

From PPLQ to PPLQ-Id: Adapting a physical literacy measure for Indonesian adolescents

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ABSTRACT

Introduction: Physical literacy (PL) is crucial for promoting lifelong physical activity, yet there is a lack of validated instruments to measure perceived PL among urban adolescents in Indonesia. This study aimed to adapt and validate the perceived physical literacy questionnaire (PPLQ) for Indonesian adolescents, creating the PPLQ Indonesian version (PPLQ-Id).

Methods: The study involved a comprehensive process of translating, culturally adapting, and validating the PPLQ for the Indonesian context. A sample of 519 adolescents aged 12-18 from various educational institutions in Semarang, Indonesia, participated in the study. The psychometric properties of PPLQ-Id were assessed through exploratory factor analysis (EFA), confirmatory factor analysis using structural equation modelling (SEM), construct validity testing and reliability analysis.

Result: EFA revealed a two-factor structure explaining 53.101% of the total variance. SEM confirmed the six-domain structure of PL with acceptable model fit (RMSEA = 0.043, CFI = 0.904, SRMR = 0.050). The physical activity behavior (PAB) domain showed the highest loading (139.472) on the PL construct. Construct validity analysis indicated strong correlations between physical competence and motivation (MOT) ($r_s = 0.503$, $p < 0.01$) and between MOT and understanding (UND) ($r_s = 0.505$, $p < 0.01$). The instrument showed no significant differences across gender or education levels. Reliability analysis yielded a Cronbach's alpha of 0.613 after adjustments.

Conclusion: The PPLQ-Id demonstrates potential as a valid and reliable instrument for measuring perceived PL among Indonesian adolescents. However, some domains, particularly knowledge and PAB, require further refinement. This study provides a foundation for UND and promoting PL in the Indonesian urban context, with implications for public health strategies to increase physical activity among adolescents.

Keywords: physical literacy, adolescents, instrument validation, Indonesia, PPLQ-Id

INTRODUCTION

Lack of physical activity is a risk factor for premature death and non-communicable diseases such as hypertension, diabetes mellitus, cardiovascular disease, dementia, and other chronic conditions [1, 2]. A global study calculating prevalence-based population attributable risks across 168 countries found that 7.2% of all deaths and 7.6% of cardiovascular diseases are attributable to insufficient physical activity. The proportion of non-communicable diseases caused by lack of physical activity ranges from 1.6% for hypertension to 8.1% for dementia. While the highest relative burden is found in developed countries, the absolute burden falls on middle-income nations [2].

Insufficient physical activity is significantly associated with waist circumference. Failure to meet recommended physical activity guidelines is strongly linked to obesity and high body fat [3], which are risk factors for chronic diseases such as diabetes mellitus, hypertension, chronic kidney disease, heart disease, asthma, arthritis, and depression [4-6]. Physical activity can also reduce the risk of mental health issues [7-9].

In Indonesia, the prevalence of insufficient physical activity has risen dramatically from 26.1% (2013) to 33.5% (2018) and 37.4% (2023). A similar trend is observed in Central Java Province, with insufficient physical activity increasing from 29.5% in 2018 to 30.4% in 2023. Compared to rural areas (34.5%), urban populations show higher rates of insufficient physical activity (39.4%) [10-12].

Physical activity is a crucial factor for health outcomes, and its primary determinant is physical literacy (PL). PL is associated with higher participation in physical activity and less time spent on sedentary behaviors [13, 14]. It represents an evolving approach to reshaping the promotion of lifelong physical activity participation [15].

The widely adopted definition of PL refers to motivation (MOT), confidence (CON), physical competence (PCO), knowledge (KNO), and understanding (UND) to value and take responsibility for performing physical activity for life [16-18]. This emphasizes the holistic development of individual capacity to promote lifelong physical activity and well-being. A systematic review found that this concept was used in twenty-four studies worldwide from 2016 to 2022 [19]. PL is increasingly recognized as vital for promoting long-term health

and well-being [9, 15]. There is a high correlation between PL and health, and international PL research is gradually shifting from sports to health, indicating that PL aims to promote individual health achievement [20].

The shift towards urbanization and emerging technologies have transformed daily lifestyles, resulting in decreased physical activity, including in Indonesia, emphasizing the need for targeted assessment tools to identify and address PL levels in urban adult populations. There are many PL instruments to assess PL in specific settings and population age groups [19, 21-24], such as the Canadian assessment of PL [25, 26], perceived PL instrument (PPLI) [13-15, 24, 27-30], PL assessment for youth [14] and perceived physical literacy questionnaire (PPLQ) [31]. **Appendix A** shows domain, items, and of PPLQ-Id.

The PPLQ, initially developed by [31], is the latest tool providing a robust framework for UND how adults view their PL. This tool has significantly influenced European population research [31]. To apply these insights in the Indonesian urban setting, it is necessary to translate, adapt, and validate the PPLQ to reflect local cultural, linguistic, and social nuances. This adaptation will ensure the reliability and relevance of the questionnaire in assessing the PL of Indonesian adolescents, a group particularly at risk of insufficient physical activity due to urban lifestyle constraints.

Initiating this cultural and contextual adaptation involves a careful translation process followed by rigorous testing to establish the psychometric properties of the Indonesian language version (PPLQ-Id). This study focuses on adolescents living in urban areas of Semarang City, Indonesia, to develop a comprehensive UND of PL in urban characteristics.

Semarang City is ideal for psychometric surveys in an Indonesian urban setting. As a significant economic and cultural center on Java's north coast, the city spans 373.8 km² with 45-50% urbanized land. Semarang's considerable population growth, from 1 million to 1.7 million in 2022, with an annual increase of 1.9%, reflects typical urban dynamics. Its strategic location as a central transportation hub and host to one of Asia's largest seaports makes Semarang representative of developing cities in Indonesia.

Semarang's demographic diversity, predominantly inhabited by Javanese Muslims with Chinese, Arab, and Indian minorities, adds socio-cultural complexity relevant to this research. The city's ongoing development along coastal areas and highlands maintains its position as a center of connectivity, industry, and cultural diversity in Central Java [32]. In terms of sports infrastructure, Semarang City offers adequate facilities, including pedestrian paths, bicycle lanes, soccer stadiums, as well as various other sports facilities such as badminton courts, volleyball courts, swimming pools, gyms, basketball courts, tennis courts, futsal courts, and athletic stadiums [33]. The availability of these facilities creates a conducive environment for assessing urban adolescent PL.

Given the importance of PL in health promotion and physical activity and the lack of validated instruments to measure perceived PL in urban adolescent populations in Indonesia, the study "From PPLQ to PPLQ-Id: Adapting a PL measure for Indonesian adolescents" becomes highly relevant. Adapting and validating the PPLQ for the Indonesian context will help address limitations in its original version and produce an instrument that is more culturally and linguistically appropriate for urban adolescent populations in Indonesia.

With its representative urban characteristics and adequate sports facilities, Semarang City provides an ideal backdrop for adapting and validating PPLQ-Id. The results of this study are expected to provide a valuable tool for researchers and public health practitioners to better understand and improve PL among Indonesian adolescents. Ultimately, this adapted instrument can contribute to increasing overall physical activity levels and health in Semarang and other Indonesian cities with similar characteristics.

