Designing and Validating an Instrument to Assess Home Literacy Environment in Early Childhood: A Confirmatory Factor Analysis

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Abstract

Strengthening literacy from preschool age impacts children's social, emotional, and critical thinking development. This activity aligns with the Sustainable Development Goals, particularly SDG 4, which targets quality and inclusive education for all children. In early literacy development in preschool-aged children, the environment closest to them plays a significant role: the family and school. Therefore, this study aims to develop a Home Literacy Environment (HLE) instrument for preschool-aged children using Confirmatory Factor Analysis (CFA). The study employs a research and development methodology, specifically the 4D model (Define, Design, Develop, Disseminate), to produce a standardised measurement tool. Validation procedures were conducted in three stages: construct validation by three experts, content validation by 14 panellists, and empirical testing involving 165 families with children aged 5–6 years in the Greater Jakarta area. Data were analysed using CFA to examine factor structure and construct validity. Results indicated that 20 items across the three core dimensions demonstrated adequate factor loadings and significant t-values, with high construct reliability and variance extracted, confirming their validity. Nine indicators of goodness of fit met the criteria. Overall, the model was deemed sufficiently fit and suitable for further interpretation. This study supports the broad applicability of the HLE as a valid measure of the literacy environment created at home for preschool children. By providing a validated HLE instrument, educators, researchers, and policymakers are equipped to assess and enhance the literacy support provided at home. This result enables targeted interventions and informed decision-making to strengthen early learning foundations and promote inclusive, equitable education from the earliest years.

Keywords: *Early Childhood Assessment, Early Literacy Development, Preschool Children, School Readiness.*

1. Introduction

Early literacy development is a critical foundation for children's cognitive growth and future academic success [1][2][3]. Literacy skills acquired during the preschool years facilitate reading and writing proficiency and contribute to children's social-emotional development and critical thinking abilities. In Indonesia, however, early literacy outcomes remain suboptimal. National assessments reveal concerning trends: the 2023 Education Report categorised student literacy achievement as "moderate" across all educational levels (primary: 61.53%; secondary: 59.00%; high school: 49.26%), and fewer than 50% of students met the minimum competency standards in the 2022 National Assessment [4]. Additionally, the 2022 PISA reading score declined to 371 [5], reflecting a broader national literacy challenge [6]. Empirical studies have identified persistent difficulties among preschool children in Indonesia, including limited letter recognition [7], poor print awareness, and underdeveloped oral language skills that are essential for reading acquisition. These challenges are often linked to insufficient stimulation within both family and school environments [8][9]. Children with low early literacy skills are at increased risk of academic underachievement [10], underscoring the urgency of early intervention.

Literacy development presents opportunities and challenges in urban regions such as the Greater Jakarta Area. For example, Jakarta province reported a high Reading Interest Index in 2024 (score ≈72.93), yet disparities in access to quality children's reading materials and inter-district variation remain pressing issues [11]. At the school level, initiatives such as the National and School Literacy Movement have promoted enriched reading environments, daily reading routines, and parent-school partnerships. Research in Indonesian primary schools has shown that effective literacy culture governance correlates with improved student reading practices [12]. However, early childhood educators face challenges in consistently assessing early literacy [13]. Despite the growing attention to school-based literacy interventions, the role of the family in supporting early literacy remains underexplored. Home interactions serve as children's

first exposure to language and literacy concepts. Parents who actively read aloud, engage in discussions, and provide literacy-rich environments can significantly accelerate children's literacy development [14]. While numerous studies have examined classroom instruction, pedagogical strategies, and technology use in literacy education [15][16], few have specifically investigated the impact of family involvement. However, parental engagement has significantly influenced children's reading skills and academic readiness [17][18].

A key determinant of early literacy development is the Home Literacy Environment (HLE), which encompasses access to books, reading routines, and parent-child verbal interactions around written texts. Unfortunately, many Indonesian families lack optimal HLE conditions due to low parental reading interest, limited access to quality children's books, and insufficient awareness of the importance of early literacy stimulation [19]. Without a supportive HLE, children miss critical opportunities to develop foundational literacy skills before entering formal schooling [6][20][21]. One of the significant challenges in advancing early literacy research and intervention is the lack of valid and reliable instruments to assess HLE among preschool-aged children. Although international literature affirms the strong association between HLE and children's language development, vocabulary acquisition, and literacy readiness [22], few tools have been adapted to the Indonesian urban context. Moreover, the dynamics of HLE are increasingly shaped by digital media, further complicating measurement efforts [23].

