

Environmental Health Literacy and Clean and Healthy Living Behavior Teaching Practices among Early Childhood Teachers: Mediating Role of Teaching Self-Efficacy

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Abstract

Implementing Clean and Healthy Living Behavior (CHLB) in early childhood education requires teachers with adequate Environmental Health Literacy (EHL) and strong Teaching Self-Efficacy (TSE). However, empirical evidence explaining how EHL translates into CHLB instructional practices remains limited. This study examined the effect of EHL on CHLB instructional practices, with TSE as a mediating variable. A quantitative explanatory research design was employed involving 150 kindergarten teachers from 53 kindergartens in Rappocini District, Makassar, Indonesia, selected through cluster sampling. Data were collected using a structured questionnaire measuring three latent constructs: Environmental Health Literacy, Teaching Self-Efficacy, and CHLB instructional practices. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The results showed that EHL had a positive and significant effect on TSE ($\beta = 0.747$, $p < 0.001$) and CHLB instructional practices ($\beta = 0.456$, $p < 0.001$). TSE also positively influenced CHLB instructional practices ($\beta = 0.272$, $p = 0.024$) and partially mediated the relationship between EHL and CHLB instructional practices ($\beta = 0.203$, $p = 0.031$). These findings demonstrate that EHL is the primary driver of effective CHLB instructional practices, while TSE functions as a complementary psychological mechanism that translates teachers' competencies into instructional practice. The study extends the Health Literacy Framework and Social Cognitive Theory by explaining how teachers' environmental health competencies shape sustainable health-oriented teaching practices in early childhood education.

Keywords: Environmental Health Literacy; Teaching Self-Efficacy; Clean and Healthy Living Behavior (CHLB); Kindergarten Teachers; PLS-SEM.

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INTRODUCTION

Environmental health has become one of the global priority issues because it contributes directly to the quality of life, growth, and development of children from an early age. Various problems such as inadequate sanitation, environmental pollution, improper waste management, and low clean and healthy living behaviors are still risk factors that affect children's health in various countries (Etzel, 2024). This condition shows that efforts to improve health status do not only depend on health services, but also require strengthening environmental health literacy through education from an early age (Sheffield et al., 2024).

Early childhood education has a strategic position in building clean and healthy living habits because in this period children begin to develop knowledge, attitudes, and behaviors that are the basis for life habits at the next stage of development (Mediyana et al., 2025). Various studies show that health learning at the ECE level is more effective if it is carried out through concrete learning experiences, daily habits, play-based activities, and active involvement of teachers in creating a healthy learning environment (Xavierees Tungka et al., 2025). Therefore, schools serve not only as a place for knowledge transfer, but also as an environment that instills clean and healthy living behaviors in a sustainable manner (Husna, 2025).

In this context, early childhood education teachers play a central role as facilitators who translate various information about health and the environment into learning practices that are in accordance with the characteristics of child development (Nugroho et al., 2025). The ability of teachers to understand, evaluate, and apply environmental health information is an important foundation for the creation of effective PHBS learning (Anatasya et al., 2025; Daboti et al., 2025). Therefore, strengthening Environmental Health Literacy in teachers is seen as one of the important prerequisites for improving the quality of PHBS learning practices in ECE and supporting the formation of healthy living habits from an early age (Daboti et al., 2025).

Research developments in the field of early childhood health education show increasing attention to Environmental Health Literacy (EHL) as a competency that supports the formation of healthy living behaviors and concern for the environment (Aisyah et al., 2023). Various studies show that project-based learning, hands-on experience, and regular habituation can improve children's understanding of environmental cleanliness, sanitation, waste management, and clean and healthy living practices (Putri et al., 2023). In addition, health education that is integrated with play activities and a supportive learning environment has been proven to have a positive impact on the development of children's health behaviors (Sastradiharja, 2024). However, most studies still place children as the main focus of interventions, while teachers' competencies as the main implementers of environmental health learning still receive relatively limited attention. The findings of various systematic reviews also confirm that health education and environmental education at the ECE level require strengthening the competence of teachers so that their implementation takes place in a sustainable manner and has a more optimal impact.

On the other hand, research on Teaching Self-Efficacy consistently shows that teachers' confidence in their ability to teach is one of the important factors that determine the quality of learning practices (Lazarides & Warner, 2020; Sari et al., 2024). Teachers with high levels of self-efficacy tend to be more confident in designing learning, managing classes, using various learning strategies, and encouraging student engagement (Fleary et al., 2022). Research in the context of early childhood education also shows that professional development programs are able to improve alignment between teachers' beliefs and learning practices implemented in the classroom (Fleary et al., 2022; Ilham & Rahman, 2024). However, most studies still position Teaching Self-Efficacy as a consequence of professional training or teaching experience, while the specific competency factors that have the potential to shape teacher self-efficacy, particularly Environmental Health Literacy, have not been explored extensively.

