

Research Article

Urdu Translation and Cross-Cultural Adaptation of Canadian Assessment of Physical Literacy-2 (CAPL-2) Questionnaires: A Reliability Analysis in Pakistani Children

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Background. Physical literacy is vital for addressing children's health issues such as childhood obesity, physical inactivity, and sedentary behavior. However, there is a lack of research on PL assessment in Pakistan. This study is aimed at translating and cross-culturally adapting the Canadian Assessment of Physical Literacy-2 (CAPL-2) tool and establishing its validity and reliability in the Pakistani population. **Methods.** The CAPL-2 was translated to Urdu employing the translation and back translation method. A cross-sectional study involving 350 school children (8-12 years) from Multan, South Punjab, evaluated the CAPL-2U version's reliability. **Results.** Expert consensus and pilot testing successfully achieved translation, cross-cultural adaptation, face and content validity. The CAPL-2U demonstrated excellent reliability and internal consistency across the domains. Specifically, daily behavior domain had an internal consistency of $\alpha = 0.964$ and test-retest reliability of ICC = 0.930. Knowledge and understanding domain showed internal consistency ranging from $\alpha = 0.906$ to 0.986 and test-retest reliability of ICC = 0.827 to 0.986. The motivation and confidence domain had an internal consistency of $\alpha = 0.923$ to 0.997 and test-retest reliability of ICC = 0.857 to 0.993. The correlation between test-retest results for knowledge and understanding and motivation and confidence domains was $r = 0.318$ to 0.973. However, two items in the motivation and confidence domain showed discrepancies in test-retest outcomes. **Conclusion.** The study confirms the successful translation and adaptation of the CAPL-2 questionnaire for use in Urdu and Pakistani contexts. The findings endorse the tool's reliability and suitability for assessing physical literacy in Pakistan's children aged 8-12.

1. Introduction

Globally, childhood obesity has surged, becoming a significant public health concern [1]. World Health Organization (WHO) data indicates that around 340 million children and adolescents aged 5 to 19 are classified as obese [2]. This alarming trend can be attributed to a combination of factors, including decreased physical activity (PA), increased food consumption, and rapid urbanization [3]. Alarming, this trend is not limited to developed nations; developing countries are also witnessing a similar increase [4, 5]. This trend is concerning, especially considering the established relationship between obesity and poverty [6]. The global impact of inactivity is staggering, with approximately 3.2 million deaths per year attributed to this issue [7]. Studies have shown that physical inactivity (PI) significantly contributes to mortality rates [8]. For instance, Pakistan ranks 9th in the world for the prevalence of obesity [9], with childhood obesity in the country attributed to increased inactivity [10] and excessive food consumption [11]. Such factors not only lead to major medical complications, such as type 2 diabetes, but also increase the risk of early morbidity and a plethora of other short- and long-term health complications [12].

Previous school-based physical activity and physical education (PE) programs have been insufficient in fostering an active lifestyle in children, with research identifying a significant lack of motivation [13]. In light of the escalating global concern of childhood obesity and the evident gaps in existing interventions, there is an imperative need to explore alternative strategies and tools. Consequently, physical literacy (PL) has emerged as a promising strategy to address childhood obesity and inactivity [14]. Despite conventional methods, PL offers a comprehensive approach, emphasizing sustained physical activity and sports engagement throughout life [15]. Such an approach is deemed vital for PE as it establishes healthy behaviors from an early age, setting the foundation for enhanced health and activity during adolescence [16, 17].

Physical literacy is a holistic concept that encompasses motivation, confidence, physical competence, knowledge, and understanding, all of which are essential for individuals to value and take responsibility for their engagement in physical activities throughout their life [15]. Several tools have been developed to assess physical literacy, including the Physical Literacy Assessment for Youth (PLAY) Tools, Passport for Life, Perceived Physical Literacy Inventory (PPLI), and Physical Literacy Observatory Tool (PLOT) [18]. Among these, the Canadian Assessment of Physical Literacy-Second Edition (CAPL-2) distinguishes itself due to its cultural adaptability and demonstrated validity [19–21]. Edwards et al. underscored the complexity of measuring PL with conventional methods, arguing that simplistic approaches may not encapsulate this multifaceted concept [22]. This perspective is further exemplified by the PLAY fun tool, which, although reliable in assessing the motor competence domain of PL among children in northern Canada, necessitates the involvement of two raters for accuracy [23]. The PPLI has been validated for assessing

the only perceived PL of adolescents and physical education teachers [24]. The Preschool Physical Literacy Assessment Tool (Pre-PLAY) has been identified as a promising measure for early years, though it requires modifications to address gender-specific influences [25].

In comparison, the CAPL-2 provides a comprehensive assessment of children's physical literacy across four domains through different valid and reliable methods, highlighting areas that may require further intervention [26]. It is evident that while various tools offer unique insights into different facets of PL, the CAPL-2 emerges as a versatile and comprehensive tool. Thus, although tools like PLAY, Passport for Life, PPLI, and PLOT offer valuable insights into specific aspects of PL, the CAPL-2 provides a more holistic and adaptable approach [26]. In essence, while multiple tools bring valuable insights, the choice of instrument should align with the researcher's specific objectives and context [27]. Among available tools, CAPL-2 is especially recognized as the most reliable tool for assessing PL in children aged 8 to 12, having been validated in countries such as Canada, China, Iran, Spain, and the UK [18]. Beyond merely measuring physical fitness or PA, CAPL-2 provides comprehensive assessment of PL. It is well-suited for enhancing PL in children and informs the creation of effective interventions.