Existing instruments for assessing the HLE offer valuable insights but exhibit notable limitations that warrant the development of a more comprehensive and contextually grounded tool. Instruments such as the StimQ [24] and the Home Literacy Model [25] emphasise cognitive stimulation and parental teaching but rely heavily on binary responses, limiting nuance and cultural adaptability. The PRBI [26][27] captures parental beliefs yet lacks behavioural indicators of literacy practices. Instruments by [28][29] focus on activity frequency but overlook interaction quality and emotional engagement. [30] introduced a culturally specific tool for Chinese-Norwegian families, yet its construct validity remains limited and excludes digital literacy dimensions. Similarly, the HLEQ by [31] measures structural aspects but fails to capture dialogic richness or screen-based practices. Recent efforts incorporate digital media but are context-bound and lack cross-cultural validation [23]. These gaps highlight the need for a novel HLE instrument that integrates frequency, quality, and digital dimensions of literacy interactions while ensuring psychometric rigour and relevance to diverse urban family contexts such as those in Indonesia.

In response to these gaps, the present study aims to design and validate a culturally appropriate instrument to assess the HLE among preschool families in the Greater Jakarta Area. The validation process employs Confirmatory Factor Analysis (CFA), a statistical technique that tests the fit between theoretical constructs and empirical data. CFA examines inter-variable relationships and confirms pre-established conceptual models derived from prior research and theory [32]. Given the multidimensional nature of HLE, CFA is essential to ensure the structural validity and reliability of the instrument. The resulting tool is expected to offer robust construct validity, accurately measure HLE dimensions, and be a reliable resource for researchers, educators, and policymakers in designing effective home-based literacy interventions.

2. Literature Review

2.1. Definition of Home Literacy Environment

The HLE is commonly defined as the entirety of literacy experiences available to children within the home, encompassing practices, resources, and parental attitudes toward literacy. These experiences extend beyond reading and writing activities, including everyday practices such as listening to stories, observing parents write shopping lists, and engaging in rich verbal interactions. HLE also involves the availability of literacy materials (such as books, magazines, and digital media) and the family's orientation toward literacy. Thus, HLE reflects not only what is accessible but also how literacy is embedded in daily family life. Describe HLE as an umbrella term comprising literacy-related interactions, access to reading materials, and family attitudes toward literacy [22]. This definition highlights a balance between behavioural (interaction), environmental (resources), and psychological (attitudinal) factors. Accordingly, HLE is measured not merely by the number of books in the home but also by the quality of conversations about texts and the family's belief in literacy's importance for child development. Emphasise that HLE includes informal and formal literacy-related activities conducted by family members and the availability of reading materials [33]. Informal activities may involve shared storybook reading or word games, while formal activities include direct instruction in letters, phonemes, or early reading skills. This definition underscores the spectrum of home-based literacy practices contributing to children's literacy development.

Further identify shared reading frequency, material availability, and the quality of parent-child interactions as key components of HLE [34]. Their findings suggest that merely providing books is insufficient; what matters more is how often children engage in reading and the nature of interactions during those activities, such as discussions, questioning, and elaboration. Therefore, both the quantity and quality of literacy engagement are critical. [28] demonstrate that the quality of literacy interactions and active parental involvement are closely linked to vocabulary growth and early reading skills. Emotional and cognitive engagement enhances literacy outcomes. In this sense, parents serve as facilitators and learning partners who play a direct role in literacy development. [27] highlight that families' socioeconomic and cultural backgrounds shape HLE and evolve throughout early childhood. Families with higher economic status typically have greater access to quality reading materials, while cultural values influence the types of texts shared with children. Importantly, HLE is not static. It adapts over time to children's developmental needs and family dynamics. In summary, HLE is a multidimensional construct encompassing practical literacy activities, resource availability, and parental attitudes and expectations. It represents a socially embedded environment that reflects how literacy is practiced, valued, and nurtured within the home. Improving literacy in early childhood must be grounded in culturally responsive frameworks. [35] emphasise that literacy programs should be evaluated by their outcomes and contextual and input dimensions to ensure cultural relevance and sustainability. This insight aligns with the present study's aim to develop an HLE instrument that reflects the sociocultural realities of Indonesian families. By incorporating parental beliefs, home practices, and access to literacy materials, the instrument seeks to capture the nuanced factors that shape early literacy development in local contexts.

