing visual elements with consistent use of blue, white, and gray color schemes and child-friendly typography (Poppins, PhagsPa, Arial). Experts found the game largely appropriate but recommended minor adjustments. The Menararia board game shows strong potential as a health communication medium to promote Clean and Healthy Living Behavior among children. Initial feedback suggests it is engaging and contextually relevant, though minor content revisions are needed to optimize its effectiveness.

Keywords: *Clean and Healthy Living Behavior, Board Game, School-Aged Children, Health Promotion, Educational Media*

INTRODUCTION

Clean and Healthy Living Behavior in schools refers to a set of lifestyle practices adopted by all members of the school community, including students, teachers, and surrounding stakeholders. Clean and Healthy Living Behavior serves as a foundational effort to cultivate healthy and high-quality human resources, which are essential for national development. All school community members are expected to engage in clean and healthy behaviors to foster a hygienic and health-promoting school environment. The implementation of Clean and Healthy Living Behavior aims to establish conditions that support the smooth and effective delivery of teaching and learning processes. Moreover, it contributes to the overall well-being of students, teachers, and the broader community, by minimizing health-related disruptions (Asharo et al., 2021; Nagy-Pénzes et al., 2024).

According to the East Java Provincial Health Profile (2018), the average percentage of households practicing Clean and Healthy Living Behavior in East Java was 56.13%, reflecting a decline from 59.2% in 2017. In Jember Regency, the percentage increased marginally by 0.3%, reaching 68.1% in 2018, still below the national target (Dinas Kesehatan Provinsi Jawa Timur, 2018). The low household-level adoption of Clean and Healthy Living Behavior increases the likelihood that unhealthy behaviors may be transferred into the school environment (Azfiani, 2022; Nurhidayati et al., 2022). This concern is reflected in school-level data from Jember Regency in 2022, where only 44.7% of elementary and Islamic elementary schools achieved Stratum IV, indicating compliance with nearly all Clean and Healthy Living Behavior indicators—a slight decline from 45.3% in 2021.

In Semboro Subdistrict, only 56% of educational institutions (Elementary School/Islamic Elementary School) met health standards. Among the lowest-performing schools within the Semboro Public Health Center's jurisdiction is Nurul Huda Islamic Elementary School. A preliminary study conducted in 2022 through interviews with the Health Promotion Officer at the Semboro Health Center revealed that the school met only 5 out of 8 Clean and Healthy Living Behavior indicators (62.5%). Health promotion efforts by the Semboro Health Center and the Jember District Health Office have primarily relied on lectures and group discussions, supported by printed media such as posters and leaflets. This situation underscores the need for more effective and engaging health promotion strategies in schools.

In the modern era, educational and promotional approaches that incorporate games are increasingly favored, as the method of material delivery significantly influences the success of learning among children. A delivery method that is enjoyable, engaging, and easy to understand positively impacts the educational process (Muqdamien et al., 2021). Play-based learning has also been shown to support children's mental health (UNICEF, 2023). One health promotion medium gaining attention is the board game, a physical game format that facilitates interactive learning. Bawawa et al., (2025) found that board games can be effective learning tools in resource-limited settings, with 80% of students achieving good performance outcomes. Board games have proven effective in enhancing public understanding of specific topics, including among school-aged children. Hilman et al., (2022) demonstrated that a modified snakes-and-ladders board game containing Clean and Healthy Living Behavior content significantly improved knowledge among elementary students. Similarly,Vita-Barrull et al., (2023) showed that board games used in rural schools provide academic benefits and support cognitive development.

This study is a Research and Development (R&D) project aimed at designing and evaluating a board game called *Menararia* as a health promotion medium to improve Clean and Healthy Living Behavior among school-aged children. The game is intended to offer an engaging, age-appropriate learning experience that enhances children's understanding and adoption of Clean and Healthy Living Behavior principles, particularly in low-resource school settings. The name *Menararia* is derived from the game's central component, tower blocks (*Menara Balok*), and symbolizes the cheerful and interactive nature of childhood learning. The development process is guided by the P-Process theory, a strategic framework for planning health communication programs. The P-Process facilitates systematic analysis, design, testing, implementation, monitoring, and evaluation of strategies, materials, and media to ensure the game is both educationally effective and practically feasible (Caldas et al., 2013). Indicators of success include the systematic development of a strategic design, implementation of the *Menararia* board game according to defined stages, completion of trials involving experts and target users, and product revision based on evaluation results and feedback.