Meanwhile, research on the learning practices of Clean and Healthy Living Behaviors (CHLB) in ECE shows that the formation of healthy living habits is more effective if it is done through planned learning, regular habituation, demonstrations, project-based activities, and collaboration between schools and families (Nurhidayati et al., 2024). These learning practices have been proven to be able to increase understanding and habituation of clean living behaviors in early childhood (Putri et al., 2023). However, most studies have evaluated the effectiveness of learning models or media on changes in children's behavior, so there is still little research that explains the teacher competencies that underlie the successful implementation of CHLB learning (Shafajar & Rohmah, 2025). Thus, although the relationship between health education, CHLB learning, and child development has been widely discussed, the mechanisms linking teachers' Environmental Health Literacy, Teaching Self-Efficacy, and CHLB learning practices have not received adequate attention in the context of early childhood education.

Although research on CHLB, Environmental Health Literacy, and Teaching Self-Efficacy has developed, there are still several research gaps that need attention. First, most research places Environmental Health Literacy as a predictor of individual or community health behavior. At the same time, its role in shaping teachers' professional competencies in learning practices is still rarely studied. Second, research on Teaching Self-Efficacy mostly explains its direct influence on learning quality without examining how these beliefs are formed through teachers' environmental health competencies. Third, empirical evidence integrating the Health Literacy Framework and Social Cognitive Theory to explain the mechanisms underlying the formation of CHLB learning practices among ECE teachers remains very limited. Therefore, this research develops a structural model that places Teaching Self-Efficacy as a mediating mechanism between Environmental Health Literacy and CHLB learning practices.

To answer the research puzzle, this study proposes a conceptual model that integrates the Health Literacy Framework and Social Cognitive Theory (SCT) as a theoretical foundation in explaining the relationship between Environmental Health Literacy, Teaching Self-Efficacy, and CHLB learning practices. Health literacy is seen as an individual's ability to acquire, understand, evaluate, and use health information in informed decision-making (Gray & Lindsey, 2019; Wharf Higgins et al., 2009). In the context of education, this ability is the professional

capital of teachers to integrate environmental health issues into the learning process.

According to Bandura (1977) behavior is the result of a mutual interaction between personal, behavioral, and environmental factors (triadic reciprocal determinism). One of the main constructs of SCT is self-efficacy, which is an individual's belief in his or her ability to perform an action. Recent research shows that health literacy contributes to increased self-efficacy which further drives health behaviors and professional practices (Q. Chen et al., 2025; Wu et al., 2026).

Furthermore, this study uses Social Cognitive Theory, specifically the concept of self-efficacy, to explain the psychological mechanisms that link competence to practice. This theory explains that individuals who have knowledge and belief in their abilities will be better able to translate their competencies into real actions. Thus, Teaching Self-Efficacy is positioned as a mechanism that explains how teachers' Environmental Health Literacy can be realized into effective CHLB learning practices.

Based on this framework, this study assumes that teachers with a higher level of Environmental Health Literacy will have stronger confidence in designing and implementing CHLB learning, so that they are able to implement more quality learning practices. The integration of the three constructs is expected to provide a more comprehensive understanding of the mechanism for the formation of CHLB learning practices in early childhood education, as well as enrich the study of teachers' professional competence in environmental health education.

This research contributes to three aspects. Theoretically, this study integrates the Health Literacy Framework and Social Cognitive Theory to explain the mechanism of the relationship between teacher competence and health learning practices. Empirically, this study expands the study of Environmental Health Literacy by placing ECE teachers as the main subject of research, which is still relatively limited in the context of early childhood education. Practically, the research findings are expected to be the basis for the development of teacher training programs, strengthening professional competencies, and formulating CHLB learning policies that are more effective in supporting the formation of clean and healthy living behaviors from an early age.

Based on the development of theory and previous research results, this study aims to analyze the influence of Environmental Health Literacy on CHLB learning practices through Teaching Self-Efficacy in ECE teachers. This study proposes a hypothesis including H1. Environmental Health Literacy has a positive effect on Teaching Self-Efficacy of ECE teachers. H2. Teaching Self-Efficacy has a positive effect on the learning practice of Clean and Healthy Living Behavior (CHLB) in ECE. H3 Environmental Health Literacy has a positive effect on the learning practice of Clean and Healthy Living Behavior (CHLB) in ECE. H4 Teaching Self-Efficacy mediates the influence of Environmental Health Literacy on the learning practice of Clean and Healthy Living Behavior (CHLB) in ECE.