While CAPL-2 presents a significant opportunity to promote PA and healthy lifestyles, there is no evidence of its translation or adaptation for Urdu-speaking Pakistani children. Consequently, this study is aimed at filling this gap by translating and adapting the CAPL-2 questionnaire for 8-12-year-old children in Multan, South Punjab, Pakistan. This study will offer insights into the questionnaire's cultural appropriateness and its potential modifications for broader application in the Pakistani context. Further, by focusing on the region of South Punjab, the study addresses the often-neglected rural regions of Pakistan, potentially bringing about significant social, economic [28], and demographical development [29, 30]. From an educational perspective, introducing a culturally relevant PL assessment tool can enrich the national physical education curriculum [31]. Enhancing PL at an early age can contribute to building more resilient, active, and empowered communities, thus fostering social cohesion and inclusive growth.

2. Literature Review

2.1. The Role of Schools in Promoting Physical Activity. Schools present a unique platform to encourage children towards healthier, more active lifestyles, countering the prevalent sedentary behavior through both organized and free-play physical activities [32]. Physical education classes play a crucial role in this endeavor by teaching students the importance of leading a healthy, active lifestyle [33]. Such PE programs in schools provide children with the necessary knowledge, confidence, motivation, and physical competence to engage in PA both inside and outside the schools [34, 35]. Such programs reduce the risk of developing chronic diseases and foster a lifelong habit of regular PA, which is crucial for overall well-being [36].

2.2. Challenges in Current Physical Education Programs. Despite the efforts to promote PA among children and adolescents, such initiatives have not been as successful as anticipated; school-based PE programs are inadequate and ineffective in achieving their goals [36, 37]. The design of these programs, which typically focuses only on health-related aspects, might be a reason for the observed lack of motivation among adolescents [38, 39]. Furthermore, research suggests that interventions to increase PA during school hours do not result in significant or sustained improvements over time [20, 40]. To effectively address the growing epidemics of obesity and physical inactivity, policies, programs, and interventions targeting children must prioritize and motivate children by providing incentives for involvement in PA [41]. If the current trend of decline continues, the ambitious goal of reducing global physical inactivity by 10% by 2025 will be unattainable [42].

2.3. Physical Literacy as an Alternative Approach. Previous school-based PA and PE programs have encountered obstacles in fostering an active lifestyle among children, as earlier interventions have failed to achieve their desired outcomes [13]. Given the challenges faced by traditional school-based PA and PE programs, PL has emerged as a promising strategy to address childhood obesity and inactivity [14]. PL is viewed as a holistic, diverse, and inclusive concept that offers novel perspectives compared to conventional methods of enhancing PA and sports participation over the course of a lifetime [15]. Whitehead defines PL as “As appropriate to each individual’s endowment, physical literacy can be described as a disposition to capitalize on the human embodied capability, wherein the individual has the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for maintaining purposeful physical pursuits/activities throughout the life course” [15]. Further, PL described as an “umbrella term” that encompasses various domains that promote the development of healthy and active lifestyles in children. It enables children to develop the motivation, confidence, and physical competence needed to participate in a wide range of activities they find enjoyable, with the expectation of successful engagement [43]. In other words, PL empowers children with the skills, knowledge, and attitudes necessary to lead an active, healthy life [44].

2.4. Role of Physical Literacy in Physical Education. PL is considered a vital component of PE as it instils an active lifestyle and healthy behaviors in children at an early age, leading to improved health outcomes and active adolescence [16, 17]. The positive impacts of PL on multiple aspects of health, such as improved body composition, fitness, blood pressure, and quality of life, have been the focus of extensive research recently [45]. Given that children spend a considerable time of their formative years in school, it is highly recommended that all children take full advantage of the educational setting to develop their PL skills [46]. Furthermore, the potential positive effects of PL on students’ health and development should be considered when evaluating the effectiveness of school-wide PA and quality PE lessons [47, 48]. Finally, pro-

moting PL as a goal of PE can help foster a positive attitude towards an active lifestyle among children [49].

2.5. Assessing Physical Literacy: The CAPL-2 Tool. For an in-depth assessment of PL, it is essential to use a multidimensional evaluation tool. The CAPL-2 stands out as the most reliable and valid tool for assessing PL in children aged 8 to 12 [19–21]. Unlike traditional methods focusing solely on physical fitness or PA, CAPL-2 offers a rigorous assessment of PL in children. The CAPL-2 adopt different method to assess PL, such as DB and PC domains, which include objective and subjective assessments, while the domains of M&C and K&U are evaluated through a questionnaire [26]. The CAPL-2 assessment findings can be used by governments, health experts, and policymakers to develop effective policies and initiatives aimed at preventing childhood obesity and inactivity by promoting PL among children; this is crucial as the habits formed during childhood play a significant role in determining the future health [19]. The CAPL-2 is an appropriate tool for assessing and improving PL among children and can guide the development of effective interventions to promote PA and healthy lifestyles.