METHODS

Study Design and Setting

The adaptation and validation process of the PPLQ to the Indonesian version (PPLQ-Id) involved three main stages:

The first stage involved a comprehensive literature review on PL, existing PL measurement instruments, and Indonesian society's cultural context and characteristics, particularly in Semarang City. This review aimed to deepen UND of the PL construct and aspects relevant to the Indonesian context.

The second stage involved professional translators familiar with the Indonesian cultural context translating the original PPLQ questionnaire into Indonesian. The translation results were then reviewed and verified by an expert panel of public health experts and linguists to ensure translation accuracy, clarity of meaning, and appropriateness to the local cultural context. This process also involved in-depth discussions and adjustments of questionnaire items deemed unsuitable or ambiguous in the Indonesian context.

The third stage involved empirical validation of the translated PPLQ-Id version, which was reviewed and adjusted by experts. The validation process involved 519 adolescent respondents selected through stratified random sampling, representing demographic diversity in age (12-18 years) and education level (**Figure 1**).

Instrument

The PPLQ was chosen as the foundational instrument for adaptation in this study due to its comprehensive coverage of PL domains [31]. The PPLQ encompasses six main domains of PL: PCO, UND, MOT, CON, KNO, and physical activity behavior (PAB). Most of them use a Likert scale of 1-5, different from the original PPLQ, which uses a 0-5 Likert scale. The adaptation was conducted to make it easy for respondents to interpret 1-5 as strongly disagree, disagree, neutral, agree, and strongly agree, respectively, with adjustments in the response format for the KNO and behavior domains. These items measure individuals' perceptions of PL across the six domains above.

In the adaptation process, we maintained the basic structure and domains of the original PPLQ while making linguistic and contextual adjustments to ensure relevance for Indonesian adolescents, particularly in urban environments like Semarang City. This adaptation involved language translation and content modification to reflect physical activity and situations familiar to Indonesian adolescents.

For example, items related to "PCO" were adjusted to include skills relevant to activities in Indonesia, such as lifting a crate of beverages compared to a whole gallon of water for heavy lifting activities.

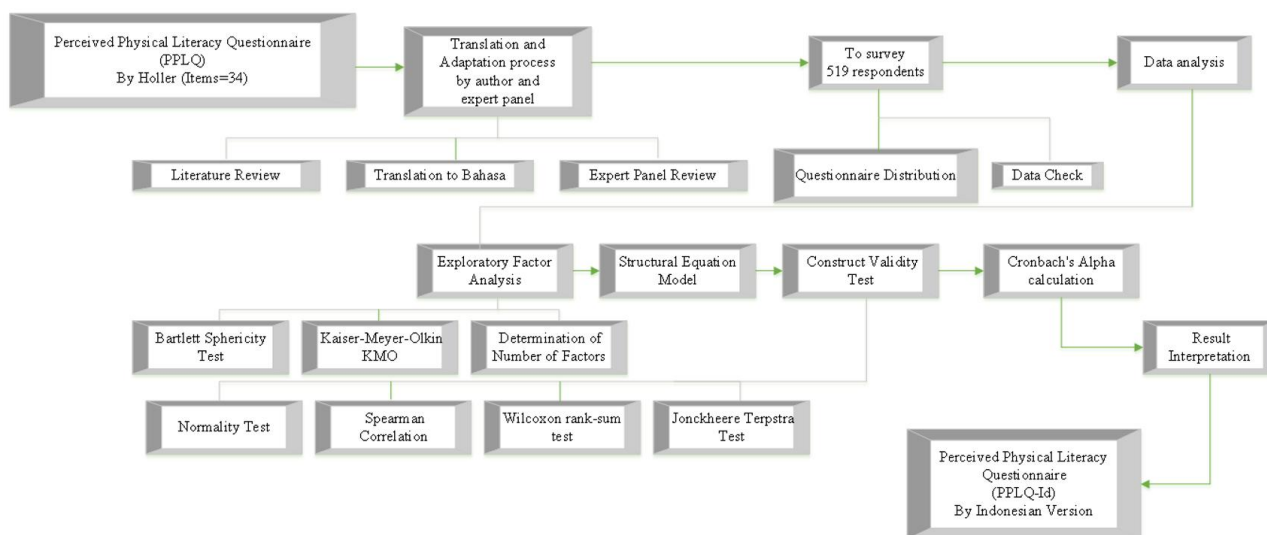


Figure 1. Diagram showing the flow of the study (Source: Authors' own elaboration)

Additionally, in the UND domain, we modified the original focus on corporate initiatives to promote physical activity to include school/university initiatives to increase physical activity.

Data Collecting

Data collection was conducted from August to September 2024 by distributing questionnaires to adolescents aged 12-18. By trained enumerators, electronic questionnaires were distributed to 519 adolescent respondents with proportional allocation across 4 junior high schools, 4 senior high schools, 2 vocational high schools, and four universities. The selection of schools and universities was carried out using purposive sampling, considering several criteria to ensure a good representation of the adolescent population in Semarang City.

Selection criteria included variation in types of educational institutions (encompassing junior high schools, senior high schools, vocational high schools, and universities to represent various education levels), balance between public and private institutions (to obtain a broader perspective and reduce potential bias from school status differences), and geographical distribution (selecting institutions from various regions in Semarang City to ensure comprehensive coverage).

Based on these criteria, the educational institutions selected as research locations were, as follows:

1. Junior high schools: SMP N 1 Semarang, SMP N 2 Semarang, SMP Al-Azhar 23 Semarang, and SMP Kesatrian 1 Semarang
2. Senior high schools: SMA N 2 Semarang, SMA N 3 Semarang, SMA Kesatrian 1 Semarang, and SMA YSKI Semarang
3. Vocational high schools: SMK N 7 Semarang and SMK N 9 Semarang
4. Universities: Universitas Dian Nuswantoro, Diponegoro University, Semarang State University, and UIN Walisongo Semarang

This selection ensured diversity in institution types (public and private), geographical locations, and student characteristics, expected to provide a representative sample of the adolescent population in Semarang City. This approach also allows for comparative analysis between various types

and levels of educational institutions, potentially offering valuable insights into variations in PL among adolescents.

Translation Model

The translation and adaptation process followed recommendations from [34]. The researchers in [34] fluent in both source and target languages, with Indonesian as their mother tongue, familiar with both cultures and UND the instrument's content, performed independent translations. A multidisciplinary expert panel then reviewed the translations, reaching a consensus on differences.

The result of this process was a translation of the PPLQ into Indonesian (PPLQ-Id), which the expert panel reviewed and adapted. This version underwent a series of stages to ensure the translation was linguistically accurate, appropriate to the Indonesian cultural context, and well understood by local respondents. **Table 1** shows the translation and adaptation process of the instrument.

Analysis

We conducted an exploratory factor analysis (EFA) to gain insights into the possible multivariate structure of the PPLQ-Id instrument. We applied the following criteria to determine the number of underlying factors: eigenvalue > 1, scree plot, factor loadings > 0.40 [35], and factor suitability regarding its substantive meaning.