METHODS

This study employed a Research and Development (R&D) design with a qualitative approach. The research was conducted from March to May 2023 in Jember Regency. Informants included a media expert, a public health expert, and a practitioner, selected based on criteria outlined in Table 1.

Table 1. Criteria of Key Informants

Key Informant	Criteria of Key Informants
Media Expert	Possesses experience and certification in visual media and is proficient in media evaluation across visual dimensions
Public Health Expert	Has experience in school-based health promotion programs and a strong understanding of research concepts and content
Practitioner	Serves as a Health Promotion Officer at the Semboro Community Health Center, Jember Regency, with experience in school-based health programs

In addition, individual target testing was conducted involving students from Semboro's Nurul Huda Islamic Elementary School in grades IV, V, and VI, with one student selected from each grade. A total of three students were chosen to participate in the preliminary testing phase, which aimed to assess the feasibility, comprehensibility, and attractiveness of the media prior to broader-scale implementation.

Primary data consisted of observations related to the strategic design and the results of the trial and evaluation of the *Menararia* board game, obtained through in-depth interviews. Secondary data included information from the East Java Provincial Health Office and the Jember District Health Office regarding Clean and Healthy Living Behavior indicators and

supporting facilities, student enrollment data from Semboro's Nurul Huda Islamic Elementary School, and relevant journals, literature, and other references on Clean and Healthy Living Behavior.

Data collection techniques included observation and in-depth interviews. The data were analyzed using content analysis, which involved several stages: transcription, data familiarization, coding, categorization, theme extraction, interpretation, and presentation of findings. To ensure credibility, the study employed a member check procedure with the key expert informants - the public health expert, media expert, and practitioner. Member checking was conducted after data collection to verify the accuracy and alignment of the information with the intended meaning of the data sources (Mekarisce, 2020)

This study received ethical approval from the Ethics Committee of the Faculty of Dentistry, University of Jember (Approval No. 195/UN25.8/KEPK/DL/2023). All informants were provided with a clear explanation of the research objectives and procedures and gave their voluntary consent to participate through informed consent.

RESULT

The development of the *Menararia* board game followed four sequential stages: strategic design, development, trial/evaluation, and revision. During the strategic design phase, the primary communication objective was to offer an alternative intervention method to promote Clean and Healthy Living Behavior among elementary school students through a board game format. The intervention, titled ARSHAT (Anak Bersih, Sehat, dan Kuat), carried the tagline "Health begins with... Me!" and emphasized fostering personal responsibility in driving health behavior change.

During the development phase, game content was created based on eight school-level Clean and Healthy Living Behavior indicators, including handwashing, healthy eating, safe sanitation practices, and regular physical activity. Health messages were embedded within gameplay to sustain engagement while facilitating learning. Content sources included the Indonesian Ministry of Health Regulation No. 2269 of 2011 and guidelines from the Ministry of Education and Culture.

A detailed breakdown of the core content incorporated into the *Menararia* board game is presented in Table 1:

Table 1. Core Content of the *Menararia* Board Game

No.	Indicator	Core Content
1	Handwashing with soap	Benefits of handwashing, diseases caused by poor hygiene, key handwashing moments, 7-step technique, assessment of handwashing facilities
2	Consuming healthy food and beverages	Benefits of healthy eating, types of nutritious foods and drinks, criteria for healthy lunchboxes, snack evaluation, canteen purchasing habits
3	Using clean and safe toilets	Definition and benefits of healthy toilet use, proper toilet habits, cleaning schedules, review of school toilet behavior
4	Disposing of waste in trash bins	Benefits of proper waste disposal, waste types and examples, 4R principles (Reduce, Reuse, Recycle, Replace), waste sorting, campaign message creation
5	Measuring weight and height every 6 months	Importance of regular checks, causes of under/overweight in children, measurement tools, practice sessions, tool availability assessment
6	Regular physical activity	Benefits of exercise, school-friendly activities, importance of warming up, warm-up practice, review of school sports schedules
7	Not smoking	Benefits of not smoking, health risks of smoking and secondhand smoke, strategies for responding when others smoke nearby
8	Eliminating mosquito larvae	Importance of mosquito control, common breeding sites, 3M Plus strategy for larvae elimination

The next stage involved the creation of the *Menararia* board game model, designed as a modified thematic Jenga-style game to ensure simplicity and ease of understanding. The model includes a comprehensive game module outlining objectives, target audience, gameplay sequence, and reflection components. Game elements consist of color-coded blocks, behavior and smart cards, warning cards, deputy pins, and supporting tools. The structured gameplay comprises four phases: preparation, opening, core activities, and closing each aimed at delivering health education through interactive play. A visual representation of the game preparation phase is shown in Figure 1.