The CAPL-2 tool, developed in 2019, has been widely adopted in various cultural contexts, such as Chinese [21], Danish [41], Greek [50], Iranian [51], and Spanish [20], allowing researchers to accurately evaluate the PL status of children in these different populations. Despite the importance and necessity of PL assessment in Pakistani children, currently, there is no evidence of the translation, cross-cultural adaptation, and reliability of the CAPL-2 questionnaire in Urdu. To address this research gap, this study is aimed at evaluating the reliability and validity of the CAPL-2 questionnaire for 8-12-year-old children from Multan, South Punjab, Pakistan, through its translation and cross-cultural adaptation into Urdu. This will enable researchers to understand better the questionnaire’s cultural suitability and potential modifications for its application in assessing PL in the Pakistani population.

3. Methods

This cross-sectional study is a part of the Pakistan Initiative to Promote Physical Literacy (PAK-IPPL) among children [52], which aims to evaluate the reliability and validity of the Urdu version of the CAPL-2 questionnaire among school-aged children in Multan city. The study employed convenience sampling techniques [20, 53] to collect data from 8- to 12-year-old children. The research was conducted in two phases: the first phase involved the translation and cross-cultural adaptation of the CAPL-2 questionnaire from English to Urdu. The second phase involved implementing a cross-sectional study to collect data for the reliability and validity analysis of the newly adapted CAPL-2 Urdu version of the questionnaire (CAPL-2U).

3.1. Participants. Eight higher secondary schools (HSS) located in Multan were contacted to participate in the study. A total of 5 schools agreed to participate, representing a response rate of 62.5%. A simple random sampling method

was used to select 350 students aged 8-12 from these schools between August and December 2020. The total number of registered students aged between 8 and 12 years in the five schools was 2,579 [54]. Each student was assigned a distinct number using a random number generator. Using simple random sampling, a sample size of 350 students was selected by generating random numbers between 1 and 2,579. This represents approximately 13.58% of the students aged 8-12 in the five schools. However, 25 participants were excluded from the final analysis due to missing data for the retest study.

The chosen sample size is adequate for studies accessing reliability, as it aligns with previous literature on reliability studies [20, 21, 55]. The choice of 8-12-year-old children as participants in the study was based on the fact that the CAPL-2 questionnaire, which was used in the study, was explicitly designed for use among 8-12-year-olds. Therefore, this age group was selected to determine the questionnaire's psychometric characteristics of reliability and validity [56]. Before participating in the study, students were given a detailed verbal description of the study's purpose and background. Participation was voluntary and required the consent of a parent or guardian. No compensation was provided for participating in the study. Individuals were required to be in good physical and medical health and not have any chronic illnesses to be eligible to participate. The inclusion criteria for this study were as follows: (a) students without having chronic diseases and medical conditions; (b) no formal diagnosis of motor, physical, or mental disorders, which could influence study participation; and (c) students who comprehended the study requirements and exhibited a willingness to fulfil them. If participants did not meet these criteria, they were replaced with another student from the same age group and school; detailed criteria have been discussed in previous studies [52, 57, 58].

3.2. Ethics Approval. In accordance with the principles outlined in the Declaration of Helsinki, ethical approval was granted by the Shanxi University School of Physical Education in 2020 (letter no. SXULL201912). Prior to the study, permission was obtained from the South Punjab Education Department and written or verbal consent from school principals and parents of participants was also secured. Additionally, before initiating the translation process, the HALO research group granted approval via email for the translation and cross-cultural adaptation of the CAPL-2 questionnaire from English to Urdu.

4. Measures and Procedure

A self-designed questionnaire was administered to the participants. The first section gathered demographic information, such as the participants' names, ages, genders, and cities of residence. The second section included anthropometric measures, such as height, weight, body mass index (BMI), and waist circumference (WC).

Height: height was measured in centimeters (cm). Students were asked to remove their shoes and stand with their backs against a wall. A measuring tape was placed on the top

of the head and extended down to the floor to measure the children's height in centimeters.

Weight: weight was measured in kilograms (kg). Students were asked to stand on a digital scale and wear minimal clothing. The scale was calibrated before each measurement. The examiner stood on the participant's right side and instructed them to stand naturally in the scale's center. The examiner recorded the weight value on the assessment sheet when the scale values increased from zero kilogram and remained the same for five seconds.

Body mass index: BMI was calculated using the formula $BMI = W(\text{kg})/H(\text{m})^2$ [59]. Further, the resulting value was used to classify the participant's weight as underweight, normal weight, overweight, and obese as per the CDC percentiles [59, 60].

Waist circumference: WC was measured in centimeters. Students were instructed to stand upright with their feet together and their stomachs and arms relaxed by their sides. The measurement was taken at the midpoint between the lowest rib and the iliac crest [61]. The examiner ensured the tape was parallel to the ground and not compressing the skin. The measurement was taken in centimeters (cm).

4.1. Canadian Assessment of Physical Literacy-Second Edition. Physical literacy is crucial for children's overall health and well-being. The CAPL-2, a widely recognized instrument, measures PL in children [50] and is aligned with the core PL philosophy [15]. The CAPL-2 assesses PL in four domains: "daily behavior, physical competence, motivation and confidence, and knowledge and understanding" [26]. Further, each domain has different assessment tests and subscales, illustrated in Figure 1. Measuring PL through the CAPL-2 is a multistep process that involves administering and scoring a set of standardized tests and self-report measures [62], as explained in Figure 2. The following method is recommended for measuring PL through the CAPL-2:

Physical Competence. The CAPL-2 assesses physical competence using a series of tests that include observations and scoring of children's physical fitness, such as the Canadian Agility and Movement Skill Assessment (CAMSA) [63], the Progressive Aerobic Cardiovascular Endurance Run (PACER) [64], and the plank isometric hold [65]. These tests assess an individual's ability to perform physical activities, including fundamental movement skills, physical fitness, and sport-specific skills.

