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Cross-Cultural Adaptation of the Physical Literacy in Children Questionnaire for Indonesian Primary School Students: A Psychometric Evaluation

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Abstract. Physical literacy assessment requires instruments that are psychometrically sound and culturally appropriate. This study aimed to adapt the Physical Literacy in Children Questionnaire (PL-C Quest) into Indonesian and evaluate the psychometric properties of the adapted version (PL-C Quest-ID) among primary school students. This cross-cultural adaptation and psychometric evaluation involved forward translation, linguistic and contextual adaptation, expert review, and preliminary testing. Three experts in language, physical education, and measurement and assessment evaluated content relevance. Preliminary testing involved 30 students in Grades IV–VI, followed by psychometric evaluation among 300 students. Content validity was assessed using the Item-Level Content Validity Index and Scale-Level Content Validity Index/Average. Structural validity was examined using confirmatory factor analysis with the Weighted Least Squares Mean and Variance Adjusted estimator, while internal consistency was assessed using Cronbach's alpha. All items obtained an I-CVI of 1.00, and the S-CVI/Ave was 1.00. Standardized factor loadings ranged from 0.695 to 0.849, with excellent model fit (CFI = 0.991, TLI = 0.991, RMSEA = 0.022, SRMR = 0.038). Cronbach's alpha ranged from 0.85 to 0.93. The findings support the content validity, structural validity, and internal consistency of the PL-C Quest-ID.

Keywords: cross-cultural adaptation; measurement properties; physical literacy; primary school students; psychometric evaluation

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INTRODUCTION

Physical literacy has become an increasingly prominent topic in discussions of physical education, participation in sport, and the promotion of active lifestyles. Despite this growing interest, the concept is not consistently defined or translated into measurable components across existing research. In their systematic review, Edwards et al. (2016) reported substantial differences in how researchers describe its fundamental attributes, philosophical underpinnings, and theoretical connections. Such differences point to the need for a well-established conceptual basis, particularly when physical literacy is incorporated into educational programs or assessed through measurement instruments.

Growing recognition of physical literacy has encouraged researchers to develop and examine different methods for evaluating this construct in children of school age. Nevertheless, identifying an assessment tool that is consistently suitable for this population remains challenging. Barnett et al. (2023), in their systematic review, found that existing instruments vary considerably in their theoretical foundations, modes of assessment, supporting psychometric evidence, and practical applicability in school environments. These differences suggest that selecting an appropriate instrument requires careful consideration of its measurement quality and administrative feasibility, particularly in relation to the characteristics of the intended population and the context of its application.

The multidimensional nature of physical literacy creates particular difficulties in developing instruments that adequately capture the construct. Differences in theoretical interpretation and operational definitions can influence which dimensions are represented and how they are assessed. Edwards et al. (2016) documented substantial variation in the theoretical understanding of physical literacy, whereas Barnett et al. (2023) reported that the available evidence supporting the validity and reliability of assessment tools differs across populations and application settings. These considerations emphasize that measurement properties established during an instrument's initial development cannot automatically be generalized to other linguistic, cultural, or demographic groups. Further evaluation is therefore necessary to determine whether an instrument remains appropriate when introduced into a different population context.

Among the available tools for evaluating physical literacy in children, the Physical Literacy in Children Questionnaire (PL-C Quest) offers an approach that

captures children's perceptions through visual representations. Introduced by Barnett et al. (2022), this questionnaire uses a pictorial self-report format to examine self-perceived physical literacy through 30 items organized into four dimensions: physical, psychological, social, and cognitive. Each item incorporates contrasting illustrations depicting different levels of expression of a particular physical literacy element, enabling children to relate the presented situations to their own perceived abilities and experiences. The initial validation study reported satisfactory reliability and support for the proposed four-dimensional measurement model (Barnett et al., 2022). Furthermore, a subsequent systematic review by Barnett et al. (2023) recognized the PL-C Quest as an assessment tool with comparatively substantial psychometric support among instruments developed for children. The review also highlighted the practical advantages of questionnaire-based assessments for implementation in school environments.

Although the PL-C Quest has demonstrated promising psychometric properties, applying an assessment instrument outside its original development context requires more than linguistic translation. Children must be able to understand the wording and pictorial scenarios, recognize the activities or situations represented, and relate these scenarios to their own experiences. Therefore, the intended conceptual meaning of an item may not necessarily be preserved through literal translation when activity experiences and contextual familiarity differ between the source and target populations. Cross-cultural adaptation should consequently consider conceptual, linguistic, and experiential relevance while preserving the underlying construct represented by each item.