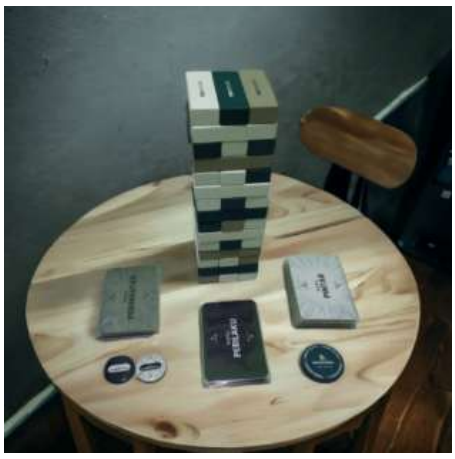

Figure 1. Illustration of the Game Preparation Phase

The subsequent stage of development focused on the composition of visual media, which includes color, typography, and illustrations. The base colors used in the *Menararia* board game are presented in Figure 2.

Figure 2. Base Colors of the Menararia Board Game

Typography was the next element considered in the visual media composition. The designer consistently employed the Poppins Family font throughout the game materials. Illustrations were incorporated selectively and appear only on specific components—namely the action cards, deputy pins, and notebook.

The trial or evaluation phase of the *Menararia* board game involved assessments of its content, game model, and visual media composition. These evaluations were conducted through in-depth interviews with subject matter experts and individual target users. The game content was reviewed by a public health expert; the game model was assessed by a school-based health promoter/educator; and the visual media composition was evaluated by a media expert. Additionally, the researcher conducted individual evaluations with members of the target audience.

Feedback from the public health expert regarding the game content is summarized in Table 2.

Table 2. Game Content Evaluation

Category	Informant Response
Suitability of content with indicators in schools	"The material is generally appropriate but needs minor revisions. The handwashing section should reflect the 6-step method per Ministry of Health guidelines. Additional indicators, such as health protocol implementation post-COVID-19, should be included. It's also suggested to present sports activities with clearer, measurable targets..."
Suitability of content with learning objectives	"The material presented is quite appropriate in addressing the objectives..."
Clarity of material explanation in the game module	"It's already clear, but the explanation of the material should be tailored to the target group according to their characteristics. Because the content explains specific behaviors, a facilitator's note or tip should be added so that the facilitator can further elaborate if the material is not fully understood by the target group..."
Proportion and selection of main topics	"The board game effectively encourages active behavior aligned with implementation in schools. The focus is appropriate, but each theme could benefit from slightly deeper content to ensure messages are clear and not overly general..."
Language appropriateness	"It's good, both in terms of word choice and sentence structure, and is aligned with the target group's characteristics..."

Based on the expert's assessment, several suggestions for improvement were identified. These included revising the handwashing content to reflect the 6-step method, enhancing the physical activity indicator, adding material on post-COVID-19 health protocols, incorporating facilitator notes or tips in the game module, and refining the content related to healthy food and beverage consumption. The game model, evaluated by the practitioner, with the evaluation results presented in Table 3.

Table 3. Game Model Evaluation

Category	Informant Response
Selection of health promotion media	"It's good, interesting. It matches the kinds of games children like. They'll definitely be excited and interested. This is actually the first time I've seen a game like this..."
Suitability of the game model for school-age children	"It's appropriate for kids. The module already provides clear enough explanations for facilitators. According to feedback from my fellow practitioners, the game helps because the material is already well structured, complete, and easy to understand. Also, the components in the game are good and suitable, in my opinion..."
Suitability of the game model with learning objectives	"Yes, the output is already like that, sir..."
Appropriateness of content delivery through the game	"The game is engaging and effectively delivers educational content in a fun way. However, certain topics like the 4R principles could be explained more clearly to prevent confusion..."
Flexibility of the *Menararia* board game	"In my opinion, it's already quite good and flexible. It seems this board game can be adapted and brought into various learning materials. The rules and instructions can also be modified as needed..."

The game model, assessed by practitioner received recommendations particularly regarding the delivery of messages related to the 4R (Reduce, Reuse, Recycle, Replace) principles. However, the evaluation related to the selection of the type of health promotion media, the suitability of the game model for school-aged children, its alignment with learning objectives, and its overall flexibility was deemed appropriate and effective by both the practitioner informant and individual users. The visual media composition was assessed by a media expert. The evaluation results can be seen in Table 4.