Daily Behavior. Daily behavior domains assess an individual's engagement in PA through objective and subjective methods [66]. The objective method involves participants reporting their seven-day step count, measured through a pedometer. The subjective method involves a self-report item about the frequency and duration of participants' moderate-to-vigorous physical activity (MVPA) for at least 60 minutes per week [62].

The Motivation and Confidence (Affective Domain). The motivation and confidence domains assess an individual's psychological and emotional responses to physical activity rather than physical abilities. The M&C domain measures four aspects: "predilection, adequacy, intrinsic motivation, and perceived competence" [62]. CAPL-2 examines these

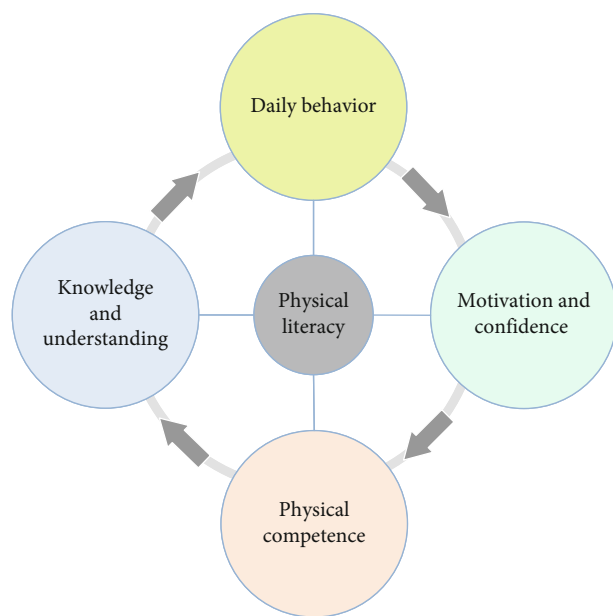


FIGURE 1: The core domains of physical literacy adopted from HALO [62].

through a 12-item self-report questionnaire. Each item is allocated 2.5 points, totaling 30 points. Scores, ranging from 0.5 to 7.5 points for each element, derive from 3 items (2.5 points per item) [26, 62] and inform the overall motivation and confidence level in PL.

The affective domain assesses an individual's level of interest and enjoyment in PA. In terms of predilection, individuals with high motivation levels tend to have a preference for PA and enjoy engaging in it. In terms of adequacy, individuals with high confidence levels tend to have the adequate self-perception and self-esteem required to engage in PA and will be likelier to engage in PA [17]. The confidence domain assesses an individual's perceived competence and intrinsic motivation in relation to PA. It is designed to measure an individual's self-efficacy, which refers to an individual's belief in their ability to engage in PA successfully. A person with high self-efficacy will feel confident in their ability to participate in PA and will be more likely to engage in PA [17].

The Knowledge and Understanding Domain (Cognitive Domain). The CAPL-2 assesses the knowledge and understanding domain consisting of a total of 10 points, which comprises five questions, the first four questions of which are multiple-choice format (1 point per question; a total of 4 points) and the fifth of which is a fill-in-the-blank format (1 point per fill-in-the-blank space; 6 points in total) [62]. The scores are based on the accuracy level or the response's correctness. The total score for the K&U domain is then calculated by summing the scores for each questionnaire question. The scores can range from 0 to 10, where higher scores indicate a higher level of K&U of PL [62]. It is important to note that this is a self-reported assessment and relies on the individual's perception of their K&U [17]. The scores should be considered alongside other measures of PL and PA participation to get an overall picture of an individual's PL.

4.2. Urdu Translation and Cross-Cultural Adaptation Procedure. The generalizability of a tool or questionnaire across different geographic locations, cultural contexts, and eras cannot be guaranteed [67]. Tools designed in a foreign language, cross-cultural adaptation, and validation are crucial before their application to broader populations [68]. Though no standard protocol exists for tool adaptation across languages and cultures [69], relying solely on basic translation can compromise accuracy [70]. To reduce bias, complete translations and cultural adaptations must be completed before using an untested instrument on a larger sample [71]. In line with this, the CAPL-2 questionnaire was translated and cross-culturally adapted into Urdu for use in the Pakistani population. The current study adopted Beaton et al. [72] method proposed for translation and cross-cultural adaptation as illustrated in Figure 3, which was followed by the six stages of translation, synthesis, back translation, expert committee review, pretesting, and submission of documentation to the expert committee for appraisal of the adaptation process.

Step 1. The first step involved translating the CAPL-2 questionnaire and testing materials by two experienced bilingual professionals who were native Urdu speakers with a command of English (as they had majored in English). The translators were blinded to each other and prepared two different translations (T1 and T2). They also provided detailed written reports outlining any changes made.

Step 2. The two translators worked together to synthesize a T3 version under the observation of a third observer translator. They prepared a synthesized report from the two (T1-T2) translations and prepared the T3 Urdu version. The third observer translator played an important role in mediating between the first two translators and helped them to reach a consensus about the Urdu wording of specific items; the third observer translator also prepared a detailed report on how the T3 version was prepared, including any changes that were resolved and addressed.