This issue is particularly relevant for the PL-C Quest because selected items use specific activity scenarios to represent physical literacy elements. An activity that is familiar within the original development context may not necessarily have the same experiential relevance for children in another country. Importantly, the official PL-C Quest User Guide itself acknowledges the potential need for contextual modification of selected scenarios. For example, the guide provides an alternative scenario in which skateboarding may be replaced with ice skating for countries where the latter activity is more contextually appropriate, while retaining the underlying element of moving using equipment. This guidance indicates that preserving the intended physical literacy element may, in selected circumstances, be more important than retaining every activity example

literally. Therefore, cross-cultural adaptation of the PL-C Quest should seek to maintain the original conceptual framework while ensuring that selected scenarios remain understandable and experientially relevant to children in the target context.

Psychometric evidence for the PL-C Quest has subsequently expanded through evaluations in different population contexts. For example, Diao et al. (2024) evaluated the instrument among 1,870 Chinese children aged 4–12 years and examined its theoretical structure comprising 30 items across the physical, psychological, social, and cognitive domains. Their findings provided support for the internal structure of the instrument within the study population. Notably, the study also demonstrated the importance of examining individual item performance when the questionnaire is applied in a different cultural context. These findings reinforce that psychometric evidence obtained in the original population cannot simply be assumed to apply unchanged in another population and that the performance of adapted or translated instruments should be empirically evaluated.

In Indonesia, research on physical literacy within school physical education has continued to develop; however, a recent systematic review indicated that the existing body of research remains fragmented and tends to emphasize motor skills. More comprehensive and multidimensional physical literacy frameworks remain relatively underutilized, while assessment approaches are heterogeneous and the need for validated and culturally relevant instruments remains evident (Sahbana Ridha et al., 2025). Within this context, psychometric evidence obtained from international studies of the PL-C Quest does not eliminate the need to evaluate the suitability of the instrument for Indonesian children. Furthermore, because selected PL-C Quest scenarios may require linguistic or contextual refinement to improve their relevance to Indonesian children's experiences, adaptation should be accompanied by empirical evaluation of the psychometric properties of the resulting version in the target population.

Based on this gap, the present study aimed to conduct a cross-cultural adaptation and psychometric evaluation of the PL-C Quest for Indonesian elementary school students. The adaptation retained the original 30-item and four-domain conceptual framework while allowing selected activity scenarios and contextual references to be linguistically refined or contextually modified when necessary to improve comprehensibility and experiential relevance for Indonesian children. The evaluation

included expert assessment of content relevance, preliminary testing of item comprehensibility and instrument feasibility, construct validity through confirmatory factor analysis of the theoretical four-factor structure, and internal consistency assessment. By combining selective cross-cultural and experiential adaptation with empirical psychometric evaluation, this study provides evidence regarding the suitability of the PL-C Quest for assessing multidimensional self-perceived physical literacy among Indonesian elementary school students.

METHOD

This study employed a cross-cultural adaptation and psychometric evaluation design to adapt the Physical Literacy in Children Questionnaire (PL-C Quest) into Indonesian and evaluate its measurement properties among Indonesian elementary school students. The evaluation examined content validity, structural validity, and internal consistency as distinct measurement properties (Mokkink et al., 2024). The PL-C Quest is a pictorial self-report instrument assessing children's self-perceived physical literacy. It comprises 30 items across four domains: physical (12 items), psychological (7 items), social (4 items), and cognitive (7 items), with four ordered response categories. The original four-factor structure was retained as the theoretical model for evaluating the Indonesian version (PL-C Quest-ID).

The adaptation began with forward translation into Indonesian and aimed to preserve the conceptual meaning and underlying physical literacy element of each item while ensuring linguistic clarity and contextual relevance. Most items were translated directly or linguistically refined, whereas selected activity scenarios were modified when the original examples were less familiar or experientially relevant to Indonesian children. For example, a skateboarding scenario was replaced with cycling while retaining the underlying element of moving using equipment. This approach preserved the intended construct while considering the linguistic and contextual appropriateness of the target population (Shahbazi et al., 2025).

The Indonesian version was reviewed by three experts in language, physical education, and measurement and assessment. They evaluated the relevance and appropriateness of each item for Indonesian elementary school students while maintaining its intended conceptual meaning. Their evaluations were analyzed using the

Item-Level Content Validity Index (I-CVI) and the Scale-Level Content Validity Index/Average (S-CVI/Ave) (Almanasreh et al., 2019).