Following the EFA, we proceeded with structural equation modeling (SEM) to test and validate the factor structure. SEM allowed us to evaluate the relationships between identified latent constructs and test the construct validity of the PL measurement model.

To assess construct validity, we examined previously anticipated relationships between PPLQ-Id total scores and characteristics such as gender and education. We used spearman correlations for continuous variables, Wilcoxon rank-sum tests for categorical variables with two groups, and Jonckheere-Terpstra tests for categorical variables with more than two ordered groups.

Cronbach's alpha was used to assess the internal consistency of the PPLQ-Id scale. The significance level was set at 0.05. Multiple tests were not corrected, so all analyses were considered exploratory.

Table 1. Translation and adaptation process of the instrument

Phase	Explanation
Phase 1. Initial translation	Two independent translators, fluent in English and Indonesian with Indonesian as their native language, translated the PPLQ into Indonesian. Both translators were familiar with the questionnaire's terminology. This phase resulted in two independent translation versions (T-1 and T-2).
Phase 2. Translation synthesis	A research team comprising translators and experts in physical literacy compared both translation versions (T-1 and T-2). They discussed the differences and agreed to produce a single synthesized translation version (T-12). This process involved careful consideration of language nuances and Indonesian cultural context.
Phase 3. Final version of PPLQ-Id	This process ensured that the translation of PPLQ into Indonesian (PPLQ-Id) was linguistically accurate, appropriate to the Indonesian cultural context, and well understood by local respondents. The process involved in-depth discussions among researchers and the expert panel, including adjustments to questionnaire items deemed unsuitable or ambiguous in the Indonesian context. This final version was then psychometrically tested to ensure its validity and reliability in measuring perceived physical literacy among Indonesian adolescents, particularly in Semarang City. Thus, the resulting PPLQ-Id is not merely a literal translation but an adaptation tailored to the Indonesian context.

This research has received approval from the health research ethics committee of UDINUS with certificate number 002211/Universitas Dian Nuswantoro/2024.

Respondent Characteristics

This study involved 519 participants, with a majority being female (62.8%) and ranging in age from 12 to 18 years, reflecting the focus on the adolescent group. The age distribution showed the highest concentration at 17 years (33.5%), followed by 14 years (21.6%) and 15 years (19.1%), representing a solid representation of secondary school students. Respondents came from various educational institutions in Semarang, including junior high schools, senior high schools, and vocational schools, with a fairly even distribution across schools. SMK N 9 Semarang had the highest representation (13.3%). Although university students had minimal involvement (1.4%), this number is reasonable given the age limit set for the adolescent category (12-18 years), which naturally limits college student participation. The diversity of school origins and the dominance of secondary school students in this sample provide a comprehensive picture of the Semarang adolescent population, which aligns with the research objectives focusing on this age group. **Table 2** shows the respondent demographic information.

Exploratory Factor Analysis

After ensuring sample adequacy based on a Kaiser-Meyer-Olkin (KMO) value of 0.656 and a significant Bartlett's test of sphericity (approximate Chi-square (χ^2) = 412.584, df = 15, p = 0.000), factor analysis was conducted. The KMO value of 0.656 is considered fairly good (> 0.6), indicating that the sample size is adequate for factor analysis. The significance value of Bartlett's test of sphericity 0.000 (< 0.05) suggests that the correlation matrix is not an identity matrix, and there are significant relationships between variables, making factor analysis appropriate.

From the analysis, two factors emerged with eigenvalues > 1 (eigenvalues = 2.129 and 1.057), explaining 35.486% and 17.615% of the total variance, respectively. These two factors cumulatively explain 53.101% of the total variance. In the rotated component matrix:

1. Factor 1 consists of MOT (0.835), UND (0.710), PCO (0.701), and CON (0.591). This factor can be interpreted as "PCO and MOT."
2. Factor 2 consists of PAB (-0.839) and KNO (0.596). This factor can be interpreted as "PAB and KNO."

PAB has a high negative loading on factor 2, indicating an inverse relationship with KNO of the same factor. Some

Table 2. Respondent demographic information (N = 519)

Variable	n
Gender	
Female	326
Male	193
Age	
12 years	17
13 years	40
14 years	112
15 years	99
16 years	39
17 years	174
18 years	38
School name	
SMP N 1 Semarang (Public Junior High School 1 Semarang)	60
SMP N 2 Semarang (Public Junior High School 2 Semarang)	48
SMP Al-Azhar 23 Semarang (Junior High School Al-Azhar 23 Semarang)	48
SMP Kesatrian 1 Semarang (Junior High School Kesatrian 1 Semarang)	53
SMA N 2 Semarang (Public Senior High School 2 Semarang)	47
SMA N 3 Semarang (Public Senior High School 3 Semarang)	55
SMA Kesatrian 1 Semarang (Senior High School Kesatrian 1 Semarang)	50
SMA YSKI Semarang (Senior High School YSKI Semarang)	47
SMK N 7 Semarang (Public Vocational High School 7 Semarang)	35
SMK N 9 Semarang (Public Vocational High School 9 Semarang)	69
Universitas Dian Nuswantoro	1
Universitas Diponegoro	4
Universitas Negeri Semarang	1
UIN Walisongo Semarang	1

variables have relatively low commonalities, such as CON (0.350) and KNO (0.371), indicating that these variables are less represented by the extracted factors. Rotation converged into 3 iterations, showing the relatively stable factor solution. The component transformation matrix shows that both factors have a reasonably high correlation (0.967 and -0.967), indicating that the factors are not entirely independent.

Structural Equation Model

The SEM analysis of the PPLQ revealed a complex but informative structure. The model showed a fairly good fit, although there is room for improvement. The model fit indices showed a significant χ^2 (p < .001), which is common in large