Table 4. Visual media composition evaluation

Category	Informant Response
Color selection	"Overall, the game is good and aligns well with its purpose. The color scheme is appropriate for pre-teens; brighter colors would only be necessary if it were designed for children…"
Typography selection	"The font is clear and suitable for elementary students. Key sentences on action cards are well-emphasized, aiding understanding. A playful font would only be needed for children..."
Illustration selection	"The illustrations are appropriate in size and serve well to make the game visually engaging for children. As they mainly function as decoration, there's no issue. Adding illustrations to other components could offer more flexibility, especially for facilitators..."

The Visual media composition evaluation, assessed by media expert, resulted aspects evaluated included color, typography, and illustration.

Evaluation and review were also conducted with individual targets, namely three students from Nurul Huda Islamic Elementary School. The evaluation results are presented in Table 5.

Table 5. Individual Target User Evaluation

Category	Informant Response
Selection of health promotion media	"It's great, sir. I like the game..." (Student 1) "It's great, sir, very interesting. At first, I didn't know about this game, now I do..." (Student 2) "I really love it, sir, it's fun and exciting..." (Student 2)
Selection of visual media composition	"It's interesting, the colors are already great, sir..." (Student 1) "The writing is clear, I like the pictures and the colors too..." (Student 2) "Looks good, sir..." (Student 3)
Selection of game type and characteristics	"It's exciting... the game is challenging, so it doesn't get boring..." (Student 1) "It's really fun, sir, in my opinion — quite thrilling..." (Student 2) "Totally fun, super exciting for sure..." (Student 3)

Both the media expert and individual users judged the visual composition to be appropriate and effective, with no further revisions recommended.

The next step in developing a health promotion medium, following the trial or evaluation to assess feasibility, is the revision phase. The revised game components are presented in Table 6.

Table 6. The revised game components

Illustration	Description
	**12 Blue Blocks** Serve as the main components of the game for building the tower, earning points written on the blocks (25–30 points), and activating behavior cards.
	**24 White Blocks** Serve as main game components used to build the tower, earn points (10–20 points), and activate smart cards.
	**9 Gray Blocks** Function as core components for constructing the tower, earning points (3–7 points), and activating warning cards.
	**13 Behavior Cards** Contain questions and commands aimed at assessing clean and healthy living behaviors.
	**25 Smart Cards** Contain questions or informational content that enhance knowledge related to clean and healthy living behavior.
	**10 Warning Cards** Contain opportunities, challenges, or new rules that must be followed during the game.

Illustration	Description
	**1 Health Deputy Pin** Acts as protection if a player causes the tower to fall. The player does not lose points and may continue to play in the next round. Obtained via special-marked behavior cards.
	**1 Cleanliness Deputy Pin** Serves as protection if the tower collapses. The player retains their points but is paused for one round. This pin is acquired through special-marked smart cards.
	**1 Notebook** Used to record each player's score throughout the game.
	**1 Turn Token** Used to indicate the current player's turn or the next player to remove a block.
	**1 Game Module** Serves as the guide or manual for playing the *Menararia* Board Game.

DISCUSSION

Educational interventions that utilize play-based learning methods are well-suited to the developmental characteristics of school-aged children and have been shown to positively influence knowledge acquisition. Through play, children engage in hands-on experiences that enhance their understanding of educational content, offering a more effective alternative to passive learning methods such as lectures or discussions. This approach optimizes information retention, particularly regarding the adoption of Clean and Healthy Living Behavior in school settings (Renamastika et al., 2025). Game-based delivery of Clean and Healthy Living Behavior education has proven effective, as demonstrated by Hikmah et al., (2023), whose study combined counseling with an educational snakes-and-ladders game. This method successfully trained students to answer Clean and Healthy Living Behavior-related questions and improved their health behaviors. Similarly, a quasi-experimental intervention by Nisa et al., (2024) revealed significant improvements in knowledge, attitudes, and practices following the implementation of the "Health Lore Games." These findings align with Maulidina et al., (2024), who found that physically played board games had a greater positive impact on motor skills than electronic games. Physical interaction among players fosters strategic thinking and provides an enjoyable, challenging environment for knowledge testing.

Recent research further supports the effectiveness of game-based learning in enhancing both knowledge retention and emotional engagement. For example, Lin (Lin et al., 2020) developed an augmented reality (AR)-enhanced board game for health education, which

significantly improved learning outcomes and elicited positive emotional responses compared to traditional board games. This supports the strategy of integrating playful, interactive methods to teach PHBS. Likewise, Marsofely *et al.*, (2024) introduced a board game titled "Towards Health," designed to teach healthy lifestyle behaviors including nutrition, physical activity, and sleep to school-aged children. Their study found that embedding physical activities into gameplay increased engagement and sustained behavioral intention. These findings reinforce the rationale that multisensory, movement-based play enhances both the absorption and application of health-related content.