Step 3. A back translation was performed by an expert translator fluent in both Urdu and English to ensure translation validity. The expert was blinded to the original manuals and did not have a health and physical education background. This expert translated the T3 Urdu version back into English, referred to as the BT0 English version. This step ensured the content validity of the tool by retranslating it into English and highlighting any inconsistencies or ambiguous phrases. To further confirm accuracy, two more translators produced back translations labelled BT1 and BT2 Urdu versions from the BT0 English version. Like the previous translators, they were blinded to each other and the original manuals. This additional step ensured that the translation was accurate and consistent across multiple translators.

Step 4. The fourth step is important in achieving a tool's translation, cross-cultural adaptation, and content validity. An expert panel comprised of two sports science professors, three Ph.D. scholars in sports science and physical education, and five high school physical education teachers. After obtaining consent from each participant over the phone, the principal investigator shared the original and all translated

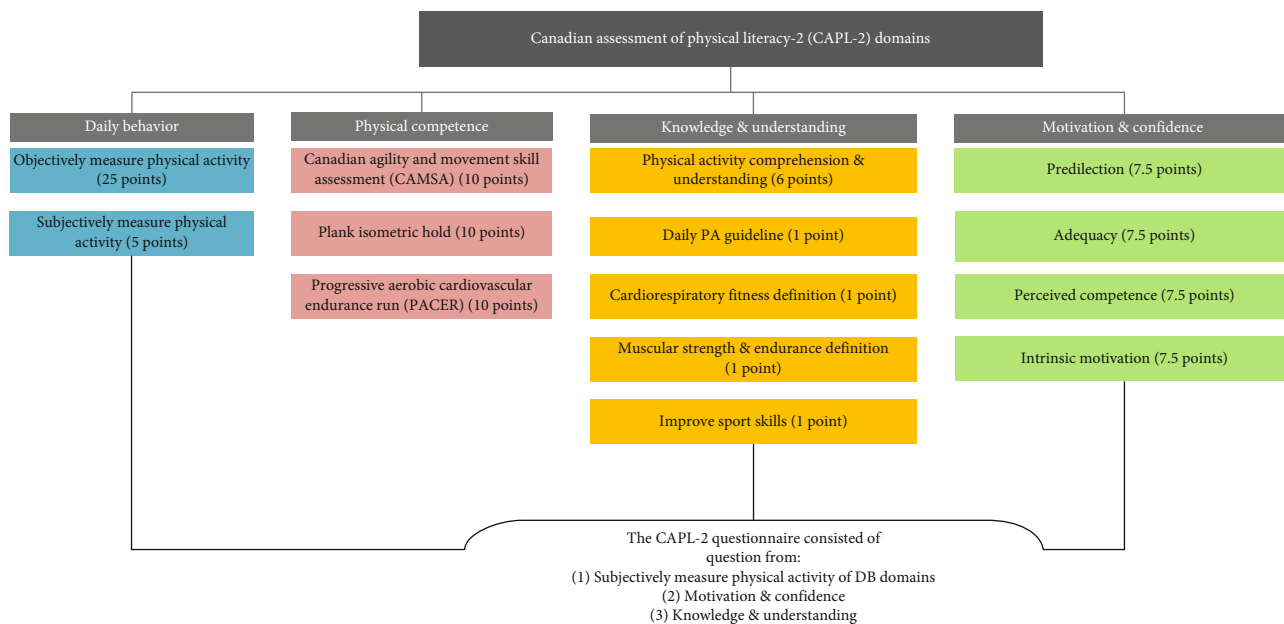


FIGURE 2: CAPL-2 and subdomain scoring [62].