Preliminary testing was conducted with 30 students in Grades IV–VI to examine the practical administration of the questionnaire and the students' ability to complete it. Items were read aloud by a facilitator while students completed their responses, and pilot data were not included in the main psychometric analyses. The main psychometric evaluation involved 300 students in Grades IV–VI, comprising 100 Grade IV students (33.3%), 120 Grade V students (40.0%), and 80 Grade VI students (26.7%). The sample included 154 boys (51.3%) and 146 girls (48.7%), and all data were included in the psychometric evaluation.

Structural validity was examined using Confirmatory Factor Analysis (CFA) to evaluate whether the original four-factor structure was supported by data from the PL-C Quest-ID. Given the four ordered response categories, CFA was estimated using the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator, which is appropriate for ordinal item responses (Brauer et al., 2023). Analyses were conducted using R statistical software, and model evaluation considered standardized factor loadings and χ^2/df, the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Internal consistency was assessed separately for each domain using Cronbach's alpha. Alpha coefficients were interpreted as estimates of item interrelatedness within each domain and not as standalone evidence of the overall reliability or unidimensionality of the instrument (Zakariya, 2022).

RESULT AND DISCUSSION

Result

The adaptation and psychometric evaluation of the Indonesian version of the Physical Literacy in Children Questionnaire (PL-C Quest-ID) provided evidence regarding the appropriateness of the adapted content, the feasibility of its administration, the validity of its theoretical structure, and the internal consistency of its domains among Indonesian elementary school students. The adaptation retained the original 30-item structure and four-domain conceptual framework while allowing selected linguistic and contextual refinements to improve the relevance of item scenarios to Indonesian children's experiences. The results therefore provide evidence regarding whether

contextual adaptation could improve experiential relevance without altering the underlying multidimensional structure of physical literacy.

The first finding concerned the content validity of the adapted instrument. Evaluation by three experts representing language, physical education, and measurement and assessment demonstrated complete agreement regarding the relevance of all adapted items. Each of the 30 items obtained an Item-Level Content Validity Index (I-CVI) of 1.00, while the Scale-Level Content Validity Index/Average (S-CVI/Ave) was also 1.00. These findings indicate that all items were considered relevant and appropriate for representing the intended construct in the target population. The detailed content validity results are presented in Table 1.

Table 1. Content Validity of the PL-C Quest-ID

Validity index	Items assessed	Value	Expert agreement
I-CVI	I01–I30 (30 items)	1.00 for each item	All three experts rated each item as relevant
S-CVI/Ave	Full scale (30 items)	1.00	Average of the 30 item-level ratings of relevance*

Note. I-CVI = item-level content validity index. S-CVI/Ave = scale-level content validity index calculated as the mean of the 30 I-CVI values.

The complete agreement observed in the expert evaluation is important because the present adaptation involved more than direct linguistic translation. The objective was to preserve the underlying physical literacy element represented by each item while improving linguistic clarity and contextual relevance for Indonesian children. Consequently, selected activity scenarios were refined when their original representations were considered less familiar to the target population.

This finding supports the importance of considering conceptual and experiential equivalence during cross-cultural adaptation. Literal preservation of an activity example does not necessarily ensure that children in another cultural context will relate to the experience represented by that example. In the present study, selected contextual modifications were therefore made while maintaining the underlying physical literacy element represented by the original item. The complete agreement among experts suggests that these refinements did not compromise the content relevance of the instrument.

The preliminary testing also provided evidence regarding the practical feasibility of administering the PL-C Quest-ID to elementary school students. The pilot involved 30

students in Grades IV–VI and generated 900 individual item responses across the 30-item questionnaire. All responses were complete, with no missing values and no responses outside the intended response range of 1–4.

The completeness of the pilot data suggests that the adapted questionnaire could be administered successfully to students in the target age range. During administration, the questionnaire items were read aloud by a facilitator while students completed their responses. This procedure helped ensure that students received the item content consistently and may have minimized the influence of differences in reading ability. The absence of missing or invalid responses therefore provides practical evidence that the wording, response format, and administration procedure were feasible for the target population. As no substantial problems were identified during preliminary testing, all 30 items were retained for the main psychometric evaluation.

The principal psychometric finding was that the theoretical four-factor structure of the PL-C Quest remained supported after adaptation to the Indonesian context. Confirmatory factor analysis was conducted using data from 300 elementary school students, and all 30 items were retained in their respective physical, psychological, social, and cognitive domains. Standardized factor loadings ranged from 0.695 to 0.849, indicating that all items demonstrated adequate relationships with their intended latent constructs. The standardized factor loadings for all items are presented in Table 2.

