



Adolescent Behavior in Implementing Clean and Healthy Living Practices through Local Wisdom-Based Character Education: A Cross-Sectional Study

Ahmad Yani^{1*}, Indra Afrianto², Muhammad Syukran³, Wa Ode Nova Noviyanti Rachman⁴, Zuriati Muhamad⁵

¹Faculty of Public Health, Universitas Muhammadiyah Palu, Sulawesi Tengah, Indonesia

²Faculty of Public Health, Universitas Muhammadiyah Palu, Sulawesi Tengah, Indonesia

³Faculty of Public Health, Universitas Muhammadiyah Palu, Sulawesi Tengah, Indonesia

⁴Faculty of Health Sciences, Universitas Mandala Waluya, Kendari, Sulawesi Tenggara, Indonesia

⁵Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Gorontalo, Indonesia

*Corresponding Author: E-mail: ahmadyani@unismuhpalu.ac.id

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ABSTRACT

Introduction: Adolescence is a crucial phase for the development of lifelong health behaviours. Clean and Healthy Living Behavior (PHBS) is essential for enhancing public health, particularly among adolescents. This study focuses on the role of character education based on local wisdom in promoting PHBS among adolescents in Balaesang District, Donggala Regency.

Methods: A cross-sectional study was conducted from June to September 2024, involving 150 adolescents aged 12-15 years. Data were collected using structured questionnaires and field observations. The study evaluated the relationship between knowledge, attitudes, and actions towards PHBS and the impact of character education based on local wisdom. Data analysis was conducted using the chi-square test.

Results: The findings revealed significant relationships between knowledge ($p = 0.004$), attitudes ($p = 0.001$), and actions ($p = 0.002$) toward the implementation of PHBS. Character education based on local wisdom was found to strengthen adolescents' knowledge, attitudes, and actions, leading to improved implementation of PHBS.

Conclusion: Character education incorporating local wisdom plays a vital role in promoting clean and healthy behaviours among adolescents. Integrating cultural values with health education can effectively enhance the knowledge, attitudes, and actions of students, contributing to better public health outcomes.

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INTRODUCTION

Clean and Healthy Living Behavior (PHBS) is one of the main pillars in improving the public health status in Indonesia. PHBS encompasses a range of actions carried out by individuals, families, and communities to maintain health, prevent disease, and enhance the quality of life through daily habits (1). The implementation of PHBS in educational settings, particularly among adolescents, is crucial because adolescence is a pivotal period for the formation of behaviors that will persist into adulthood (2). According to the World Health Organization (WHO), health behaviors established from a young age have the potential to impact one's health status throughout life (3). However, the low awareness and adoption of PHBS among adolescents remain a significant challenge, which, if not addressed properly, can have long-term negative effects on their health.

In the context of behavioral health change, a deep understanding of the factors influencing behavior becomes essential. Knowledge, attitude, and action are three key variables used to understand and predict an individual's health behavior (4,5). Knowledge provides a cognitive foundation that explains the importance of a behavior, attitude reflects an individual's emotional or affective response to that behavior, while action is the concrete manifestation of the formed knowledge and attitude (6). Several studies have shown that these three variables are interrelated in shaping healthy behavior, including the application of PHBS. However, even with sufficient knowledge, if not supported by a positive attitude and a conducive environment, the expected behavior does not always materialize. Therefore, a comprehensive approach to building knowledge, attitude, and action is essential to ensuring sustainable behavioral change (7).

One innovative approach that can be integrated into health behavior formation is character education based on local wisdom (8). Local wisdom refers to cultural heritage that encompasses values, norms, and practices related to cleanliness, health, and daily life that have proven to be relevant in society (8). In Indonesia, many communities possess traditions that emphasize cleanliness and health, such as the practice of *gotong royong* (mutual cooperation) in cleaning the environment, the use of natural remedies, and social values that support healthy behaviors (9). Integrating these values into character education in schools can strengthen the implementation of PHBS among students, as they would not only understand the importance of cleanliness from a scientific perspective but also from a cultural context that they recognize and respect (9).