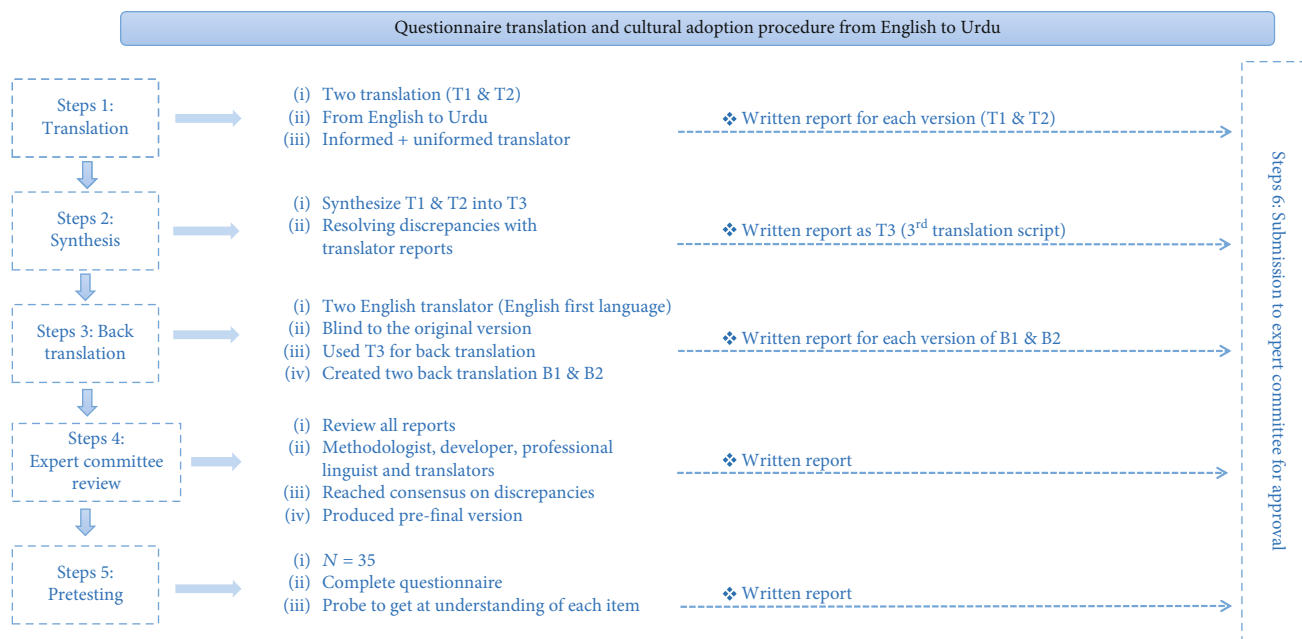


FIGURE 3: Translation and cross-cultural adaptation process recommended by Beaton et al. [72].

versions (T1, T2, BT1, and BT2) with the panel, explaining the changes made. The panel discussed semantic, idiomatic, experiential, and conceptual equivalences through a series of meetings. The committee reached a consensus by the fourth meeting, finalizing the CAPL-2U version for pilot testing.

Step 5. The fifth step involved pilot testing, which also aimed to evaluate the face validity of the CAPL-2U questionnaire. This involved testing with 10 PE teachers and 35 school children [72] aged 8-12 from Multan. The participants were asked to complete the CAPL-2U questionnaire and, subsequently, were interviewed by the data collection

team members to elicit feedback on any difficulties they may have encountered in comprehending and understanding the meaning and concepts presented in the questionnaire. While the feedback was largely positive, the research team noted a few suggested modifications and presented them to the expert committee. The expert committee reviewed these suggestions and recommended necessary revisions to the questionnaire before it was used in the main study. This phase was essential in confirming the CAPL-2U questionnaire's face validity and refining it for the main study.

Step 6. In the concluding phase, the principal investigator submitted all translations, the finalized CAPL-2U version, and the pilot and face validity reports to the expert committee. The expert committee carefully reviewed the content of the current questionnaire version, considering all stages and reports from the translators. Expressing satisfaction, minor revisions were suggested. The committee expressed satisfaction with the processes adopted in the translation and cross-cultural adaptation of the CAPL-2 questionnaire. Further, it approved the CAPL-2 Urdu version for further testing, deeming it fit for the main study. This indicated that the questionnaire met the standards of content validity and was suitable for use in the main study. This final stage of the research was crucial in ensuring the questionnaire's validity and reliability and preparing the instrument for the main analysis.

4.3. Procedure. Further, the current study is aimed at investigating the test-retest reliability of the CAPL-2 Urdu version among 350 students aged 8-12 years from five HSS in the city of Multan. The chosen sample size aligns with literature recommendations for reliability and validity studies [73–75]. Before data collection, the CAPL-2 questionnaire and other necessary materials were translated and cross-culturally adapted. The study was conducted over a period of three months, specifically from August to October 2020. The principal investigator contacted the focal person of each school and scheduled a day and time to conduct the study. Upon arrival at the designated school, the principal investigator obtained verbal permission from the school and called 20 selected students to separate classrooms. The data collection process was carried out under the supervision of the principal investigator and school focal personnel. Data collection and testing were mostly conducted during drill classes (PE class) to minimize interruption to the teaching schedule.

The researcher first provided an overview of the study's purpose and introduced the CAPL-2U questionnaire to the participating students. After distributing the questionnaires, instructions were provided for completion. While students were urged to seek clarifications, if necessary, they were advised to answer based on their comprehension without any time constraints. This same data collection method was adopted in all five schools. Data from 350 students were compiled for the initial test, and 325 students participated in the retest. The retest study was conducted one week after the initial test, which was deemed a reasonable time frame for the children to ensure that they could not remember the questionnaire in detail.

4.4. Data Analyses. The present study utilized IBM SPSS version 22.0 to analyze the collected data statistically. Normality was assessed through the Q-Q plot and histogram test, with a parametric test employed due to the normal distribution of the data. Outliers were identified using the ± 5 Z-score method. Additionally, a descriptive analysis was conducted to describe the variables of age, height, body weight, BMI, and WC through mean and standard deviation and the chi-squared test to identify differences between the genders among all variables. The internal consistency reliability was

measured for each domain, and the subdomain construct of the CAPL-2U questionnaire using Cronbach's alpha (α), with values >0.7 , was considered good for higher internal consistency [76].

The test-retest reliability of each item and composite category of the CAPL-2U questionnaire was assessed by calculating the intraclass correlation coefficient (ICC) values (with a 95% confidence interval). The ICC values of <0.02 were considered weak agreement, values of 0.21-0.40 were considered fair, 0.41-0.60 were considered moderate, 0.61 to 0.80 were considered significant, and values >0.80 were considered excellent [77]. The paired sample *t*-test was utilized to compare and identify differences between test and retest results. Pearson's correlation was used to find each item's correlation with each construct's total scores for both the test and retest, and the correlation was found significant at the 0.01 level. The correlation was found per the following classifications: >0.81 = excellent, 0.61-0.80 = very good, 0.41-0.60 = good, 0.21-0.4 = acceptable, and <0.20 = insufficient [78]. The standard errors of measurement (SEM) were calculated through the following equation: $SEM = SD \times \sqrt{(1 - ICC)}$. The percent error of SEM (SEM%) was calculated through the following equation: $SEM\% = (SEM \times mean) \times 100$. The minimum detectable changes (MDCs) were calculated through the following equation: $MDCs = \sqrt{2} \times 1.96 \times SEM$.