METHOD

Research Design

This study uses a quantitative approach with an explanatory research design to examine the causal relationship between Environmental Health Literacy (EHL), Teaching Self-Efficacy (TSE), and Clean and Healthy Living Behavior Learning Practices (CHLB) in kindergarten teachers. This approach was chosen because it allows testing of conceptual models developed based on the Health Literacy Framework and Social Cognitive Theory (SCT) through the analysis of direct and indirect relationships between constructs (Creswell & Creswell, 2023; Kata et al., 2024; Said et al., 2026). In this research model, Teaching Self-Efficacy is positioned as a mediating variable that explains the mechanism of the influence of Environmental Health Literacy on CHLB Learning Practices.

Research Location and Population and Sample

This research was carried out in Rappocini District, Makassar City, South Sulawesi, Indonesia. Rappocini District was chosen as the research location because it has a high concentration of kindergarten education units, with 53 kindergarten schools spread across 10 villages, thus representing the characteristics of the implementation of early childhood education in urban areas. All teachers who teach in the 53 schools are the research population.

The cluster sampling technique is carried out by making sub-districts as cluster units. All kindergarten schools are first grouped based on 10 sub-districts in Rappocini District. Furthermore, schools from each cluster were selected proportionally to ensure representation of the entire research area. All teachers who met the inclusion criteria in the selected schools were included as respondents until 150 teachers were recruited as the research sample.

A total of 150 kindergarten teachers participated as respondents to the study. Respondents were selected based on the following criteria: (1) status as active teachers in kindergarten education units in Rappocini District, (2) have at least one year of teaching experience, (3) involved in the implementation of Clean and Healthy Living Behavior (CHLB) learning in schools, and (4) willing to participate voluntarily in the research. The number of samples was considered adequate for the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis because the research model consisted of only three latent constructs with one mediating variable. As per the recommendations of Hair et al. (2022) This sample size has met the requirements to produce stable parameter estimation, reliable hypothesis testing.

Research Instruments

The research instrument uses a structured questionnaire that is compiled through the synthesis of literature and adaptation of instruments that have been validated in previous research. The Environmental Health Literacy construct was developed based on the Health Literacy Framework, Teaching Self-Efficacy was adapted from the concept of Teacher Self-Efficacy in Social Cognitive Theory, while the CHLB Learning Practice construct was developed from the literature on health education and the habituation of Clean and Healthy Living Behaviors in early childhood education. Each construct was measured using five indicators so that there were a total of 15 research indicators. All indicators are adapted into

the context of early childhood learning through editorial adjustments without changing their conceptual meaning. Prior to data collection, the instrument was validated by three experts using Aiken's V (Aiken, 1985) to assess the validity of the content, then tested on 30 kindergarten teachers who had similar characteristics to the research sample to evaluate the clarity, readability, and consistency of the items with an aiken v value above 0.80. All statements were measured using a four-point Likert scale (1 = Strongly Agree to 4 = Strongly Agree) (Usman et al., 2026). The use of a scale without a neutral choice aims to reduce *central tendency bias* and encourage respondents to give a more assertive assessment of each statement.

Data Analysis

The data was analyzed using SmartPLS 4 through the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. The analysis was carried out in two stages, namely the evaluation of the measurement model (outer model) and the structural model (inner model). The evaluation of the measurement model included testing outer loading, Cronbach's Alpha (CA), Composite Reliability (CR), Average Variance Extracted (AVE), and discriminant validity using the Heterotrait–Monotrait Ratio (HTMT) (Henseler et al., 2015). Furthermore, structural models were evaluated through testing Variance Inflation Factor (VIF), path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and bootstrapping to test hypothesis significance (Hair et al., 2022).

RESULTS

Evaluation of the Measurement Model (Outer Model)

Before evaluating the quality of the measurement model, the model estimation was carried out using the PLS Algorithm on SmartPLS 4 to obtain the initial value of the relationship between the indicator and the latent construct. The estimation results are visualized in the form of a PLS-SEM model that displays the outer loading value of each indicator and the initial path coefficient between constructs. This visualization provides an initial overview of the quality of the measurement model as well as the basis for evaluating the validity and reliability of the construct before testing the structural model. Furthermore, the evaluation of the measurement model (outer model) is carried out to ensure that each latent construct meets the criteria of validity and reliability. In accordance with the recommendations of Hair et al. (2022), the evaluation of the outer model in reflective constructs includes outer loading testing to assess the validity of indicators, Cronbach's Alpha (CA) and Composite Reliability (CR) to measure internal consistency, Average Variance Extracted (AVE) to test convergent validity, and Heterotrait–Monotrait Ratio (HTMT) to evaluate discriminant validity (Henseler et al., 2015). The construct is declared to meet the requirements if all indicators reach the recommended threshold value, so that it is suitable for use in structural model evaluation (inner model) and research hypothesis testing.