The selection of the research location was also based on the relevance of local wisdom to health behaviors in the target community. Balaesang District, Donggala Regency, Central Sulawesi, was chosen as the research site because this area has a rich cultural heritage that is well preserved by the local community, including values of local wisdom related to health. Traditions such as *gotong royong*, the use of medicinal plants, and social cohesion are important elements that can support the study of the influence of character education based on local wisdom on the implementation of PHBS. Moreover, the challenges faced by this region in implementing PHBS among adolescents make it an ideal location to evaluate the extent to which the integration of local wisdom in health education can enhance healthy living behaviors (10).

Although many studies have examined factors influencing the implementation of PHBS, there is a gap in the literature regarding the integration of character education based on local wisdom in the context of PHBS among adolescents (11–13). Most previous studies have focused more on conventional health education approaches, while the importance of local wisdom as a factor that can influence health behaviors is often overlooked. In fact, other research suggests that education linking local culture with health content is more effective in changing behavior than approaches that are disconnected from the cultural context of students. Thus, there is an urgency to explore how character education based on local wisdom can strengthen students' knowledge, attitudes, and actions toward the implementation of PHBS.

This study aims to address this gap by assessing the relationship between students' knowledge, attitudes, and actions regarding PHBS, while also examining the role of character education based on local wisdom in supporting these healthy behaviors. The study will provide new insights into the effectiveness of culturally-based approaches in health education and offer a foundation for developing educational and health policies that are more aligned with the needs of local communities. The findings of this research are expected to not only be applicable to the research area but also to other regions with similar cultural characteristics, thereby enhancing the success of PHBS implementation across Indonesia.

METHOD

This study employs a quantitative approach with a cross-sectional study design, aimed at evaluating the relationship between character education based on local wisdom and clean and healthy living behaviors (PHBS) among early adolescents. The research was conducted from June to September 2024 in Balaesang District, Donggala Regency. The study population includes all adolescents aged 12-15 years enrolled in schools within the district. Using purposive sampling, 150 respondents were selected based on inclusion criteria, namely adolescents aged 12-15 years who reside in Balaesang District and are actively enrolled in formal schools.

Data collection was carried out through two primary methods: structured questionnaires and field observations. The questionnaire instrument used was validated through a pilot study with a small sample before the main research. Construct validity was tested using factor analysis to ensure that each item accurately measured the intended concept. Ethical considerations were also taken into account in this study, with respondents being fully informed about the purpose and procedures of the research. Written informed consent was obtained from each respondent, and their data confidentiality was maintained throughout and after the study.

Data analysis was performed using the chi-square test to evaluate the correlation between knowledge, attitude, and actions related to PHBS, as well as character education based on local wisdom among the respondents.

Ethical Considerations

This study has not yet received ethical approval from the Ethics Committee. However, it has been conducted in accordance with ethical research principles outlined in the Declaration of Helsinki and applicable research ethics guidelines in Indonesia. Before data collection, all participants were provided with clear information regarding the study's objectives, procedures, benefits, and potential risks. Participation in this study was entirely voluntary, and respondents who agreed to participate provided verbal consent after receiving an explanation of the research. Additionally, confidentiality and anonymity of participants' data were strictly maintained, ensuring that personal information would not be disclosed or used for purposes beyond the study. Moving forward, the researchers will seek formal ethical approval from the relevant ethics committee to ensure compliance with established ethical research standards.

RESULTS

This section presents the key findings of the study, which include an analysis of students' knowledge, attitudes, and actions towards the implementation of Clean and Healthy Living Behavior (PHBS). The results obtained illustrate the significant relationships between these variables, as well as the role of character education based on local wisdom in influencing student behavior. These findings will be further elaborated to provide insights into the effectiveness of the approach used in this study:

Descriptive Statistics

Table 1. Distribution of Respondents' Characteristics

Characteristics	Frequency	%
Gender		
Man	80	53,3
Women	70	46,7
Age Group (Years)		
12	52	34,7
13	72	48
14	23	15,3
15	3	2

Table 1 presents the distribution of respondents' characteristics based on gender and age groups. From the table, it can be seen that the number of male respondents is higher than that of female respondents, with 80 male respondents (53.3%) and 70 female respondents (46.7%).