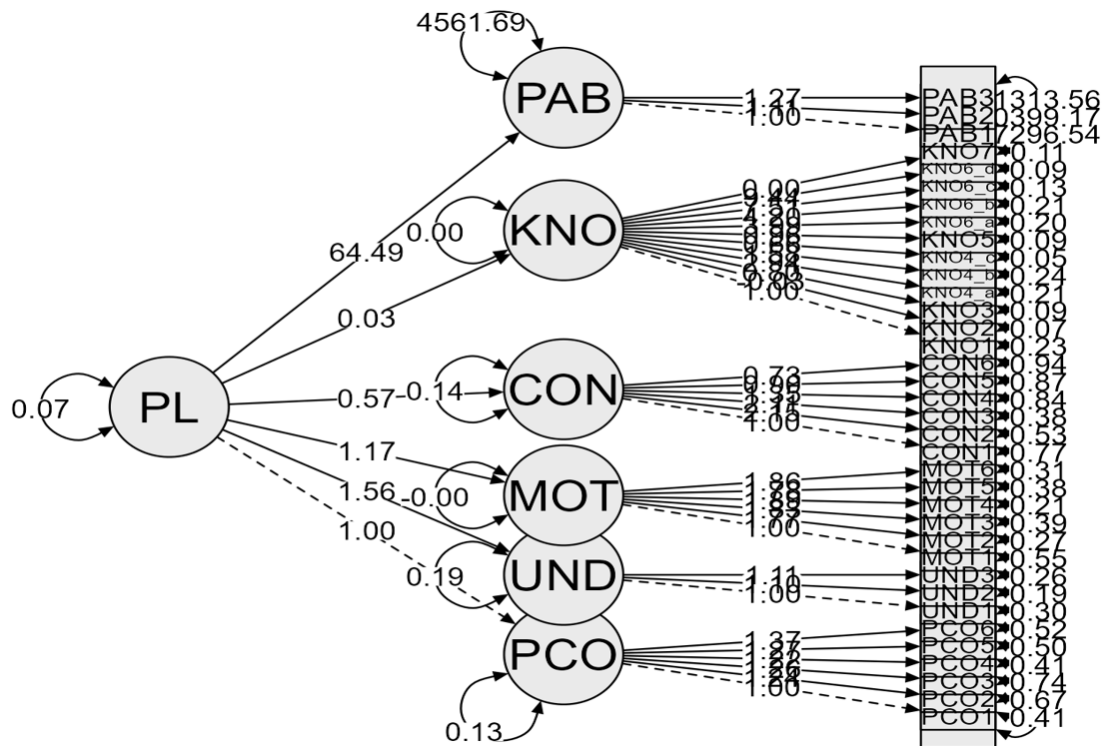


Figure 2. Path diagram (Source: Authors' own elaboration)

samples. The factor structure of PPLQ was confirmed with six main domains: PCO, UND, MOT, CON, PAB, and KNO, all contributing to the PL construct. Factor loadings for most domains showed good convergent validity, with significant values ($p < .001$) for most items. However, the KNO domain showed some deficiencies, with several items having non-significant loadings, such as KNO2 ($p = 0.933$), KNO3 ($p = 0.173$), and KNO7 ($p = 0.995$). This indicates that the KNO domain may require substantial revision or removal of these items.

The path diagram revealed exciting relationships between PL and its domains (Figure 2). PAB had the highest loading (64.491), substantially contributing to PL. UND (1.564) and MOT (1.169) also showed significant contributions. Conversely, KNO had a very low and non-significant loading (0.027, $p = 0.131$), indicating that this domain might not effectively measure the intended aspect of PL.

Several technical issues were identified in the model. The factor variance for MOT was negative (-0.003), although not significant ($p = 0.653$), which could indicate model specification problems. PAB showed a very high variance (4,561.688), possibly due to different measurement scales or extreme variability in PAB.

Residual variances for some items were quite high, especially for items in the PAB domain (PAB1: 27,296.538, PAB3: 31,313.556), indicating that the model does not explain most of the variation in these items. This may indicate a need to revise the measurement of PAB or consider additional factors affecting this variability.

Overall, the SEM model confirms the multidimensional structure of PPLQ but also reveals areas that need improvement. The KNO domain requires special attention, with the possibility of removing or reformulating problematic items. PAB measurement may also require adjustment to reduce extreme variability. Although this model provides valuable insights into the PL structure, further refinement is

needed to improve the validity and reliability of the instrument, especially in the KNO and PAB domains.

After removing non-significant or invalid items, the SEM analysis results showed several significant changes. The overall model fit improved, with a lower χ^2 value (759.727) compared to the previous model, although it remained significant ($p < .001$). Other model fit indices also showed improvement, with the comparative fit index (CFI) reaching 0.904, which is above the acceptable threshold (> 0.90). The Tucker-Lewis index (TLI) also increased to 0.891, approaching the desired threshold.

Root mean square error of approximation (RMSEA) of 0.043 (90% CI: 0.039-0.048) indicates a perfect fit, below the threshold of 0.05, indicating a close fit. Standardized root mean square residual (SRMR) of 0.050 also shows a good fit, well below the threshold of 0.08.

The factor structure of PPLQ still consists of six main domains, but some changes are seen in the contribution of each domain to the PL construct. PAB now has a very high loading (139.472) on PL, showing a significant increase in its contribution. KNO also indicates substantial growth with a loading of 1.145, while UND decreased to 0.230.

Although the model fit improved, some technical issues remain. Several factors show negative variance (PCO: -0.257, MOT: -0.109, CON: -0.089, KNO: -0.595), indicating potential problems in model specification or instability in parameter estimation. PAB still shows a high variance (34.720), although much lower than the previous model.

Covariances between factors show a complex pattern with many negative values, which may reflect complicated relationships between PL domains. Residual variances for some items are still relatively high, especially for items in the PAB domain (PAB2: 7,452.088, PAB3: 34,049.546), indicating that there is still substantial variation unexplained by the model.

Overall, removing problematic items has improved the model fit and clarified the factor structure of PPLQ. However, the emergence of negative variances and the complexity of relationships between factors indicate that there is still room for further improvement. This model provides a more substantial basis for UND the PL structure but also shows the need for further investigation, especially regarding PAB measurement and relationships between PL domains.

Construct Validity Test

We conducted a series of non-parametric analyses to assess the construct validity of the PPLI because the data was not normally distributed (Kolmogorov-Smirnov and Shapiro-Wilk tests, $p < 0.05$ for all variables).

Spearman correlation analysis showed that most components of perceived PL correlated positively and significantly. The strongest correlations were found between PCO and MOT ($r_s = 0.503$, $p < 0.01$) and between MOT and UND ($r_s = 0.505$, $p < 0.01$). However, some components had weak or non-significant correlations, such as KNO and PCO ($r_s = 0.064$, $p = 0.144$) and between PAB and CON ($r_s = 0.020$, $p = 0.642$).

We also tested the correlation between total perceived PL scores and demographic variables. Results showed no significant correlation between total PAL scores and gender ($r_s = -0.055$, $p = 0.214$) or education level ($r_s = 0.063$, $p = 0.155$). The Jonckheere-Terpstra test showed no significant trend in Perceived PL scores among various education levels (standardized test statistic = 1.419, $p = 0.156$). This indicates that the PPLI does not significantly differentiate between different education levels. The Mann-Whitney U test showed no significant difference in perceived PL scores between males and females ($U = 29,405.500$, $p = 0.214$). Although males had a slightly higher mean rank (270.64) than females (253.70), this difference was not statistically significant. The analysis results show that the PPLI has fairly good internal consistency for some components, but some components show weak correlations. This instrument does not show strong convergent validity with the demographic variables tested and cannot significantly differentiate between education levels or gender. This suggests that although this instrument has the potential to measure perceived PL, further refinement is needed to improve its construct validity, especially in terms of its ability to differentiate between different groups.

Cronbach's Alpha Calculation

Reliability analysis using Cronbach's alpha was conducted to assess the internal consistency of the perceived PL scale consisting of 6 domains. The analysis results show several findings: the overall Cronbach's alpha value is -0.022, a negative value. This is an indication of a lack of internal consistency in the scale. Domain statistics show that the "PAB (score)" domain has a very high standard deviation (273.21872) compared to other domains, which range between 11-14. However, if the "PAB" domain is removed, Cronbach's alpha value will increase to 0.613, which is a substantial increase (above 0.6). The "PAB" domain is very different from other domains because of differences in measurement scale or the concept being measured. Removing the "PAB" domain will significantly increase the scale's reliability, making it acceptable (above 0.6). There is a need for improvement or further development in PAB.