5. Results

5.1. Descriptive and Inferential Analysis. Table 1 summarizes the demographic and anthropometric characteristics of 325 students aged 8 to 12 by gender. The mean age was 10.00 years, with nonsignificant differences ($p = 0.966$) between both genders. Boys had higher body weight, height, BMI, and WC than girls, although the differences were not statistically significant ($p > 0.966$), except for WC, where the difference was significant.

Table 2 presents the mean and test-retest reliability measures for the domains of the daily behavior questionnaire. The mean number of weekdays with at least 60 minutes of MVPA was 4.92 and 5.04 for the test and retest, respectively. The paired sample *t*-test results indicated no significant difference ($p > 0.05$) between the test and retest scores. Furthermore, as measured by Cronbach's alpha, the internal consistency for the DB domains was 0.929, which is considered good, indicating excellent consistency between the test and retest scores. Additionally, the intraclass correlation coefficient (ICC) value was 0.963 (95% CI: 0.899-0.949), which is considered excellent and demonstrates that the translation of this domain is reliable.

Table 3 presents the mean composite scores of the test-retest and reliability measures for the knowledge and understanding domain. The results indicate that overall, the composite scores for the retest were higher than the composite test scores. Specifically, the retest scores were higher than the test scores in all the K&U domain questions, with a nonsignificant difference ($p > 0.05$). The Cronbach's alpha for the K&U domain composite scores was found to be 0.992, considered an excellent internal consistency level. Also, for the other domains, Cronbach's alpha ranged from 0.906 to

TABLE 1: Characteristics of the study participants.

Characteristics	Overall (<i>n</i> = 325) $\bar{x} \pm SD$	Boys (<i>n</i> = 171) $\bar{x} \pm SD$	Girls (<i>n</i> = 154) $\bar{x} \pm SD$	<i>p</i> value
Age (years)	10.00 (1.41)	10.00 (1.45)	9.99 (1.38)	0.966
Body weight (kg)	30.17 (8.98)	30.56 (9.28)	29.73 (8.63)	0.424
Height (m)	138.38 (12.81)	139.01 (13.39)	137.68 (12.11)	0.367
BMI (kg/m ²)	15.56 (3.28)	15.61 (3.28)	15.50 (3.30)	0.765
WC (cm)	58.28 (9.37)	59.38 (9.63)	57.05 (8.91)	0.031

Note: data is presented as follows: \bar{x} : mean; SD: standard deviation; BMI: body mass index; WC: waist circumference; *p* value significant at < 0.05. *p* value in bold shows significant difference.

TABLE 2: Test-retest difference and reliability in the CAPL-2U questionnaire daily behavior domain and construct.

Daily behavior	Test (<i>n</i> = 325)		Retest (<i>n</i> = 325)		Reliability test					
	$\bar{x} \pm SD$	Item total correlation	$\bar{x} \pm SD$	Item total correlation	Cronbach's α	ICC (95% CI)	<i>p</i> value ⁺	SEM	%SEM	MDC
Subjectively measured DB	4.97 (1.01)	N/A	5.00 (1.03)	N/A	0.964	0.930 (0.913–0.944)	0.132	0.27	5.45	0.76

Note: DB: daily behavior. Data is presented as follows: \bar{x} : mean; SD: standard deviation; N/A: not applicable; ICC: calculated with a two-way mixed model, absolute agreement, and single measure; *p* value⁺: paired sample *t*-test. SEM: standard error of measurement; %SEM: standard error of measurement as a percentage; MDC: minimum detectable change; Cronbach's alpha α : >0.7 = good; ICC: <0.02 = weak, 0.21-0.40 = fair, 0.41-0.60 = moderate, 0.61 to 0.80 = significant, and >0.80 = excellent.

TABLE 3: Test-retest difference and reliability in the CAPL-2U questionnaire knowledge and understanding domain.

K&U	Test (<i>n</i> = 325)		Retest (<i>n</i> = 325)		Reliability test					
	$\bar{x} \pm SD$	Item total correlation	$\bar{x} \pm SD$	Item total correlation	Cronbach's α	ICC (95% CI)	<i>p</i> value ⁺	SEM	%SEM	MDC
Physical activity understanding	0.83 (0.38)	0.318**	0.85 (0.36)	0.318**	0.906	0.827 (0.788–0.860)	0.109	0.16	18.59	0.44
Cardiorespiratory fitness definition	0.69 (0.47)	0.666**	0.70 (0.59)	0.656**	0.951	0.906 (0.884–0.925)	0.249	0.18	25.84	0.50
Muscular endurance definition	0.48 (0.50)	0.535**	0.50 (0.51)	0.523**	0.962	0.927 (0.909–0.941)	0.132	0.14	27.56	0.38
Improve sport skills	0.69 (0.47)	0.659**	0.70 (0.45)	0.630**	0.946	0.898 (0.874–0.918)	0.166	0.15	21.44	0.42
PA comprehension	3.64 (1.17)	0.731**	3.66 (1.18)	0.725**	0.993	0.986 (0.982–0.988)	0.083	0.14	3.81	0.39
Composite K&U domain score	6.32 (1.94)	N/A	6.37 (1.95)	N/A	0.992	0.983 (0.978–0.986)	0.009	0.25	3.99	0.70