2.2. Dimension of Home Literacy Environment

The HLE has been widely studied, with scholars proposing various dimensions to define its construct. [29] Categorised HLE into formal and informal dimensions essential in supporting early literacy development. [34] emphasised three core components: the frequency of

shared reading, the availability of reading materials, and the quality of parent–child interactions during literacy activities. [25] further distinguished between parental involvement in shared reading and direct teaching of literacy skills, noting that each pathway contributes differently to children's reading development. [27] introduced sociocultural dimensions, highlighting how cultural values, socioeconomic status, and dominant parenting styles shape literacy practices. [28] focused on active parental engagement, particularly the quality of literacy interactions that stimulate vocabulary and cognitive skills. While [33] underscored the importance of differentiating between the availability of literacy materials, frequency of literacy activities, and parental attitudes toward literacy, as each dimension uniquely influences early literacy outcomes.

From these perspectives, HLE in preschool-aged children can be defined as the literacy-rich environment created at home, characterised by access to reading materials, consistent parental involvement in shared reading, and positive beliefs and expectations about literacy. To capture this multidimensional construct, HLE is measured using a questionnaire comprising three key dimensions:

1. Reading Environment
   This dimension assesses the extent to which the home provides accessible literacy resources, such as storybooks, writing tools, alphabet posters, and a supportive reading atmosphere. Indicators include the availability of children's books, access to reading materials, and literacy-related tools. Higher scores reflect a richer literacy environment.
2. Reading Activities
   This dimension captures the frequency and quality of parental engagement in literacy activities, both direct (e.g., reading aloud, word games) and indirect (e.g., modelling reading behaviour). Indicators include how often parents read to their children, the nature of interactions during shared reading, and informal literacy activities such as singing alphabet songs. Higher scores indicate more active parental involvement.
3. Reading Beliefs and Expectations
   This dimension reflects parents' attitudes, beliefs, and aspirations regarding literacy and their role in fostering reading skills. Indicators include the belief in literacy's importance for child development, expectations for children's reading abilities, and emotional and motivational involvement in literacy practices. Higher scores suggest more substantial parental commitment and positive literacy orientation.

3. Methods

This study aims to develop a Home Literacy Environment (HLE) instrument, evaluate its validity and reliability, and analyse item characteristics using a Confirmatory Factor Analysis (CFA) approach. The resulting instrument is intended to provide a comprehensive profile of the HLE experienced by preschool-aged children. This research adopts a research and development methodology, which enables the creation of a practical and empirically grounded measurement tool.

3.1. Development Procedure

The HLE instrument was developed using the 4D model: Define, Design, Develop, and Disseminate. This model comprises four key stages to ensure the creation of a valid and reliable instrument.

1. Define: aims to identify the needs, scope, and challenges of developing the HLE instrument. A needs analysis will be conducted through literature review, school document analysis, teacher and parent interviews, and preliminary surveys. Researchers will collaborate with schools to examine documents related to literacy development efforts and assess existing policies on parental involvement. Interviews and surveys will also explore the roles of teachers and parents in supporting early literacy. Additionally, researchers will analyse the profiles of parents, teachers, and preschool children as target users of the instrument. The literature review will help identify conceptual gaps (specifically, the absence of instruments measuring preschool HLE) and guide the formulation of conceptual and operational definitions and the HLE dimensions.
2. Design: involves drafting the initial framework of the HLE instrument. Indicators will be derived from literature to ensure cultural relevance and alignment with early literacy goals. The output includes a blueprint of the instrument, comprising item statements and a three-point Likert scale. The initial draft consists of 32 items.
3. Develop: focuses on testing and refining the instrument through three phases of validity assessment. First, internal validity will be evaluated by three experts from diverse professional backgrounds, with qualitative analysis of their feedback. Second, content validity will be assessed by 14 panellists using Aiken's V index. Third, external validity will be examined through a limited empirical trial involving parents of preschool children in the Greater Jakarta Area. Data will be analysed using CFA to determine which observed indicators effectively measure latent variables. The CFA model will be evaluated based on Goodness of Fit criteria, encompassing three components: the measurement model, the structural model, and overall model fit. The measurement model assesses how observed variables represent latent constructs, using factor loadings (λ) and t-values to determine validity. Reliability will be evaluated using Construct Reliability (CR $\geq$ 0.70) and Average Variance Extracted (AVE $\geq$ 0.50). The structural model examines relationships among latent constructs, specifically how the three HLE dimensions interact to form a unified variable. Model fit will be assessed using 13 indices, including Chi-Square p-value, GFI, RMSEA, SRMR, ECVI, AGFI, NFI, CFI, IFI, RFI, AIC, CAIC, and PGFI.
4. Disseminate: involves implementing and disseminating the HLE instrument. The instrument will be distributed to schools and educational communities through print and digital platforms, accompanied by usage guidelines. Research findings will be disseminated through oral presentation at an international conference and publication in academic journals.