In terms of age groups, the majority of respondents are 13 years old, with a frequency of 72 individuals (48%), followed by 52 respondents (34.7%) aged 12. There are 23 respondents (15.3%) aged 14, and the smallest group is 15-year-olds, with only 3 respondents (2%). Overall, this table illustrates that most respondents are between the ages of 12 and 13, and there is a relatively balanced distribution between male and female respondents

Descriptive Statistics

Table 2. The Relationship between Students' Behavior and the Implementation of Clean and Healthy Living Behavior (PHBS)

Variabel	Implementation of Clean and Healthy Living Behavior (PHBS)				Total	p-value
	Not Implementing		Implementing			
	n	%	n	%		
Knowledge						
Poor	16	33,3	32	66,7	48	0,004
Good	13	12,7	89	87,3	102	
Attitude						
Poor	16	35,6	29	64,4	45	0,001
Good	13	12,4	92	87,6	105	
Action						
Poor	14	37,8	23	62,2	37	0,002
Good	15	13,3	98	86,7	113	

Table 2 provides an overview of the relationship between students' knowledge, attitudes, and actions towards the implementation of Clean and Healthy Living Behavior (PHBS). The table classifies students based on their levels of knowledge, attitude, and action, and shows the percentage of students who have or have not implemented PHBS. Each variable was analysed using statistical tests, with p-values indicating the significance of the relationships between these variables.

Firstly, based on knowledge levels, it is shown that out of 48 students with poor knowledge, 16 students (33.3%) have not implemented PHBS, while 32 students (66.7%) have implemented PHBS. Conversely, out of 102 students with good knowledge, the majority (87.3%) have implemented PHBS, with only 13 students (12.7%) who have not implemented it. A p-value of 0.004 (< 0.05) indicates a significant relationship between students' knowledge and the implementation of PHBS. This suggests that the better the students' knowledge about PHBS, the more likely they are to adopt clean and healthy behaviors.

Secondly, students' attitudes also show a significant correlation with the implementation of PHBS. Out of 45 students with a poor attitude, 16 students (35.6%) have not implemented PHBS, while 29 students (64.4%) have. Meanwhile, among the 105 students with a positive attitude, the majority (87.6%) have implemented PHBS, with only 12.4% not implementing it. A p-value of 0.001 shows a significant relationship between attitude and PHBS implementation. This indicates that a positive attitude towards cleanliness and health plays an important role in improving PHBS adoption among students.

Lastly, students' actions regarding PHBS also show a significant relationship with the implementation of this behavior. Out of 37 students with poor actions, 14 students (37.8%) have not implemented PHBS, while 23 students (62.2%) have. On the other hand, of the 113 students with good actions, the majority (86.7%) have implemented PHBS, and only 13.3% have not. A p-value of 0.002 (< 0.05) indicates that students' actions significantly influence the implementation of PHBS. This reinforces the fact that actual behavior results from good knowledge and attitude, which ultimately encourages students to be more active in practicing clean and healthy behaviors.

Overall, this analysis shows that students' knowledge, attitudes, and actions are significantly related to the implementation of PHBS. These three variables are interconnected and collectively influence the level of clean and healthy living behaviors among students. Therefore, interventions that enhance knowledge, shape positive attitudes, and encourage concrete actions in maintaining cleanliness and health are crucial to improving students' overall health.

DISCUSSION

Students' Knowledge on the Implementation of PHBS

The results of this study show that students' knowledge has a significant relationship with the implementation of Clean and Healthy Living Behavior (PHBS), with a p-value of $0.004 < 0.05$. This finding is consistent with previous studies that found knowledge has a significant impact on the implementation of health behaviors among students (14). Those with better knowledge about PHBS tend to be more disciplined in practicing these behaviors.