As evidence grows regarding the effectiveness of game-based learning in promoting Clean and Healthy Living Behavior among children, it is important to consider the broader implementation context. One major challenge in health education is the limited resources available in rural schools. A lack of infrastructure, interactive media, and teacher training often impedes the delivery of engaging and comprehensible health content. In such settings, analog game formats like board games offer an affordable, flexible, and effective educational solution. Vita-Barrull et al., (2023b) found that board games promote cognitive development more effectively than conventional methods, making them particularly relevant for resource-limited schools. Mohamad et al., (2020) also demonstrated that board games are adaptable and can be successfully implemented in rural schools despite infrastructure constraints.

Board games are characterized by relatively complex components and gameplay mechanics, involving the placement, movement, and manipulation of elements on a game board governed by specific rules and narratives (Scorviano, 2010). This complexity, rather than being a limitation, serves as a pedagogical strength. It encourages strategic thinking, staged comprehension, and sustained engagement. Gui et al., (2023) found that board games designed to introduce concepts incrementally reduce cognitive load and enhance understanding of complex subjects.

Analog board games offer distinct advantages over digital games and traditional learning methods across cognitive, emotional, and social domains. These include improvements in memory, numeracy, problem-solving, motivation, engagement, interaction, and collaboration Tokarchuk et al., (2024) conducted a survey involving parents of children aged 3 to 7 years, revealing that board games are preferred for promoting parent-child interaction, enhancing social bonding, and reducing isolation compared to digital games. Wang et al., (2022) reported that board games yielded the highest effect size (ES = 1.455, $p < .001$) in STEM learning achievement, outperforming immersive and digital tutorial games.

Aesthetic design and component selection play a crucial role in creating an immersive and enjoyable gameplay experience. The base colors chosen for the *Menararia* board game blue, white, and gray serve as distinctive visual identifiers, reflecting the game's identity and uniqueness (Nityanasari, 2020). Typography is another essential element in visual media design. Principles such as legibility, readability, visibility, and clarity ensure that text is easily understood. Typography selection is critical for communication legibility (Sieghart, 2023; Day et al., 2024). Animated visual illustrations were also incorporated to entertain and engage students while delivering educational content. Sibarani et al., (2024) found that animation significantly improved science learning outcomes among third-grade students in a pre-test/post-test experiment. Illustrations tailored to children's cognitive and emotional levels ranging from realistic to abstract styles, serve as effective communication tools.

Following the design development and component selection phases, the next stage involved trial testing of the *Menararia* board game. This phase assessed the media's functionality, player engagement, and effectiveness in conveying Clean and Healthy Living Behavior messages to school-aged children. Azizi-Soleiman *et al.*, (2023) developed and tested a board game themed around healthy lifestyles. Their experimental study included expert validation and trials with elementary students, resulting in significant improvements in health knowledge and motivation. These findings underscore the importance of thoroughly evaluating educational media before large-scale implementation. Trial testing is essential for identifying areas requiring refinement, whether in content or gameplay mechanics.

The final stage in developing a health promotion medium is the revision phase, conducted based on feedback and suggestions from informants (Kartini & Putra, 2020). Recommended improvements focused on two main aspects: content and game design. Content-related suggestions included revising the handwashing steps, enhancing physical activity indicators, adding post-COVID-19 health protocol education, incorporating facilitator notes in the game module, and refining material on healthy food and beverage consumption. Game design improvements centered on the presentation of messages, particularly those related to the 4R environmental principles: Reduce, Reuse, Recycle, and Replace.

CONCLUSION

Based on the development and evaluation of the *Menararia* board game as a health promotion medium for Clean and Healthy Living Behavior among school-aged children, the findings indicate that *Menararia* is a suitable and engaging tool for encouraging the adoption of clean and healthy behaviors within the school environment. These results support the

research objective of creating an effective, interactive health promotion medium tailored for use in educational settings. Validation from expert informants and target users confirms the game's appropriateness in terms of content, visual design, and educational delivery, with measurable improvements in understanding observed during initial trials.

Nonetheless, minor revisions remain necessary—particularly in enhancing message clarity and incorporating additional content related to health protocols. Therefore, a structured follow-up phase is recommended, involving a pilot test in 10 elementary schools, accompanied by pre- and post-intervention knowledge assessments to quantitatively evaluate learning outcomes. This next step will not only strengthen the evidence base but also inform final refinements to the game.

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