Visualization of the results of the initial estimate is presented in Figure 1, which provides an overview of the structural model and the measurement model as a basis for evaluating the validity and reliability of the construct before hypothesis testing.

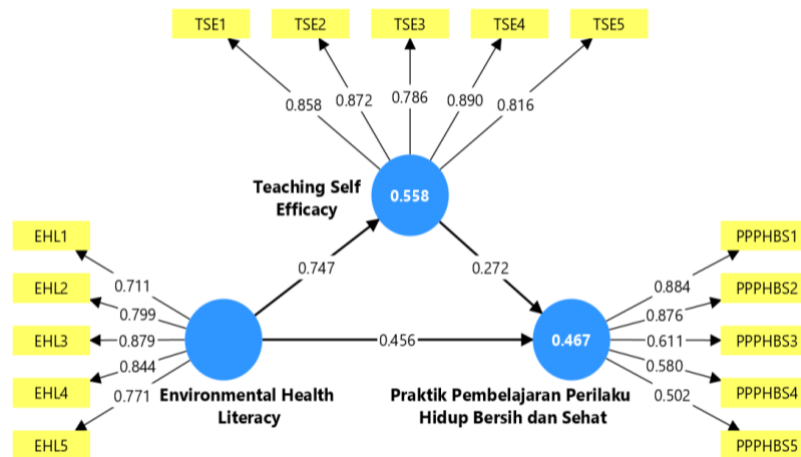


Figure 1. Initial Estimation of PLS-SEM Model PLS Algorithm

Figure 1 shows the results of the initial estimation of the PLS-SEM model obtained through the PLS Algorithm. It can be seen that all indicators have an initial outer loading value above the recommended minimum limit (>0.50), although some indicators still show relatively lower values than others. The results of this initial estimate were then evaluated in more depth through measurement model testing (outer model) which included outer loading, Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), and Heterotrait–Monotrait Ratio (HTMT) to ensure that the entire construct meets the requirements for validity and reliability before the evaluation of the structural model (inner model).

Table 2. Measurement Model Assessment Results

Variabel	Indicator	Code	LF	α	CR (rho_a)	CR (rho_c)	AVE
Environmental Health Literacy	Access environmental health information.	EHL1	0.711	0,861	0,870	0,900	0,644
	Understand the relationship between the environment and children's health.	EHL2	0.799				
	Evaluate environmental health information	EHL3	0.879				
	Applying environmental health information in learning.	EHL4	0.844				

<i>Variabel</i>	<i>Indicator</i>	<i>Code</i>	<i>LF</i>	α	<i>CR</i> (rho_a)	<i>CR</i> (rho_c)	<i>AVE</i>
Clean and Healthy Living Behavior Learning Practices	Making decisions in environmental health learning	EHL5	0.771	0,807	0,928	0,827	0,502
	Planning CHLB learning	PPCHLB1	0.884				
	Implementing CHLB learning.	PPCHLB2	0.876				
	Setting an example for CHLB	PPCHLB3	0.611				
	Utilizing the environment as a CHLB medium	PPCHLB4	0.580				
	Strengthening and evaluating CHLB	PPCHLB5	0.502				
Teaching SelfEfficacy	Confidence in planning CHLB learning	TSE1	0.858	0,900	0,901	0,926	0,715
	Confidence in implementing CHLB learning.	TSE2	0.872				
	Confidence in managing classes for CHLB.	TSE3	0.786				
	Belief motivates children to implement CHLB	TSE4	0.890				
	Confidence evaluates CHLB learning.	TSE5	0.816				

The results of the evaluation of the measurement model (outer model) show that all constructs have met the criteria of convergent validity and internal reliability recommended in PLS-SEM. The outer loading value in the Environmental Health Literacy construct ranges from 0.711–0.879, while the Teaching Self-Efficacy construct is in the range of 0.786–0.890, which shows that all indicators have a good ability to reflect their respective latent constructs. In the construct of Clean and Healthy Living Behavior Learning Practices (CHLB), the outer loading value is in the range of 0.502–0.884.

Even though the two indicators in the CHLB Learning Practices construct have relatively low outer loadings (>0.50), they are retained because the entire construct meets the criteria for Composite Reliability (>0.70) and Average Variance Extracted (>0.50) as recommended by Hair et al. (2022). Thus, these indicators still provide an adequate contribution to construct validity.