Result Interpretation

The PPLQ instrument shows a complex but informative multidimensional structure. Although the initial model indicated a fairly good fit, further refinement through removing non-significant items resulted in substantial improvements in model fit. This shows that this instrument has good potential for measuring PL but requires adjustments to improve its validity and reliability.

The PAB and KNO domains emerge as areas that require special attention. PAB contributes a very large amount to the PL construct but also has high variability. This indicates that measuring PAB may need to be revised to capture this aspect more accurately. Meanwhile, the KNO domain shows improvement after revision but still requires further development to ensure its relevance in measuring PL.

The instrument's construct validity shows varied results. Although most components correlate positively and significantly, some show weak or non-significant correlations. This instrument also does not show significant sensitivity to demographic differences such as gender and education level. This suggests that PPLQ may measure the PL construct universally but also indicates the need for refinement to improve its ability to differentiate variations in the population.

Reliability analysis reveals challenges in internal consistency, especially related to the PAB domain. Removing this domain significantly improves reliability, indicating the need for a different approach to measuring aspects of PAB.

Overall, these results indicate that PPLQ has a strong foundation as an instrument for measuring PL but requires further refinement. The main focus for future development should be improving the measurement of PAB, strengthening the KNO domain, and increasing the instrument's sensitivity to demographic variations. With these refinements, PPLQ has the potential to become a valid and reliable tool for measuring PL in the Indonesian context, providing an essential contribution to UND and promoting PL among adolescent and young adult populations. **Appendix B** shows the results.

DISCUSSION

The validation results of the Indonesian version of the perceived physical literacy questionnaire (PPLQ-Id) show that this instrument generally has a factor structure consistent with the established concept of PL. According to the international physical literacy association) definition, PPLQ-Id successfully measures six main domains of PL: MOT, CON, PCO, KNO, UND, and PAB [36]. This indicates that PPLQ-Id can capture the multidimensional construct of PL in Indonesia's adult population.

After some modifications, confirmatory factor analysis produced a pretty good model fit. The RMSEA value of 0.043 is below the threshold of 0.05, indicating a perfect fit. CFI reached 0.904, exceeding the acceptable threshold (> 0.90), and TLI increased to 0.891, approaching the desired threshold. SRMR of 0.050 also shows a good fit [37]. The improvement in these fit indices indicates that the revised model is better at capturing the underlying data structure.

However, it should be noted that the structure of other versions of the PPLQ instrument differs. For example, the original PPLI version [38] and the Spanish version [28] group items into three factors, while PPLQ-Id maintains six separate

domains. These differences may reflect cultural and contextual variations and the characteristics of the sample used. This study used a more heterogeneous sample than previous research focused on physical education teachers or college students.

Regarding psychometric properties, most domains of PPLQ-Id show good validity and reliability. The PCO and UND domains have high factor loadings (0.68 to 0.90) and Cronbach's alpha values (0.88 and 0.87), indicating strong internal consistency. The average variance extracted (AVE) values for these two domains are also satisfactory (0.55 and 0.78), showing good convergent validity (39).

However, the KNO domain still needs further improvement. Some items in this domain have low or non-significant factor loadings, such as KNO3, KNO4c, and KNO7. The low Cronbach's alpha value (0.49) and inadequate AVE (0.12) indicate problems in internal consistency and convergent validity. These findings align with the results of other studies showing that the KNO domain is often challenging to measure PL [39].

Interestingly, PPLQ-Id does not show significant sensitivity to demographic differences such as gender and education level. This differs from previous studies that found variations in PL based on demographic characteristics [40]. This finding may indicate that PPLQ-Id measures the PL construct universally but also shows the need for further refinement to enhance the instrument's ability to detect variations in the population.

Spearman correlation analysis shows that most PPLQ-Id components correlate positively and significantly with each other, with the strongest correlations between PCO and MOT ($r_s = 0.503$, $p < 0.01$) and between MOT and UND ($r_s = 0.505$, $p < 0.01$). However, some components have weak or non-significant correlations, such as KNO and PCO ($r_s = 0.064$, $p = 0.144$) and between PAB and CON ($r_s = 0.020$, $p = 0.642$). This correlation pattern shows that PPLQ-Id domains are interrelated but have their uniqueness, which aligns with the concept of PL as a multidimensional construct [41].

One interesting finding is the substantial contribution of the PAB domain to the PL construction, with a factor loading of 64.491. This underlines the importance of actual behavior in PL, which aligns with the argument that PL should be reflected in physical activity participation [42]. However, the high variability in the PAB domain (variance 4,561.688) indicates the need for a more nuanced approach to measuring PAB.

Although PPLQ-Id shows good potential, several limitations need to be considered. First, the temporal stability of the instrument has not been tested through test-retest analysis. Second, criterion validity has not been evaluated by comparing PPLQ-Id results with objective measurements of PL. Further refinement of the KNO domain could be done by reformulating items or considering a formative measurement approach [31]. Testing measurement invariance across different demographic groups ensures that PPLQ-Id functions equally across various subpopulations—evaluation of criterion validity by comparing PPLQ-Id results with objective PCO and PAB measurements. With further refinement, PPLQ-Id has the potential to become a valuable tool for measuring PL in the adult population in Indonesia. This instrument can provide essential insights for researchers, practitioners, and policymakers in efforts to increase physical activity participation and public health more broadly. Given the high prevalence of physical inactivity in Indonesia, especially in

urban areas [12], using PPLQ-Id can help identify areas that require intervention in improving community PL.

CONCLUSION

This study has successfully translated, adapted, and validated the PPLQ for the Indonesian context, producing PPLQ-Id for adolescents. The analysis results show that PPLQ-Id has a factor structure consistent with PL, with six main domains that can be measured validly and reliably. PCO and UND domains show excellent psychometric properties, while the KNO domain requires further refinement.

PPLQ-Id shows good potential as an instrument to measure PL in the adolescent population in Indonesia. Nevertheless, some challenges remain, especially regarding the instrument's sensitivity to demographic differences and the validity of the KNO domain. Further research is needed to refine this instrument, including cross-validation with a more extensive and diverse sample and evaluation of criterion validity with objective measurements of PL.

With further refinement, PPLQ-Id can become a valuable tool for researchers, practitioners, and policymakers to improve PL and participation in physical activity in Indonesia. Given the high prevalence of physical inactivity in this country, especially in urban areas, the use of PPLQ-Id can help identify areas that require intervention in improving adolescent PL, which can ultimately contribute to improving the health and well-being of the overall population.

Author contributions: **H:** conceptualized the study, provided project administration, and supervised the research process. He coordinated the overall research activities, established comprehensive research protocols, managed resource allocation, and provided leadership throughout all phases of the study; **N:** led the community engagement initiatives and health promotion program development. She designed and implemented physical activity promotion strategies targeted at adolescents in Semarang City, developed evidence-based educational materials, and established collaborative networks with key stakeholders, including local government authorities, educational institutions, and community organizations; **ER:** developed the methodology and led the instrument validation process. She adapted and modified the Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) to create the Physical Activity Literacy (PAL) instrument, and refined the instrument based on validity and reliability analyses. All authors have agreed with the results and conclusions.