In this context, the concept of the Health Belief Model (HBM) is also highly relevant. According to this theory, knowledge is an essential component that influences an individual's perception of health risks and benefits, which ultimately encourages positive behavior (15). HBM explains that individuals with adequate knowledge about the importance of maintaining health are more motivated to adopt healthy behaviors. In the context of PHBS, students with good knowledge of hygiene and health are more likely to implement PHBS in their daily lives.

However, the findings of this study differ from research that found knowledge does not always correlate directly with the implementation of PHBS (16). Even though students may have good knowledge, without supervision and encouragement from their environment (such as family and school), they might not implement PHBS. This highlights the importance of other factors, such as social influences, in encouraging healthy behaviors.

Character education based on local wisdom plays a crucial role in shaping students' knowledge regarding the implementation of PHBS (17). Local wisdom often includes cultural values related to cleanliness, health, and the environment, passed down from generation to generation. For example, in many Indonesian cultures, maintaining personal and environmental cleanliness has been part of local traditions (18). By integrating this local wisdom into education, students' knowledge about PHBS can be enhanced in a more relevant and meaningful way.

Previous studies also support the idea that knowledge built on local context is easier for students to understand and apply. For instance, traditions such as gotong royong (mutual cooperation) to clean the environment or the use of natural remedies for health in several regions of Indonesia can be effective means of fostering PHBS knowledge among students (19–21). Education that links these local practices with modern health theories helps students better understand the importance of PHBS in their daily lives.

The implementation of PHBS based on local wisdom not only fosters a deeper understanding but also instills pride in students' cultural identity, thus increasing their motivation to consistently practice healthy behaviors. Therefore, character education based on local wisdom can enrich students' knowledge of the importance of PHBS, not only from a scientific perspective but also from a cultural viewpoint.

Students' Attitudes Towards the Implementation of PHBS

This study also shows that attitudes have a significant relationship with the implementation of PHBS, with a p-value of $0.001 < 0.05$. This finding is supported by previous studies, which state that a positive attitude towards cleanliness and health is essential in determining PHBS behavior among students. Attitude is an affective response formed from individual beliefs, norms, and experiences, which is then translated into behavior.

In the context of the Theory of Planned Behavior (TPB), attitude is one of the main factors influencing the intention to perform a particular action. TPB posits that the more positive a person's attitude toward a behavior, the stronger their intention to perform that behavior (22). This explains why students with positive attitudes tend to be more consistent in implementing PHBS compared to those with less positive attitudes.

However, unlike previous studies, some research has found that attitude alone is not enough to guarantee action. The environment and social support, especially from peers and family, have a greater influence than the individual's attitude alone (22). In this case, a positive attitude towards PHBS must be reinforced by a supportive environment to ensure consistent implementation of this behavior.

Students' attitudes towards PHBS can also be influenced by character education that integrates local wisdom. Positive attitudes towards health and cleanliness embedded in local values can strengthen the implementation of PHBS among students. For example, in various local cultures in Indonesia, there is a strong belief that maintaining personal and environmental cleanliness is a reflection of good morals. These values can be integrated into character education curricula, fostering students' more positive attitudes towards the implementation of PHBS.

Character education based on local wisdom teaches the importance of individual responsibility to the community, aligning with the implementation of PHBS. The spirit of gotong royong in cleaning the environment, for instance, is not only about maintaining physical cleanliness but also reflects social responsibility recognized in local

culture. By teaching this local wisdom in schools, students not only understand the importance of cleanliness from a health perspective but also from moral and cultural standpoints, ultimately strengthening their attitudes towards PHBS.