In addition to the validity of the indicators, reliability test results showed that the entire construct had Cronbach's Alpha between 0.807–0.900, Composite Reliability (rho_a) between 0.870–0.928, and Composite Reliability (rho_c)

between 0.827–0.926, all of which were above the threshold value of 0.70. These findings indicate that each construct has an excellent level of internal consistency. Furthermore, the Average Variance Extracted (AVE) values of each construct were 0.644 for Environmental Health Literacy, 0.715 for Teaching Self-Efficacy, and 0.502 for CHLB Learning Practices, all of which have exceeded the minimum limit of 0.50. Thus, it can be concluded that each construct is able to explain more than 50% of the variance of its indicators so that it meets the criteria of convergent validity. Based on these results, the measurement model was declared to have an adequate level of validity and reliability so that it was feasible to continue in the evaluation of the structural model (inner model).

Once the convergent validity and reliability of the construct are met, the next step is to evaluate the discriminant validity to ensure that each construct has an adequate degree of difference from the other. This study uses the Heterotrait–Monotrait Ratio (HTMT) approach recommended by Henseler et al. (2015) because it has a better ability to detect discriminant validity than traditional methods. A construct is declared to meet discriminant validity if the HTMT value is below the threshold of 0.90, which indicates that each construct measures a different concept empirically. The results of the discriminant validity test using HTMT are presented in Table 3.

Table 3. Heterotrait-Monotrait Ratio (HTMT) Discriminant Validity Assessment

<i>Variabel</i>	<i>(EHL)</i>	<i>(PPCHLB)</i>	<i>TSE</i>
EHL			
PPCHLB	0,605		
TSE	0,844	0,545	

Table 3 shows that the entire HTMT value is in the range of 0.545–0.844, which is lower than the threshold value of 0.90. The HTMT value between Environmental Health Literacy and Teaching Self-Efficacy was 0.844, between Environmental Health Literacy and CHLB Learning Practice was 0.605, and between Teaching Self-Efficacy and CHLB Learning Practice was 0.545. These findings indicate that all constructs have adequate discriminant validity, so that each construct is able to represent a different concept empirically and is suitable for structural model evaluation (inner model) and hypothesis testing.

Evaluation of the Structural Model (Inner Model)

After the measurement model (outer model) meets the requirements for validity and reliability, the next stage is to evaluate the structural model (inner model) to test the relationships between latent constructs proposed in the research model. The internal evaluation of the model aims to assess the predictive ability of the model as well as test the hypotheses developed based on the Health Literacy Framework and Social Cognitive Theory. Referring to Hair et al. (2022) This evaluation includes collinearity testing using Variance Inflation Factor (VIF), coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and path coefficients through the bootstrapping procedure. The results of

the evaluation provided information on the magnitude of the model explainability, the contribution of each exogenous construct to the endogenous construct, and the significance of the causal relationship between variables in the research model

Collinearity Assessment (VIF)

Before evaluating structural relationships, collinearity testing is carried out to ensure that there is no multicollinearity between predictor constructs. The test was carried out using the Variance Inflation Factor (VIF). A VIF value below 3.0 indicates that the model is free of multicollinearity problems so that the estimated path coefficient can be reliably interpreted (Hair et al., 2022)

Table 4. Collinearity Assessment Using Variance Inflation Factor (VIF)

<i>Variabel</i>	<i>VIF</i>
Environmental Health Literacy -> Clean and Healthy Living Behavior Learning Practices	2,265
Environmental Health Literacy -> Teaching Self Efficacy	1,000
Teaching SelfEfficacy -> Clean and Healthy Living Behavior Learning Practices	2,265

Table 4 shows that the entire VIF value is in the range of 1,000–2,265, which is entirely lower than the threshold value of 3.0. A VIF score of 1,000 was obtained in the Environmental Health Literacy → Teaching Self-Efficacy pathway, while a VIF score of 2,265 was obtained in the Environmental Health Literacy → Clean and Healthy Living Behavior Learning Practices and Teaching Self-Efficacy → Clean and Healthy Living Behavior Learning Practices. These results indicate that there is no problem of multicollinearity between predictor constructs, so that the structural model meets the collinearity assumption and is feasible to proceed with coefficient of determination (R^2) evaluation and hypothesis testing using the bootstrapping procedure.