Table 2. Standardized Factor Loadings of the PL-C Quest-ID

Domain	Item	Standardized Factor Loading
Physical	I01	0.819
	I02	0.799
	I03	0.765
	I04	0.829
	I05	0.805
	I06	0.764
	I07	0.773
	I08	0.751
	I09	0.795
	I10	0.793
	I11	0.728
	I12	0.799
Psychological	I13	0.849
	I14	0.809
	I15	0.846
	I16	0.788
	I17	0.806
	I18	0.800

	I19	0.822
Social	I20	0.816
	I21	0.777
	I22	0.812
	I23	0.825
Cognitive	I24	0.779
	I25	0.813
	I26	0.778
	I27	0.816
	I28	0.802
	I29	0.845
	I30	0.695

The CFA results indicate that the adapted items continued to represent their intended domains after linguistic and contextual adaptation. The strongest standardized loading was observed for Item I13 (0.849), whereas Item I30 showed the lowest loading (0.695). Nevertheless, the loading of Item I30 remained adequate, indicating that the item continued to contribute meaningfully to its intended cognitive domain.

The retention of all 30 items is supported by both expert judgment and empirical evidence from the CFA. This convergence between content validity and structural validity strengthens the conclusion that the adapted items remained conceptually relevant and empirically associated with their intended latent constructs. Importantly, the results suggest that the contextual modifications introduced during adaptation did not disrupt the relationships between the items and the four theoretical domains.

The overall CFA model also demonstrated excellent fit to the empirical data. The Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) were both 0.991, while the Root Mean Square Error of Approximation (RMSEA) was 0.022 and the Standardized Root Mean Square Residual (SRMR) was 0.038. These results indicate a close correspondence between the hypothesized four-factor structure and the observed relationships among the questionnaire items. The goodness-of-fit indices are presented in Table 3.

Table 3. Goodness-of-Fit Indices of the Four-Factor PL-C Quest-ID Model

Fit Index	Value	Interpretation
CFI	0.991	Excellent fit
TLI	0.991	Excellent fit
RMSEA	0.022	Excellent fit
SRMR	0.038	Excellent fit

The excellent model fit provides strong evidence that the theoretical organization of the questionnaire remained applicable in the Indonesian context. Taken together, the fit indices indicate that the four-domain structure comprising physical, psychological, social, and cognitive dimensions closely represented the empirical relationships observed among Indonesian elementary school students.

This finding is consistent with the multidimensional theoretical structure underlying the original PL-C Quest developed by Barnett et al. (2022). It also supports the importance of evaluating measurement instruments within each population and context in which they are used. Psychometric evidence obtained in the original population cannot automatically be assumed to apply to another cultural or linguistic context. The present findings therefore extend the available evidence by demonstrating that the hypothesized four-domain structure remained supported among Indonesian elementary school students.

The findings are also broadly consistent with previous psychometric evaluations conducted in other populations. Diao et al. (2024), for example, examined the theoretical structure of the PL-C Quest among Chinese children and provided evidence supporting its multidimensional organization. However, evidence obtained from another population does not eliminate the need for empirical evaluation in Indonesia. The present study addresses this issue by demonstrating that the four-factor model remained strongly supported after the instrument was linguistically and contextually adapted.

The strong model fit observed in the present study may be related to the adaptation strategy used. Rather than redesigning the instrument or modifying the conceptual definition of physical literacy, the adaptation retained the original four-domain theoretical framework and focused on selected linguistic and contextual features. The results suggest that contextual modification of item scenarios does not necessarily compromise structural equivalence when the underlying conceptual element represented by an item is preserved.

The internal consistency analysis provided additional evidence regarding the reliability of the four domains. Cronbach's alpha coefficients ranged from 0.85 to 0.93. The physical domain demonstrated the highest coefficient ($\alpha = 0.93$), followed by the psychological domain ($\alpha = 0.91$), cognitive domain ($\alpha = 0.90$), and social domain ($\alpha = 0.85$). The internal consistency results for each domain are presented in Table 4.