This approach also aligns with Social Learning Theory, which suggests that attitudes can be shaped through observing and imitating others' behaviors, especially when those behaviors are positively regarded within the social and cultural context (23). By observing local wisdom practices that emphasize cleanliness and health, students can develop positive attitudes that will encourage the implementation of PHBS in their daily lives.

Students' Actions Towards the Implementation of PHBS

Students' actions were also found to have a significant relationship with the implementation of PHBS, with a p-value of $0.002 < 0.05$. This finding aligns with other studies showing that real actions are a direct indicator of the implementation of healthy behaviors. The actions students take reflect how their knowledge and attitudes are integrated into their daily behaviors (24).

From the perspective of Cognitive Behavioral Change Theory, action is the final stage of behavior change. Before acting, individuals must go through stages of knowledge enhancement and positive attitude formation (25). Actions are the end result of a cognitive process that involves both knowledge and attitudes. This study confirms that students with good knowledge and attitudes are more likely to translate them into real actions in the form of implementing PHBS.

However, compared to other studies, it has been found that students' actions regarding PHBS are not only influenced by knowledge and attitudes but also by external factors such as the availability of sanitation facilities at school (26). Even though students have good knowledge and attitudes, the lack of sanitation facilities and clean water becomes a major barrier to implementing PHBS. This highlights the importance of supportive infrastructure in improving the implementation of clean and healthy living behaviors in schools.

Character education based on local wisdom also has great potential in influencing students' actions related to PHBS. Real actions in maintaining cleanliness and health, as taught through local traditions and culture, such as cleaning the yard, washing hands before meals, or using herbal remedies for health, can serve as practical examples for students in implementing PHBS (27). When character education based on local wisdom is consistently applied in schools, students' actions in implementing PHBS become stronger and more directed.

The implementation of PHBS through character education also strengthens the concept of social responsibility, which is often embedded in local wisdom. In various regions, for instance, maintaining environmental cleanliness is a collective duty involving all community members (28). Thus, students' actions in implementing PHBS can be influenced by a sense of collective responsibility instilled early through culturally based character education.

Cognitive-Behavioral Theory is also relevant here, as students' actions are not only the result of their cognitive understanding but also a product of reinforced social and cultural values. When actions related to PHBS are supported by local wisdom norms, students are more likely to consistently apply those actions, as they are seen as part of their identity and responsibility within the community (29). Therefore, integrating local wisdom into character education enriches the implementation of PHBS in students' daily lives.

Character Education Based on Local Wisdom in Health Promotion Among Students

In addition to health education and social support, character education based on local wisdom also plays a strategic role in shaping healthy behavior among students. In many regions, local wisdom values such as gotong royong, caring for others, and responsibility towards community health have been integral parts of daily life. This local wisdom can be integrated into PHBS programs through learning that emphasizes the importance of personal and environmental health, aligned with local culture.

For example, in Indonesian society, which has a tradition of gotong royong, this value can be adopted in promoting environmental cleanliness in schools through joint activities such as cleaning the classroom or school environment. Moreover, customs that respect community health and life can be used to teach students the importance of maintaining personal health and avoiding harmful behaviors like smoking or drug abuse (30,31).

Character education integrated with local wisdom also strengthens students' sense of identity and social responsibility, motivating them to take care of their health and their environment. Using this approach, schools can

create an environment that supports the sustainable implementation of PHBS, not only through health promotion but also through strengthening positive character rooted in local cultural values.

Strengthening students' character through a local wisdom-based approach can also be supported by the role of parents and the community. As seen in studies on the role of husbands in supporting immunization in Kotarindau Village, parental involvement has a significant impact in ensuring that healthy behavior at home supports school health programs (32). When local wisdom values taught at home align with PHBS programs at school, students are more motivated to implement PHBS not only in school but also in their daily lives. This combination ensures continuity between formal and informal health education, ultimately contributing to the creation of a healthier generation aware of the importance of living clean and healthy lives (31).