Once it is confirmed that the structural model is free from multicollinearity problems, the next step is to evaluate the coefficient of determination (R^2) to assess the ability of exogenous constructs to explain endogenous construct variance. The R^2 value indicates the proportion of variation in the endogenous variable that can be explained by the predictor variable in the research model. According to Hair et al. (2022), the higher the R^2 value, the greater the model's predictive ability in explaining the phenomenon being studied. The results of the coefficient of determination (R^2) and adjusted R^2 tests are presented in Table 5

Table 5. Coefficient of Determination (R^2) Results

<i>Variabel</i>	<i>R-square</i>	<i>R-square adjusted</i>
Clean and Healthy Living Behavior Learning Practices	0,467	0,459
Teaching SelfEfficacy	0,558	0,556

Table 5 shows that the Teaching Self-Efficacy construct has an R^2 value of 0.558 with an adjusted R^2 of 0.556, which means that Environmental Health Literacy is able to explain 55.8% of the variation in Teaching Self-Efficacy, while

the remaining 44.2% is influenced by other factors outside the research model. Meanwhile, the construct of Clean and Healthy Living Behavior Learning Practices obtained an R^2 value of 0.467 and an adjusted R^2 of 0.459, which shows that Environmental Health Literacy and Teaching Self-Efficacy together are able to explain 46.7% of the variation in CHLB learning practices, while 53.3% The rest is affected by other variables that are not included in the model. Based on the classification of Hair et al. (2022), the two R^2 values show that the model has explanatory power in the moderate category, so that it is able to provide an adequate explanation of the relationship between constructs proposed in the study.

After the evaluation of the measurement model and structural model shows adequate results, the next step is to test the significance of the relationship between constructs using the bootstrapping procedure. Bootstrapping is a nonparametric resampling technique used in PLS-SEM to estimate the statistical significance of path coefficients, outer loading, and mediating effects without assuming the normal distribution of data (Hair et al., 2022). This procedure produces path coefficients, t-statistics, and p-values that are the basis for testing the research hypothesis. The results of the model estimation using the bootstrapping procedure are presented in Figure 2

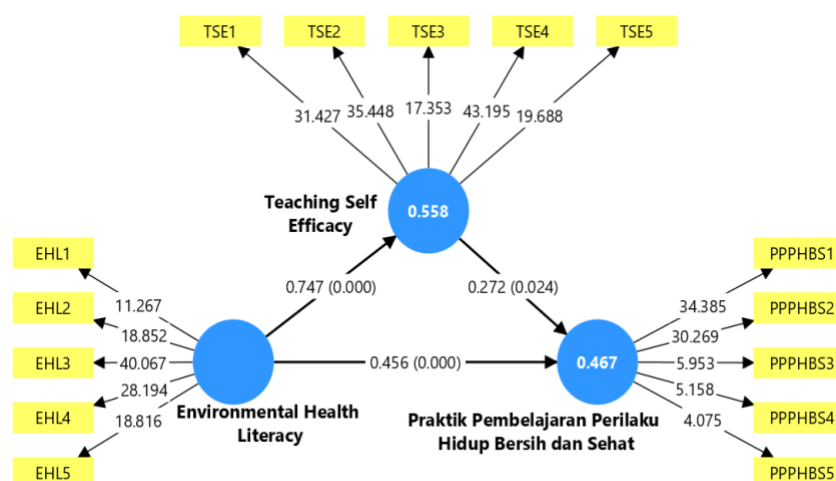


Figure 2. Results of the PLS-SEM Bootstrapping Analysis

After obtaining the results of the model estimation through the bootstrapping procedure, the next step is to evaluate the significance of direct and indirect effects between latent constructs. Hypothesis testing was carried out based on the path coefficient (β), t-statistics, and p-values, while the magnitude of the contribution of each relationship was evaluated using effect size (f^2). Referring to Hair et al. (2022) A relationship is declared significant if the value of $p < 0.05$ or $T > 1.96$ at a confidence level of 95%. The results of the hypothesis testing using are presented in Table 6.

Table 6. Results of Hypothesis Testing Using Bootstrapping

<i>Variabel</i>	β	<i>SD</i>	<i>T</i>	<i>P values</i>	f^2	<i>Keterangan</i>
<i>Direct effects</i>						
Environmental Health Literacy -> Clean and Healthy Hidup Behavioral Learning Practices	0,456	0,109	4,181	0,000	0,172	diterima
Environmental Health Literacy -> Teaching Self Efficacy	0,747	0,044	16,852	0,000	1,265	diterima
Teaching Self Efficacy -> Clean and Healthy Hidup Behavioral Learning Practices	0,272	0,121	2,256	0,024	0,061	diterima
<i>Indirect effects</i>						
Environmental Health Literacy -> Teaching Self Efficacy -> Clean and Healthy Hidup Behavioral Learning Practices	0,203	0,094	2,155	0,031	0,041	diterima

The test results in Table 6 show that the entire research hypothesis is supported by empirical data. Environmental Health Literacy has a positive and significant effect on Clean and Healthy Living Behavior Learning Practices ($\beta = 0.456$; $t = 4.181$; $p < 0.001$) with an effect size (f^2) of 0.172, which shows an influence in the medium category. In addition, Environmental Health Literacy also has a strong positive influence on Teaching Self-Efficacy ($\beta = 0.747$; $t = 16.852$; $p < 0.001$) with an effect size of 1.265, which indicates a very large contribution to increasing teachers' confidence in carrying out CHLB learning. Furthermore, Teaching Self-Efficacy had a positive and significant effect on Clean and Healthy Living Behavior Learning Practices ($\beta = 0.272$; $t = 2.256$; $p = 0.024$) with an effect size of 0.061, which is a small category.