3.2. Participants

Data for this study were collected through online and offline questionnaire distribution, involving an initial sample of 172 parents of preschool-aged children residing in the Greater Jakarta Area. Following data cleaning procedures, seven respondents were excluded due to incomplete responses across the instrument items. Consequently, the final sample comprised 165 participants. This sample size meets the minimum requirements for factor analysis in instrument development. According to [36], an ideal sample size for factor analysis should be at least five times the number of itemsanalysed, while [32] recommendss a minimum of 100 participants. Based on these guidelines, the sample of 165 respondents is considered adequate and appropriate for conducting CFA in developing the HLE.

3.3. Data Analysis

The collected data were analysed using CFA, a statistical approach designed to test the construct validity of an instrument based on a predefined theoretical model. In this study, CFA served as the primary method for confirming the factor structure of the HLE instrument. As a confirmatory technique, CFA evaluates whether empirical data support the proposed conceptual framework. The analysis was conducted using LISREL software, which offers robust capabilities for estimating model parameters and assessing factor structure fit. The main objective of CFA in this context was to ensure that each item in the HLE statistically represents the intended construct. This process involved evaluating standardised loading factors (SLF), t-values, construct reliability (CR), and average variance extracted (AVE). Items with SLF $\geq$ 0.50 and t-value $\geq$ 1.96 were considered statistically valid, while CR $\geq$ 0.70 and AVE $\geq$ 0.50 indicated sufficient internal consistency and explanatory power of the latent construct. Additionally, overall model fit was assessed using a range of Goodness of Fit (GOF) indices, including RMSEA, GFI, AGFI, SRMR, ECVI, NFI, CFI, IFI, RFI, AIC, CAIC, and PGFI.

4. Result and Discussion

4.1. Development of the Initial Draft of the HLE

The definition stage formulated a theoretical construct based on literature review, interviews, and preliminary surveys. These findings guided the development of both conceptual and operational definitions of the HLE, which were thenorganised into three core dimensions.

Table 1. Description of the HLE Dimension

Dimension	Description
Reading Environment	Reflects the extent to which the home provides accessible literacy resources for children, such as storybooks, writing tools, alphabet posters, and a literacy-supportive setting.
Reading Activities	Captures the frequency and quality of parental involvement in literacy activities, both direct (e.g., reading aloud, word games) and indirect (e.g., modellingg reading behaviourr).
Reading Beliefs and Expectations	Represent parental attitudes, beliefs, and expectations regarding the importance of literacy and their role in supporting children's reading development.

The design stage produced the initial draft of the HLE instrument, consisting of 32 items. Of these, eight items measure the reading environment dimension, 14 assess reading activities, and 10 evaluate reading beliefs and expectations.

Table 2. Blueprint of HLE

Dimension	Indicator	Items Number
Reading Environment	Availability of children's reading materials	1, 8
	Children's access to reading materials	2, 3, 6, 7
	Availability of writing tools and other media	4, 5
Reading Activities	Frequency of parents reading to children	9, 10, 14
	Parent–child interaction during shared reading	11, 12, 13, 18, 20, 21, 22
	Informal literacy activities (e.g., word games, alphabet songs)	15, 16, 17, 19
Reading Beliefs and Expectations	Belief in the importance for child development	23, 24, 26, 27
	Parental expectations for reading skills	25, 30, 31
	Emotional and motivational involvement in literacy	28, 29, 32

The development stage began with construct validity testing by three experts:
1. KM, a kindergarten principal and National Accreditation Board for Primary and Secondary Education, West Java assessor, specialises in family and child development.
2. Ms., a lecturer in Early Childhood Education at Universitas Jambi, with expertise in preschool pedagogy.
3. MSI, a researcher at the National Population and Family Planning Agency, specialises in family studies.