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Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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APPENDIX A: DOMAIN, ITEMS, AND OF PPLQ-Id

Table A1. Domain, items, and of PPLQ-Id (response scale: 5 points Likert scale: strongly disagree-strongly agree)

Domain	Item and answer
PCO	1. I have a lot of muscle power.
	2. I can run for at least 30 min minutes without stopping.
	3. It is easy for me to lift heavy objects (e.g., full beverage crate).
	4. I would do well in a test of muscle strength.
	5. I can be physically active for a long period of time without getting tired.
	6. I am good at endurance activities (e.g., distance running, aerobics, cycling, swimming, or cross-country skiing).
UND	1. I see a purpose in engaging in physical activity regularly.
	2. I feel a lot of appreciation for people engaging in regular physical activity.
	3. I think initiatives in companies to increase physical activity (e.g., company walking day) make sense.
MOT	“I plan to be physically active on a regular basis in the coming weeks and months ...”
	1. ... because I simply enjoy it.
	2. ... because the positive consequences are simply worth the effort.
	3. ... because physical activity is simply part of my life.
	4. ... because it is good for me.
	5. ... because it gives me experiences that I wouldn't want to miss.
CON	6. ... because I have good reasons for it.
	“I still engage in planned physical activities even if ...”
	1. ... I am tired.
	2. ... I feel depressed.
	3. ... I am annoyed about something.
	4. ... I can't find anyone to do sports with me.
PAB	5. ... weather is bad.
	6. ... an interesting TV program is running.
	1a. During the last 7 days, how many days did you walk for at least 10 min minutes at a time? This includes walking distances at home or at work, walking from one place to another, and all other walking for recreation, exercise, or leisure.
	1b. How much time did you usually spend walking on one of those days?
	2a. Think only about those physical activities that you did for at least 10 min minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast cycling or fast swimming?
	2b. How much time do you usually spend doing vigorous physical activities on one of those days?
KNO	3a. Think again only about those physical activities that you did for at least 10 min minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or swimming at ordinary speed?
	Caution: This does not include walking!
	3b. How much time do you usually spend doing moderate physical activities on one of those days?
	PAB1 = 1a * 1b; PAB2 = 2a * 2b; PAB3 = 3a * 3b
	1. Up to what age is muscle strength trainable? [40, 50, 60, 70, 80, 90, always]
	2. According to the physical activity guidelines, at least how many minutes per week should you perform activities that involve a slight increase in breathing and pulse rate e.g., brisk walking)? [30 min (½ hour), 45 min (¾ hours), 60 min (1 h hour), 75 min (1 ¼ hours), 90 min (1½ hours), 120 min (2 h hours), 150 min (2½ hours) , 180 min (3 h hours), 240 min (4 h hours)]
3. Pure strength training (without endurance training) also has health benefits [true , false].	
4. A physically inactive lifestyle increases the risk of suffering from the following diseases: (multiple choice response scale).	
a. Breast cancer [no, yes].	
b. Dementia [no, yes].	
c. Hypertension [no, yes].	
5. Women need different strength exercises than men to build muscle [true , false].	
6. Physical activity can improve the course of the following diseases: (multiple choice response scale).	
a. Diabetes mellitus [no, yes].	
b. Parkinson's disease [no, yes].	
c. Joint wear (arthrosis) [no, yes].	
d. Heart failure[no, yes].	
7. Strength training is suitable for losing weight (body fat) [true , false].	

APPENDIX B: RESULTS

Table B1. Results of EFA PPLQ-Id

KMO and Bartlett's test of sphericity	
KMO measure of sampling adequacy	.656
Bartlett's test of sphericity	Approximate Chi-square (χ^2)
	df
	Significance
	412.584
	15
	.000

Table B2. Results of SEM analysis PPLQ-Id: Model fit

	Baseline test			Difference test					
	AIC	BIC	n	χ^2	df	p	$\Delta\chi^2$	Δdf	p
Model 1	51,292.623	51,777.340	519	1,072.880	588	<.001	1,072.880	588	<.001

Table B3. Parameter estimates: Factor loadings

Latent	Indicator	Estimate	Standard error	z-value	p	95% confidence interval	
						Lower	Upper
CON	CON1	1.000	0.000			1.000	1.000
	CON2	2.151	0.255	8.426	<.001	1.651	2.652
	CON3	2.110	0.249	8.471	<.001	1.622	2.598
	CON4	1.355	0.186	7.277	<.001	0.990	1.720
	CON5	0.905	0.151	5.988	<.001	0.608	1.201
	CON6	0.731	0.143	5.110	<.001	0.450	1.011
KNO	KNO1_recode	1.000	0.000			1.000	1.000
	KNO2_recode	-0.026	0.312	-0.085	0.933	-0.638	0.585
	KNO3_recode	0.799	0.586	1.362	0.173	-0.351	1.948
	KNO4_a	2.941	1.782	1.651	0.099	-0.551	6.433
	KNO4_b	1.585	1.084	1.462	0.144	-0.541	3.710
	KNO4_c	0.658	0.462	1.425	0.154	-0.247	1.564
	KNO5_recode	0.961	0.655	1.467	0.142	-0.323	2.246
	KNO6_a	3.994	2.365	1.689	0.091	-0.642	8.629
	KNO6_b	4.200	2.482	1.692	0.091	-0.666	9.065
	KNO6_c	7.512	4.357	1.724	0.085	-1.028	16.052
KNO6_d	9.435	5.477	1.723	0.085	-1.299	20.169	
KNO7_recode	0.002	0.396	0.006	0.995	-0.774	0.778	
MOT	MOT1	1.000	0.000			1.000	1.000
	MOT2	1.771	0.216	8.210	<.001	1.348	2.193
	MOT3	1.829	0.228	8.018	<.001	1.382	2.276
	MOT4	1.889	0.225	8.383	<.001	1.447	2.331
	MOT5	1.781	0.222	8.013	<.001	1.345	2.217
	MOT6	1.864	0.228	8.181	<.001	1.417	2.310
PAB	PAB1Item	1.000	0.000			1.000	1.000
	PAB2Item	1.106	0.265	4.171	<.001	0.586	1.626
	PAB3Item	1.270	0.278	4.576	<.001	0.726	1.814
PCO	PCO1	1.000	0.000			1.000	1.000
	PCO2	1.238	0.130	9.557	<.001	0.984	1.492
	PCO3	1.261	0.134	9.408	<.001	0.998	1.523
	PCO4	1.217	0.116	10.500	<.001	0.990	1.444
	PCO5	1.269	0.123	10.289	<.001	1.028	1.511
	PCO6	1.375	0.130	10.546	<.001	1.119	1.630
PL	PCO	1.000	0.000			1.000	1.000
	UND	1.564	0.192	8.159	<.001	1.188	1.939
	MOT	1.169	0.191	6.110	<.001	0.794	1.544
	PAB	64.491	21.061	3.062	0.002	23.213	105.769
	CON	0.573	0.111	5.162	<.001	0.355	0.790
	KNO	0.027	0.018	1.510	0.131	-0.008	0.062
UND	UND1	1.000	0.000			1.000	1.000
	UND2	1.099	0.064	17.234	<.001	0.974	1.224
	UND3	1.111	0.066	16.740	<.001	0.981	1.241