Indirect effect analysis showed that Teaching Self-Efficacy significantly mediated the relationship between Environmental Health Literacy and Clean and Healthy Living Behavior Learning Practices ($\beta = 0.203$; $t = 2.155$; $p = 0.031$; $f^2 = 0.041$). Because both direct and indirect influences are equally significant, Teaching Self-Efficacy acts as a partial mediator. These findings show that the improvement of Environmental Health Literacy not only has a direct influence on CHLB learning practices, but also strengthens the practice through the improvement of teachers' Teaching Self-Efficacy.

DISCUSSION

The findings of the study showed that Environmental Health Literacy had a positive and significant effect on the Teaching Self-Efficacy of kindergarten teachers ($\beta = 0.747$; $p < 0.001$; $f^2 = 1.265$), which indicates that environmental health literacy is the main determinant in building teachers' professional confidence to implement CHLB learning. This finding can be explained through

Nutbeam (2000) who states that health literacy includes the ability of individuals to access, understand, evaluate, and apply health information in decision-making, while Bandura (1977) explains that belief in one's own abilities develops through the mastery of relevant knowledge and experiences.

In the context of early childhood education, teachers who have good Environmental Health Literacy will be better able to integrate environmental health information into the planning, implementation, and evaluation of learning, thereby increasing their confidence in implementing CHLB learning. This finding is strengthened by Fitri and Hadiyanto (2022) who affirm that strengthening environmental literacy is an important prerequisite for ECE teachers in developing contextual learning, Firda and Suharni (2022) who show that teachers' health literacy competencies are the basis for implementing health education in schools, and Rumpoko and Diana (2022) which explains that improving teachers' professional competence is an important factor in improving the quality of learning in ECE. In addition, Suryani and Yudha (2023) emphasized that the success of the implementation of health and nutrition services in ECE is highly dependent on the capacity of teachers to translate health knowledge into daily learning practices. Thus, the results of this study strengthen the argument that Environmental Health Literacy is the foundation of professional competence that is able to build Teaching Self-Efficacy teachers in carrying out CHLB learning effectively

The findings of this study strengthen the empirical evidence that Teaching Self-Efficacy is a psychological factor that plays an important role in improving the quality of learning practices. Rivas et al. (2023) shows that increasing teacher self-efficacy through the Teacher–Child Interaction Training program encourages teachers to be more confident in implementing learning strategies, managing classes, and actively engaging students. Similar findings were also reported by Li (2025) and Yan et al. (2025) which explains that teachers with a high level of teaching self-efficacy tend to be better able to make instructional decisions, manage the learning process, and maintain the quality of teaching practices despite facing various challenges in the classroom.

In the context of early childhood education, Chen et al. (2022) shows that teachers' capacity in teaching health education through the Life Skills approach is greatly influenced by their belief in teaching ability, especially in guiding hygiene behaviors, hygiene practices, and healthy living habits. The results of this study are also in line with Sollerhed (2023) who found that self-efficacy affects the readiness of educators to implement learning practices that are more structured and behavior-oriented than relying solely on routine activities. However, this study shows that the magnitude of the influence of Teaching Self-Efficacy on CHLB learning practices is relatively small ($f^2 = 0.061$), which indicates that the success of CHLB implementation is not only determined by teachers' confidence in their ability to teach, but is also influenced by other factors such as institutional support, availability of resources, professional training, and a conducive school environment. This interpretation is in line with the findings of Chen et al. (2022) which confirms that the teaching ability of health education is influenced by a combination of predisposing, enabling, and reinforcing factors, and is supported by Zhao et al. (2023) which shows that organizational resources

and work environment support are important factors in improving the quality of teaching practices of ECE teachers.

Practically, the results of this study show that improving the quality of CHLB learning is not enough to be done through the provision of learning materials or media alone. Teacher professional development programs need to be designed to strengthen Teaching Self-Efficacy, for example through practice-based training, microteaching, mentoring, peer observation, and providing constructive feedback. This approach is expected to increase teachers' confidence in implementing CHLB learning consistently so that the formation of clean and healthy living behaviors in early childhood can take place more effectively.