Expert validation was conducted qualitatively, focusing on item clarity, relevance, and alignment with theoretical constructs. Six items were revised based on expert feedback, which included rewording statements, providing child-relevant examples, simplifying language, and clarifying instructions.

Table 3. Expert Feedback

Item Number	Expert		
	KM	MS	MSI
1	Clarify age-appropriateness criteria.		Provide specific examples of age-appropriate content.
4	Include examples like animals or plants.		Generalise the criteria and add examples.
6		"Place" terminology is unclear	
9		Align with item number 8.	Measure parental reading intensity.
11	Allows children to explore books visually.		
16	Include storytelling with puppets or toys.		

Content validity testing involved 14 panellists with relevant educational and professional backgrounds. Their evaluations were analysed using Aiken's V to assess agreement on item relevance. All items achieved V values above 0.70, indicating strong content validity.

Table 4. Content Validity Result

Item No	Aiken's V	Conclusion	Item No	Aiken's V	Conclusion
1	0.839	Valid	17	0.982	Valid
2	0.911	Valid	18	0.875	Valid
3	0.911	Valid	19	0.804	Valid
4	0.857	Valid	20	0.821	Valid
5	0.911	Valid	21	0.857	Valid
6	0.821	Valid	22	0.804	Valid
7	0.942	Valid	23	0.964	Valid
8	0.875	Valid	24	0.946	Valid
9	0.857	Valid	25	0.911	Valid
10	0.929	Valid	26	0.946	Valid
11	0.964	Valid	27	0.839	Valid
12	0.911	Valid	28	0.893	Valid
13	0.982	Valid	29	0.911	Valid
14	0.911	Valid	30	0.946	Valid
15	0.929	Valid	31	0.911	Valid
16	0.946	Valid	32	0.929	Valid

4.2. CFA Result

CFA was conducted in multiple stages to identify valid items aligned with the theoretical model. The initial analysis included all 32 items. Results indicated that 11 items had standardised loading factor (SLF) values below 0.50, rendering them statistically invalid. Additionally, the model failed to meet the required fit criteria, necessitating modifications by removing low-loading items. Table 5 presents the results of the first CFA stage for the invalid items.

Table 5. CFA Result – Stage One

Dimension	Item No	Loading Factor		Error
		SLF	t-value	
Reading Environment	1	0.489	6.130	0.260
	3	0.479	5.987	0.112
	7	0.466	5.811	0.152
Reading Activities	15	0.417	5.377	0.269
	19	0.311	3.917	0.135
Reading Beliefs and Expectations	24	-0.001	-0.019	0.036
	26	-0.009	-0.117	0.029
	28	0.261	3.355	0.230
	29	-0.000	-0.005	0.030
	30	0.383	5.023	0.036
	31	0.013	0.165	0.006

In addition to SLF and t-values, model fit was evaluated using 13 Goodness of Fit (GOF) indices to assess alignment between the theoretical model and empirical data. In the first stage, only three of the thirteen indices met the acceptable thresholds, indicating that the initial model lacked sufficient fit and required further refinement. A second CFA was conducted using a simplified model comprising 21 items deemed most representative theoretically and empirically to address these issues. However, this analysis revealed one item with an SLF exceeding one and an unfavourablee error variance (a phenomenon known as a Heywood case). This case indicates unrealistic parameter estimates that may compromise model validity. Despite this, the second-stage GOF results showed substantial improvement, with nine indices meeting the fit criteria. A third CFA was performed to resolve the Heywood case and enhance model fit by removing the problematic item (item no. 27). This step reflects a systematic, theory-driven approach to instrument refinement. It demonstrates a commitment to developing a valid, reliable tool for assessing the HLE in preschool-aged children.

The third-stage CFA yielded 20 valid items demonstrating strong alignment with the theoretical model. As shown in Table 6, all items met the SLF threshold. The construct reliability (CR = 0.979) and average variance extracted (AVE = 0.704) indicate excellent internal consistency and explanatory power. The items within each dimension were highly correlated, and the intended construct was consistently measured, ensuring a stable and reliable assessment of HLE. Furthermore, the model met the criteria for multiple GOF indices, including RMSEA, ECVI, NFI, CFI, IFI, RFI, AIC, CAIC, and PGFI. Although four indices fell below the fit threshold (likely due to sample size limitations), most incremental (NFI, CFI, IFI, RFI) and parsimonious (AIC, CAIC, PGFI) indices confirmed acceptable model fit.