Table B4. Factor variances

Variable	Estimate	Standard error	z-value	p	95% confidence interval (CI)	
					Lower	Upper
PCO	0.127	0.021	5.948	< .001	0.085	0.168
UND	0.193	0.026	7.462	< .001	0.142	0.244
MOT	-0.003	0.007	-0.450	0.653	-0.017	0.011
CON	0.136	0.031	4.403	< .001	0.076	0.197
KNO	0.002	0.002	0.866	0.386	-0.002	0.006
PAB	4,561.688	1,528.345	2.985	0.003	1,566.186	7,557.190
PL	0.072	0.016	4.592	< .001	0.041	0.103

Table B5. Residual variances

Variable	Estimate	Standard error	z-value	p	95% CI lower	95% CI upper
PCO1	0.406	0.029	14.074	< .001	0.349	0.463
PCO2	0.673	0.047	14.228	< .001	0.580	0.765
PCO3	0.744	0.052	14.347	< .001	0.643	0.846
PCO4	0.414	0.031	13.140	< .001	0.352	0.475
PCO5	0.503	0.037	13.453	< .001	0.430	0.576
PCO6	0.515	0.039	13.065	< .001	0.438	0.592
UND1	0.304	0.024	12.654	< .001	0.257	0.351
UND2	0.193	0.020	9.445	< .001	0.153	0.232
UND3	0.262	0.024	11.029	< .001	0.215	0.308
MOT1	0.548	0.035	15.704	< .001	0.479	0.616
MOT2	0.269	0.020	13.482	< .001	0.230	0.308
MOT3	0.393	0.028	14.198	< .001	0.339	0.447
MOT4	0.209	0.017	12.238	< .001	0.175	0.242
MOT5	0.375	0.026	14.213	< .001	0.324	0.427
MOT6	0.314	0.023	13.617	< .001	0.269	0.359
CON1	0.774	0.051	15.305	< .001	0.675	0.873
CON2	0.531	0.054	9.900	< .001	0.426	0.636
CON3	0.381	0.046	8.211	< .001	0.290	0.472
CON4	0.841	0.057	14.733	< .001	0.729	0.953
CON5	0.870	0.056	15.527	< .001	0.760	0.980
CON6	0.940	0.060	15.759	< .001	0.823	1.057
KNO1_recode	0.232	0.014	16.067	< .001	0.204	0.260
KNO2_recode	0.068	0.004	16.109	< .001	0.060	0.076
KNO3_recode	0.092	0.006	16.042	< .001	0.081	0.103
KNO4_a	0.208	0.013	15.698	< .001	0.182	0.234
KNO4_b	0.238	0.015	16.007	< .001	0.209	0.267
KNO4_c	0.049	0.003	16.023	< .001	0.043	0.054
KNO5_recode	0.085	0.005	16.004	< .001	0.075	0.096
KNO6_a	0.203	0.013	15.311	< .001	0.177	0.229
KNO6_b	0.207	0.014	15.241	< .001	0.181	0.234
KNO6_c	0.134	0.013	10.516	< .001	0.109	0.159
KNO6_d	0.090	0.016	5.691	< .001	0.059	0.120
KNO7_recode	0.110	0.007	16.109	< .001	0.096	0.123
PAB1Item	27,296.538	2,098.019	13.011	< .001	23,184.497	31,408.578
PAB2Item	10,399.170	1,552.324	6.699	< .001	7,356.670	13,441.670
PAB3Item	31,313.556	2,734.653	11.451	< .001	25,953.735	36,673.378

Table B6. Additional fit measures: Fit indices (t-size CFI is computed for $\alpha = 0.05$, t-size equivalents of the conventional CFI cut-off values [poor < 0.90 < fair < 0.95 < close] are **poor < 0.883 < fair < 0.937 < close** for model: Model 1)

Index	Value
Comparative fit index (CFI)	0.880
t-size CFI	0.842
Tucker-Lewis index (TLI)	0.872
Bentler-Bonett non-normed fit index (NNFI)	0.872
Bentler-Bonett normed Fit index (NFI)	0.771
Parsimony normed fit index (PNFI)	0.719
Bollen's relative fit index (RFI)	0.754
Bollen's incremental fit index (IFI)	0.881
Relative noncentrality index (RNI)	0.880

Table B7. Additional fit measures: Information criteria

	Value
Log-likelihood	-25,532.311
Number of free parameters	114.000
Akaike (AIC)	51,292.623
Bayesian (BIC)	51,777.340
Sample-size adjusted Bayesian (SSABIC)	51,415.480

Table B8. Other fit measures

Metric	Value
Root mean square error of approximation (RMSEA)	0.040
RMSEA 90% CI lower bound	0.036
RMSEA 90% CI upper bound	0.044
RMSEA p-value	1.000
T-size RMSEA	0.044
Standardized root mean square residual (SRMR)	0.054
Hoelter's critical N ($\alpha = .05$)	313.267
Hoelter's critical N ($\alpha = .01$)	325.450
Goodness of fit index (GFI)	0.981
McDonald fit index (MFI)	0.627
Expected cross validation index (ECVI)	2.507

Note. t-size RMSEA is computed for $\alpha = 0.05$, t-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.056 < fair < 0.089 < poor** for model: Model 1

Table B9. Factor co-variances

Variables	Value
PCO-UND	0.371
PCO-MOT	-0.043
PCO-CON	-0.057
PCO-KNO	-0.387
PCO-PAB	-25.775
UND-MOT	0.228
UND-CON	0.165
UND-KNO	0.294
UND-PAB	29.575
MOT-CON	0.004
MOT-KNO	-0.127
MOT-PAB	-8.281
CON-KNO	-0.127
CON-PAB	-6.592
KNO-PAB	-37.670

Table B10. SEM (deletion of invalid items): Model fit

				Baseline test			Difference test		
	AIC	BIC	n	χ^2	df	p	$\Delta\chi^2$	Δdf	p
Model 1	42408.683	42880.644	519	759.727	384	< .001	759.727	384	< .001

Table B11. Additional fit measures: Fit indices (t-size CFI is computed for $\alpha = 0.05$, t-size equivalents of the conventional CFI cut-off values [poor < 0.90 < fair < 0.95 < close] are **poor < 0.883 < fair < 0.937 < close** for model: Model 1)

Index	Value
Comparative fit index (CFI)	0.904
t-size CFI	0.870
Tucker-Lewis index (TLI)	0.891
Bentler-Bonett non-normed fit index (NNFI)	0.891
Bentler-Bonett normed Fit index (NFI)	0.825
Parsimony normed fit index (PNFI)	0.728
Bollen's relative fit index (RFI)	0.802
Bollen's incremental fit index (IFI)	0.905
Relative noncentrality index (RNI)	0.904