The findings of this study reinforce various previous research results that place teachers as the main actors in the successful implementation of CHLB learning in the school environment. Aliyah et al. (2023) and Rahmaddiansyah et al. (2023) explained that the success of the CHLB program in schools does not only depend on the availability of health facilities, but also on the ability of teachers to transform health information into learning experiences that encourage students to know, understand, and practice clean and healthy living behaviors. In line with that, Rahman et al. (2022) shows that teachers who are able to choose appropriate learning strategies, such as the use of narrative media and practical activities, are more successful in increasing students' understanding of healthy living behaviors than learning that is only informative. Similar results were also reported by Romadona and Rudiyanto (2022) who found that improving teachers' competence in the field of health and nutrition encourages teachers' ability to integrate CHLB materials into daily learning activities. Furthermore, Sagitarini (2022) emphasized that increasing health literacy allows teachers to choose more effective learning strategies than just delivering information or using posters, while Sumantri et al. (2024) shows that CHLB habituation carried out consistently through the example of teachers and direct practice is more effective in shaping children's healthy behaviors. Thus, the results of this study expand the empirical evidence that Environmental Health Literacy not only increases teachers' knowledge about environmental health, but also directly improves the quality of CHLB learning practices through the ability of teachers to process health information into pedagogical decisions, choose learning strategies that are in accordance with the characteristics of early childhood, and build habits of clean and healthy living behaviors in a sustainable manner.

The findings of this study confirm that Environmental Health Literacy is a stronger predictor of CHLB learning practices than Teaching Self-Efficacy, so that teachers' competence in understanding and applying environmental health information is the main foundation for the implementation of CHLB learning. Meanwhile, Teaching Self-Efficacy acts as a psychological mechanism that strengthens the application of these competencies in learning practices. Practically, these results indicate that improving the quality of CHLB learning in ECE needs to be directed at strengthening Environmental Health Literacy through training that not only develops pedagogical skills, but also the ability of teachers to understand, evaluate, and integrate environmental health issues into learning in accordance with the characteristics of early childhood.

The findings of this study expand the empirical evidence on the mechanism of shaping CHLB learning practices by showing that Teaching Self-Efficacy partially mediates the influence of Environmental Health Literacy on CHLB learning practices. This pattern is in line with various studies that place the implementation of CHLB as a result of the interaction between teacher competence and the learning process supported by psychological factors and the school environment. Febriawati et al. (2023) explained that the success of CHLB learning is not only determined by increasing health knowledge, but also by the ability of teachers to turn this knowledge into learning practices that actively involve students. In line with that, Putri et al. (2023) shows that project-based learning is able to improve children's understanding of environmental cleanliness through the active involvement of teachers in facilitating the learning experience. Meanwhile, Haryati (2022) emphasized that teachers' understanding of health materials affects the effectiveness of learning delivery to students, while Junaidin et al. (2024) shows that the success of CHLB implementation is also influenced by the support of facilities, habituation, and ongoing school involvement.

Thus, the results of this study show that Environmental Health Literacy can improve CHLB learning practices directly through teachers' professional competence, as well as indirectly through increasing Teaching Self-Efficacy which strengthens teachers' readiness to implement these competencies. The fact that the mediation that occurred was partial indicates that the implementation of CHLB learning is not only influenced by teachers' confidence in their ability to teach, but also by their environmental health competencies and the support of the school ecosystem in creating a clean and healthy living culture.

The findings of this study make a conceptual contribution by showing that the relationship between Environmental Health Literacy and CHLB learning practices does not take place directly, but is also mediated by Teaching Self-Efficacy as a psychological mechanism that translates professional competencies into pedagogical practices. These results expand on previous studies that tended to position Teaching Self-Efficacy as a direct predictor of learning quality and Environmental Health Literacy as determinants of individual health behavior. Therefore, the two constructs need to be seen as complementary factors in building effective CHLB learning practices. Practically, the professional development of ECE teachers needs to be designed in an integrated manner by strengthening Environmental Health Literacy as well as Teaching Self-Efficacy through practice-based training, microteaching, mentoring, and learning reflection, so that teachers are better able to implement CHLB learning consistently and sustainably.

CONCLUSION

This study shows that Environmental Health Literacy is a key factor in improving the learning practice of Clean and Healthy Living Behavior (CHLB) in kindergarten teachers, both through direct influence and through Teaching Self-Efficacy as a partial mediation mechanism. These findings confirm that teachers' competence in understanding and applying environmental health information is the main foundation of effective CHLB learning, while Teaching Self-Efficacy strengthens the translation of these competencies into pedagogical practice. This

research enriches the study of health education by integrating the Health Literacy Framework and Social Cognitive Theory, as well as providing an empirical basis for the development of teacher competency improvement programs to support sustainable CHLB learning in early childhood education.

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