Table 6. CFA Result – Stage Three

Dimension	Item No	Loading Factor		Error
		SLF	t-value	
Reading Environment	2	0.638	8.305	0.380
	4	0.609	7.833	0.254
	5	0.589	7.529	0.160
	6	0.625	8.095	0.491
	8	0.690	9.153	0.163
Reading Activities	9	0.695	9.889	0.199
	10	0.764	11.271	0.160
	11	0.536	7.143	0.151
	12	0.604	8.253	0.127
	13	0.772	11.453	0.146
	14	0.729	10.547	0.197
	16	0.540	7.216	0.193
	17	0.532	7.084	0.285
	18	0.603	8.243	0.252
	20	0.750	10.988	0.136
	21	0.665	9.333	0.187
	22	0.738	10.742	0.201
Reading Beliefs and Expectations	23	0.800	9.709	0.013
	25	0.569	7.015	0.012
	32	0.762	9.284	0.018

Table 7. Goodness of Fit Result

No	GOF Index	Threshold	Estimated Value	Conclusion
1	Chi-Square p-value	> 0.05	0.000	Misfit
2	GFI	> 0.90	0.832	Close Fit
3	RMSEA	< 0.08	0.078	Fit
4	SRMR	< 0.05	0.068	Misfit
5	ECVI	< ECVI SM dan IM	2.549<2.561<23.394	Fit
6	AGFI	> 0.90	0.788	Close Fit
7	NFI	> 0.90	0.912	Fit
8	CFI	> 0.90	0.954	Fit
9	IFI	> 0.90	0.954	Fit
10	RFI	> 0.90	0.900	Fit
11	AIC	< AIC SM dan IM	417.971<420.000<3836.646	Fit
12	CAIC	< CAIC SM dan IM	594.527<1282.249<3918.765	Fit
13	PGFI	> 0.60	0.661	Fit

4.3. Discussion

The results of the CFA conducted in this study indicate that the HLE developed demonstrates satisfactory levels of validity and reliability, despite several Goodness of Fit (GOF) indices not fully meeting ideal thresholds. These findings suggest that the instrument achieves an acceptable fit and holds promise for future application while offering opportunities for further refinement. First, based on the Standardised Loading Factor (SLF), most items exceeded the recommended threshold of 0.50, ranging from 0.532 to 0.800. According to [32], SLF values ≥ 0.50 reflect adequate contribution of indicators to the measurement of latent constructs. This result confirms strong convergent validity across items, indicating that all indicators significantly contribute to the dimensional structure of HLE [37]. Second, the GOF analysis yielded mixed results. Several indices demonstrated excellent fit, including the Comparative Fit Index (CFI = 0.954), Incremental Fit Index (IFI = 0.954), and Normed Fit Index (NFI = 0.912), all surpassing the 0.90 threshold, indicating strong alignment between the model and empirical data [38]. Additionally, the Root Mean Square Error of Approximation (RMSEA = 0.078) fell within the acceptable range (< 0.08), suggesting adequate model fit [36]. Parsimony indices such as the Parsimony Goodness of Fit Index (PGFI = 0.661), Aiken's Information Criterion (AIC), and Consistent AIC (CAIC) also outperformed comparison models, further supporting overall model adequacy.

However, several GOF indices remained below optimal levels. The Goodness of Fit Index (GFI = 0.832) and Adjusted GFI (AGFI = 0.788) did not meet the 0.90 benchmark. At the same time, the Standardised Root Mean Square Residual (SRMR = 0.068) exceeded the recommended limit of 0.05, indicating notable residual discrepancies between observed and predicted covariances. Moreover, the Chi-Square test yielded a p-value of 0.000, suggesting poor model fit. Nevertheless, given the test's sensitivity to sample size, particularly with a relatively large sample (n = 165), this result should not be the sole basis for rejecting the model [39].