Table B12. Additional fit measures: Information criteria

	Value
Log-likelihood	-21,093.341
Number of free parameters	111.000
Akaike (AIC)	42,408.683
Bayesian (BIC)	42,880.644
Sample-size adjusted Bayesian (SSABIC)	42,528.307

Table B13. Other fit measures

Metric	Value
Root mean square error of approximation (RMSEA)	0.043
RMSEA 90% CI lower bound	0.039
RMSEA 90% CI upper bound	0.048
RMSEA p-value	0.992
T-size RMSEA	0.048
Standardized root mean square residual (SRMR)	0.050
Hoelter's critical N ($\alpha = .05$)	295.223
Hoelter's critical N ($\alpha = .01$)	309.366
Goodness of fit index (GFI)	0.982
McDonald fit index (MFI)	0.696
Expected cross validation index (ECVI)	1.892

Note. t-size RMSEA is computed for $\alpha = 0.05$, t-size equivalents of the conventional RMSEA cut-off values (close < 0.05 < fair < 0.08 < poor) are **close < 0.056 < fair < 0.089 < poor** for model: Model 1

Table B14. Factor variances

Variable	Estimate	Standard error	z-value	p	95% confidence interval (CI)	
					Lower	Upper
PCO	-0.257					
UND	0.338					
MOT	-0.109					
CON	-0.089					
KNO	-0.595					
PAB	34.720					
PL	0.455					

Table B15. Factor co-variances

Variables	Value
PCO-UND	-0.020
PCO-MOT	-0.221
PCO-CON	-0.266
PCO-KNO	-0.520
PCO-PAB	-45.198
UND-MOT	0.063
UND-CON	-0.008
UND-KNO	-0.117
UND-PAB	-12.641
MOT-CON	-0.179
MOT-KNO	-0.347
MOT-PAB	-36.388
CON-KNO	-0.380
CON-PAB	-37.412
KNO-PAB	-72.238

Table B16. Parameter estimates: Factor loadings

Latent	Indicator	Estimate	Standard error	z-value	p	95% confidence interval	
						Lower	Upper
CON	CON1	1.000	0.000			1.000	1.000
	CON2	2.229					
	CON3	2.158					
	CON4	1.343					
	CON5	0.871					
	CON6	1.000					
KNO	KNO1_recode	3.171	0.000			1.000	1.000
	KNO2_recode	1.720					
	KNO3_recode	1.047					
	KNO4_a	4.233					
	KNO4_b	4.431					
	KNO4_c	8.030					
	KNO5_recode	10.203					
	KNO6_a	1.000					
	KNO6_b	1.786					
	KNO6_c	1.811					
	KNO6_d	1.898					
	KNO7_recode	1.761					
MOT	MOT1	1.854	0.000			1.000	1.000
	MOT2	1.000					
	MOT3	0.758					
	MOT4	1.000					
	MOT5	1.253					
	MOT6	1.267					
PAB	PAB1Item	1.220	0.000			1.000	1.000
	PAB2Item	1.288					
	PAB3Item	1.337					
PCO	PCO1	1.000	0.000			1.000	1.000
	PCO2	0.230					
	PCO3	0.670					
	PCO4	139.472					
	PCO5	0.731					
	PCO6	1.145					
PL	PCO	1.000	0.000			1.000	1.000
	UND	1.117					
	MOT	1.124					
	PAB	1.000					
	CON	2.229					
UND	UND1	1.343	0.000			1.000	1.000
	UND2	0.871					
	UND3	1.000					

Table B17. Residual variances

Variable	Estimate	Standard error	z-value	p	95% CI lower	95% CI upper
PCO1	0.406					
PCO2	0.665					
PCO3	0.741					
PCO4	0.412					
PCO5	0.493					
PCO6	0.535					
UND1	0.311					
UND2	0.187					
UND3	0.260					
MOT1	0.548					
MOT2	0.263					
MOT3	0.399					
MOT4	0.205					
MOT5	0.381					
MOT6	0.317					
CON1	0.780					
CON2	0.504					
CON3	0.374					
CON4	0.856					
CON5	0.884					
CON6	0.232					
KNO1_recode	0.208					
KNO2_recode	0.238					
KNO3_recode	0.085					
KNO4_a	0.204					
KNO4_b	0.208					
KNO4_c	0.134					
KNO5_recode	0.087					
KNO6_a	7,452.088					
KNO6_b	34,049.546					
KNO6_c	0.406					
KNO6_d	0.665					
KNO7_recode	0.741					
PAB1Item	0.412					
PAB2Item	0.493					
PAB3Item	0.535					

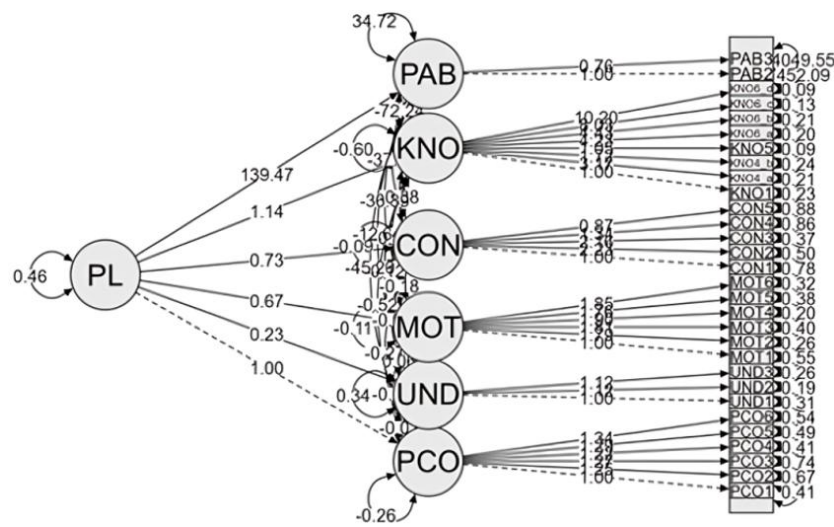


Figure B1. Path diagram (Source: Authors' own elaboration)

Table B18. PPLQ-Id data normality test results: Tests of normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Significance	Statistic	df	Significance
Physical competence (score)	.103	519	.000	.978	519	.000
Motivation (score)	.093	519	.000	.973	519	.000
Confidence (score)	.087	519	.000	.981	519	.000
Understanding (score)	.174	519	.000	.871	519	.000
Physical activity behavior (score)	.423	519	.000	.289	519	.000
Knowledge (score)	.129	519	.000	.963	519	.000

Note. ^aLilliefors significance correction

Table B19. PPLQ-Id construct validity test results: Ranks

	Jenis Kelamin responden	N	Mean rank	Sum of ranks
Total physical literacy score	Laki-laki	193	270.64	52,233.50
	Perempuan	326	253.70	82,706.50
	Total	519		

Table B20. Test statistics

	Total physical literacy score
Mann-Whitney U	29,405.500
Wilcoxon W	82,706.500
Z	-1.244
Asymptotic significance (2-tailed)	.214

Table B21. Reliability analysis results

Reliability of all domains		Domain reliability except PAB	
Cronbach's alpha	Number of items	Cronbach's alpha	Number of items
-.022	6	.613	5