Table 4. Internal Consistency of the PL-C Quest-ID Domains

Domain	Number of Items	Cronbach's α
Physical	12	0.93
Psychological	7	0.91
Social	4	0.85
Cognitive	7	0.90

The results demonstrate good to excellent internal consistency across all four domains. The physical domain produced the highest alpha coefficient, whereas the social domain produced the lowest coefficient. However, this difference should be interpreted cautiously because Cronbach's alpha is influenced not only by the relationships among items but also by the number of items included within a scale. The social domain contained four items, whereas the physical domain contained 12 items.

The internal consistency findings should therefore be interpreted together with the CFA results. Cronbach's alpha provides evidence regarding the interrelatedness of items within each domain, whereas CFA evaluates whether the items conform to the hypothesized multidimensional structure. In the present study, the combination of adequate standardized factor loadings, excellent model fit, and good-to-excellent internal consistency provides complementary evidence supporting the measurement properties of the PL-C Quest-ID.

Taken together, the findings demonstrate that the Indonesian adaptation retained the original conceptual organization of the PL-C Quest while incorporating selected linguistic and contextual refinements intended to improve its relevance to Indonesian elementary school students. This finding is relevant to the broader assessment of physical literacy because the construct has been conceptualized and operationalized differently across the literature (Edwards et al., 2016). Consequently, psychometric evidence should be established when an instrument is applied within a new linguistic and cultural context.

The findings also contribute to the continuing discussion regarding physical literacy assessment instruments. Barnett et al. (Barnett et al., 2023) highlighted variation in the available psychometric evidence supporting instruments designed to assess physical literacy in children. The present study contributes to this evidence by providing population-specific results for the Indonesian adaptation of a multidimensional self-report instrument rather than assuming that psychometric evidence obtained in another country would automatically apply to Indonesian children.

The primary contribution of the present study therefore extends beyond the translation of the PL-C Quest into Indonesian. Its contribution lies in demonstrating that selective linguistic and contextual adaptation can be undertaken while preserving the original 30-item and four-domain theoretical structure. The adaptation was intended to improve the experiential relevance of selected item scenarios without changing the underlying physical literacy element represented by the items. The subsequent empirical results support this approach, as the adapted version demonstrated complete expert agreement regarding content relevance, successful administration during preliminary testing, adequate factor loadings for all items, excellent four-factor model fit, and good-to-excellent internal consistency.

This contribution is particularly relevant to the Indonesian context, where multidimensional and culturally relevant approaches to physical literacy assessment remain important areas for further development (Sahbana Ridha et al., 2025).The present findings provide empirical evidence supporting the use of the PL-C Quest-ID to assess self-perceived physical literacy while maintaining the conceptual distinction among physical, psychological, social, and cognitive dimensions.

Overall, the present study provides evidence supporting the content validity, structural validity, and internal consistency of the PL-C Quest-ID among Indonesian elementary school students. All 30 items were retained, and the hypothesized four-domain structure was strongly supported by the empirical data. These findings suggest that the PL-C Quest-ID provides a promising multidimensional instrument for assessing self-perceived physical literacy in Indonesian elementary school students.

Nevertheless, the present findings represent evidence for selected psychometric properties and should not be interpreted as establishing every possible aspect of validity and reliability. Future research may strengthen the evidence base by examining additional measurement properties, including test–retest reliability and measurement invariance across sex, grade level, and other relevant population groups. Evaluation using broader and more geographically diverse Indonesian samples would also provide additional evidence regarding the generalizability of the instrument.

CONCLUSION

This study adapted the Physical Literacy in Children Questionnaire (PL-C Quest) into Indonesian and evaluated the psychometric properties of the adapted version (PL-C

Quest-ID) among Indonesian elementary school students. The findings provided evidence supporting the content validity, structural validity, and internal consistency of the instrument. All 30 items were retained following linguistic and contextual adaptation, including selected modifications intended to improve the experiential relevance of item scenarios for Indonesian children while preserving their underlying physical literacy constructs.

The hypothesized four-factor structure comprising physical, psychological, social, and cognitive domains was supported by the confirmatory factor analysis. All items demonstrated adequate standardized factor loadings, and the model showed excellent overall fit. In addition, the four domains demonstrated good-to-excellent internal consistency. Taken together, these findings indicate that the PL-C Quest-ID is a promising instrument for assessing multidimensional self-perceived physical literacy among Indonesian elementary school students.

The contribution of this study extends beyond the translation of an existing instrument by demonstrating that selective linguistic and contextual adaptation can be undertaken while preserving the original theoretical structure of the PL-C Quest. Further research involving broader and more geographically diverse samples is recommended to examine additional measurement properties, including test–retest reliability and measurement invariance across relevant population groups.

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