From a theoretical perspective, the findings affirm that the home literacy environment can be effectively measured through three core dimensions: availability of reading materials and media, parental involvement in shared reading activities, and parental beliefs and expectations regarding literacy. These dimensions align with international research on parent–child literacy interactions as key predictors

of early literacy development [25], [28]. Although the model is not yet fully optimised, the study validates the theoretical structure of HLE within the Indonesian early childhood context. The novelty of this research lies in the empirical validation of an HLE instrument using CFA within an Indonesian setting. Most prior studies on HLE in Indonesia have relied on qualitative or basic correlational approaches, lacking standardised instruments with tested construct validity [40]. This study is among the first to offer a methodologically sound, standardised tool for assessing HLE, enabling researchers, educators, and policymakers to measure home literacy conditions more accurately and design targeted interventions to enhance early literacy skills.

Furthermore, the instrument has broad practical implications. It can assist schools and early childhood education institutions in conducting initial assessments of literacy support at home. For instance, if families are found to have limited access to reading materials, interventions can focus on improving book availability. Similarly, if parental engagement in shared reading is low, parenting programs can be developed to emphasise the importance of literacy interactions [34]. Thus, the HLE instrument serves as a research tool and a diagnostic resource for early childhood education practice.

This study also contributes to advancing knowledge in psychometrics and early childhood education. From a psychometric standpoint, it enriches the literature on instrument validation using CFA, particularly in non-Western cultural contexts. As [41] notes, cultural settings profoundly influence construct validity. This research demonstrates that HLE models commonly used in Western countries apply to the Indonesian context, albeit with necessary cultural adaptations. From an educational perspective, the study reinforces the role of the family as a central ecosystem in literacy development, consistent with Bronfenbrenner's ecological theory of child development [42]. While the instrument shows strong validity and reliability, limitations remain. Some GOF indices suggest further model refinement, which may involve removing low-loading items or testing simpler alternative models. Additionally, the sample was limited to the Greater Jakarta Area, so broader generalisation across Indonesia requires further testing with more diverse populations.

5. Conclusion

This study aimed to develop and validate an HLE instrument for preschool-aged children using CFA. The analysis revealed that the instrument comprises three core dimensions: (1) availability of reading materials and literacy media, (2) parental involvement in shared reading activities, and (3) parental beliefs and expectations regarding the importance of reading, with a total of 20 items.

Overall, the tested CFA model demonstrated an acceptable fit. Incremental fit indices (CFI = 0.954; NFI = 0.912; IFI = 0.954; RFI = 0.900) and parsimony measures (AIC, CAIC, PGFI) supported the model's reliability, while construct reliability (CR > 0.70) and average variance extracted (VE > 0.50) confirmed strong internal consistency and convergent validity. However, several indices (GFI = 0.832; AGFI = 0.788; SRMR = 0.068; Chi-Square p < 0.05) did not meet ideal thresholds, indicating the need for future model refinement to achieve optimal fit. The study successfully addressed its objectives by producing a valid and reliable HLE instrument tailored to the Indonesian preschool context. Its novelty lies in being one of the first empirically validated HLE instruments using CFA within a local setting. The contribution of this research extends beyond methodological advancement, offering practical implications for educators, parents, and policymakers to assess and strengthen home literacy environments. Ultimately, the findings affirm the critical role of family literacy support in fostering early literacy skills, school readiness, and lifelong learning foundations.

Based on these findings, several recommendations and implications are proposed. First, although the HLE instrument demonstrated strong validity and reliability, future studies should involve larger and more diverse samples, encompassing varied socioeconomic and cultural backgrounds, to enhance factor structure consistency and generalizability. Second, given that some goodness-of-fit indices remain suboptimal, further refinement using advanced approaches such as second-order CFA or modification indices is recommended to improve statistical robustness. The instrument may also be adapted for other age groups, such as early primary school children, to broaden its applicability in measuring family literacy variations. Additionally, future research should examine the relationship between HLE scores and children's literacy outcomes to establish predictive validity, such as phonological awareness, vocabulary, and reading comprehension.

The practical implications of this study are substantial. For educators, the HLE instrument can be a diagnostic tool to identify strengths and weaknesses in home literacy environments, enabling more targeted interventions. For parents, the findings underscore the importance of active engagement in shared reading and providing diverse literacy materials at home as a foundation for early literacy development. For policymakers, the instrument offers empirical support for designing family-based literacy programs aligned with Sustainable Development Goal 4, promoting inclusive and quality early childhood education. For researchers, the successful development of this instrument enriches the psychometric literature in early childhood education. It opens avenues for future studies linking family literacy dimensions to school readiness and lifelong learning trajectories.

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