By utilizing local wisdom, schools can also strengthen health education integrated with students' daily lives. For example, in the context of the strong gotong royong culture in many parts of Indonesia, PHBS can be promoted through collective activities involving all school elements. Additionally, using local language and folklore that teach about cleanliness and health can reinforce students' understanding of the importance of personal and environmental health (33).

A local wisdom-based approach can also increase students' active involvement in PHBS programs. When students feel that the school health program aligns with the cultural values they hold, their participation increases (34). For instance, activities such as cleanliness competitions between classes or villages, conducted with the spirit of gotong royong, can build collective awareness of the importance of maintaining environmental cleanliness. Moreover, the use of traditional media, such as regional games or cultural arts with health messages, can be an interesting and effective way to deliver PHBS materials (35).

Furthermore, this approach also helps create a sense of ownership toward the health program at school. When students are directly involved in activities based on their culture, they do not only become recipients of information but also agents of change in their environment (36,37). This enables the PHBS program to be implemented more widely, not only in schools but also in families and the surrounding community. Therefore, integrating local wisdom into health education can be a long-term strategy to strengthen a culture of healthy living among young generations.

Implications

The results of this study have important implications for the development of policies and programs in education and health. First, integrating character education based on local wisdom into the school curriculum has proven effective in improving students' knowledge, attitudes, and actions regarding the implementation of PHBS. Therefore, education policymakers should consider implementing a curriculum that emphasizes local values to strengthen health education in schools. Second, these findings can also serve as a basis for health intervention programs that focus more on culturally-based approaches, relevant to the needs and social values of local communities, especially in rural or traditional communities. Third, schools are expected to implement PHBS programs involving the entire school community, including teachers, students, and parents, to create an environment that supports the sustainable adoption of clean and healthy living behaviors.

Limitations

This study has several limitations. First, this study uses a cross-sectional design, which only captures data at one point in time, making it impossible to identify changes in student behavior or causal relationships clearly. Longitudinal studies are needed to observe changes in students' behavior towards PHBS over time. Second, this study was conducted in only one area, Balaesang District, Donggala Regency, so the results may not be generalizable to other areas with different cultural characteristics. Third, although this study assesses the relationship between knowledge, attitudes, and actions regarding PHBS implementation, other external factors, such as family influence, social media, and access to sanitation facilities, have not been explored in depth. Future research should consider these factors to provide a more comprehensive picture.

CONCLUSION

This study shows that students' knowledge, attitudes, and actions have significant relationships with the implementation of PHBS. Students with good knowledge and attitudes are more likely to consistently implement PHBS. Local wisdom values integrated into character education have also been shown to strengthen students'

understanding and behavior in implementing PHBS. This confirms that a local culture-based approach positively impacts improving healthy behaviors among students.

The findings of this study underscore the importance of character education based on local wisdom in enhancing the implementation of PHBS. Additionally, interventions that include improving knowledge, fostering positive attitudes, and support from the social environment and adequate infrastructure are necessary to encourage the success of the PHBS program. These findings provide a basis for developing more effective and culturally relevant education and health policies for local communities.

AUTHOR'S CONTRIBUTION STATEMENT

Ahmad Yani designed and organized the research, supervised the entire research process, and contributed to the preparation and revision of the manuscript. Indra Afrianto was responsible for data collection, statistical analysis, and drafting the methodology and results sections of the manuscript. Muhammad Syukran assisted with data analysis and interpretation, contributed to the discussion and literature review, and helped review the manuscript. Wa Ode Nova Noviyanti Rachman provided critical feedback on the revisions of the scientific article. Zuriati Muhamad was involved in editing the manuscript, coordinating communication with stakeholders, and contributed significantly to the introduction and conclusion sections. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

CONFLICTS OF INTEREST

The authors acknowledge that some of the contributors to this manuscript are also serving as editors for the journal in which this manuscript is being submitted. To ensure transparency and maintain the integrity of the editorial process, the peer review and editorial decision-making for this manuscript have been conducted independently and without the involvement of the authors in their editorial roles. This arrangement upholds the impartiality and credibility of the review process.

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