Note: K&U: knowledge and understanding. Data is presented as follows: \bar{x} : mean; SD: standard deviation; N/A: not applicable. Correlation is significant at the 0.01 level; Cronbach's α was calculated for each construct; ICC: calculated with a two-way mixed model, absolute agreement, and single measure. *p* value⁺: paired sample *t*-test, value in bold shows a significant difference. SEM: standard error of measurement; %SEM: standard error of measurement as a percentage; MDC: minimum detectable change; Cronbach's alpha α : >0.7 = good; ICC: <0.02 = weak, 0.21-0.40 = fair, 0.41-0.60 = moderate, 0.61 to 0.80 = significant, and >0.80 = excellent. Pearson's correlation *R*: >0.81 = excellent, 0.80-0.61 = very good, 0.60-0.41 = good, 0.40-0.21 = acceptable, <0.20 = insufficient. **: shows *p* < 0.01 for item-total correlation.

0.993, indicating excellent internal consistency. The correlation of each item with the composite domain scores for the test and retest was significant and acceptable to very good (ranging from 0.318 to 0.731 and 0.318 to 0.725 for the test-retest, respectively). The reliability of the K&U domain as measured by ICC was 0.983, indicating excellent reliability. Furthermore, ICC ranged from 0.827 to 0.986 for each domain item, indicating excellent reliability of the CAPL-2U K&U domain questionnaire.

Table 4 presents the results of the test-retest and reliability measures for the motivation and confidence domain. The data demonstrate that the composite scores for the retest were higher than the composite test scores for all constructs within the M&C domain. Additionally, the retest scores were found to be higher than the test scores for each question within the M&C domain constructs, with no significant difference (*p* > 0.05) observed. However, there were exceptions for the adequacy construct item 1 and intrinsic motivation

TABLE 4: Test-retest difference and reliability in the CAPL-2U questionnaire motivation and confidence domain.

M&C	Test (<i>n</i> = 325)		Retest (<i>n</i> = 325)		Reliability test					
	$\bar{x} \pm SD$	Item total correlation	$\bar{x} \pm SD$	Item total correlation	Cronbach's α	ICC (95% CI)	<i>p</i> value ⁺	SEM	%SEM	MDC
Predilection	4.84 (1.91)	N/A	4.86 (1.93)	N/A	0.997	0.993 (0.991–0.994)	0.121	0.16	3.32	0.45
Predilection item 1	1.57 (0.62)	0.915**	1.59 (0.64)	0.907**	0.967	0.936 (0.920–0.948)	0.121	0.05	3.12	0.14
Predilection item 2	1.70 (0.72)	0.959**	1.73 (0.74)	0.935**	0.973	0.947 (0.934–0.957)	0.077	0.17	9.58	0.47
Predilection item 3	1.57 (0.63)	0.919**	1.59 (0.62)	0.901**	0.986	0.973 (0.966–0.978)	0.133	0.07	4.52	0.20
Adequacy	5.05 (1.94)	N/A	5.06 (1.90)	N/A	0.979	0.960 (0.950–0.968)	0.597	0.39	20.00	1.08
Adequacy item 1	1.75 (0.71)	0.766**	1.71 (0.70)	0.765**	0.955	0.914 (0.893–0.931)	0.049	0.21	11.90	0.58
Adequacy item 2	1.68 (0.66)	0.942**	1.69 (0.68)	0.926**	0.961	0.924 (0.906–0.939)	0.273	0.47	27.57	1.29
Adequacy item 3	1.62 (0.68)	0.776**	1.66 (0.66)	0.752**	0.923	0.857 (0.824–0.884)	0.105	0.26	15.49	0.71
Intrinsic motivation (IM)	4.17 (1.50)	N/A	4.20 (1.54)	N/A	0.993	0.986 (0.983–0.986)	0.053	0.18	4.34	0.51
IM item 1	1.46 (0.55)	0.937**	1.48 (0.58)	0.929**	0.965	0.933 (0.916–0.946)	0.052	0.15	10.14	0.42
IM item 2	1.37 (0.53)	0.973**	1.38 (0.55)	0.968**	0.987	0.974 (0.967–0.979)	0.059	0.09	6.43	0.25
IM item 3	1.34 (0.53)	0.818**	1.33 (0.51)	0.820**	0.995	0.989 (0.986–0.991)	0.059	0.06	4.15	0.15
PA competence (PAC)	4.51 (1.17)	N/A	4.54 (1.18)	N/A	0.986	0.972 (0.965–0.977)	0.078	0.20	4.35	0.55
PAC item 1	1.50 (0.54)	0.434**	1.49 (0.52)	0.461**	0.993	0.985 (0.981–0.988)	0.058	0.07	4.41	0.18
PAC item 2	1.50 (0.52)	0.868**	1.52 (0.53)	0.876**	0.973	0.947 (0.933–0.957)	0.096	0.12	8.03	0.34
PAC item 3	1.51 (0.52)	0.879**	1.53 (0.54)	0.878**	0.968	0.938 (0.923–0.950)	0.047	0.13	8.63	0.37
Composite domain score	18.56 (4.12)	N/A	18.66 (4.07)	N/A	0.992	0.983 (0.979–0.987)	0.031	0.54	2.88	1.49

Note: M&C: motivation and confidence domain. Data is presented as follows: \bar{x} : mean; SD: standard deviation; N/A: not applicable. Correlation is significant at the 0.01 level; Cronbach's α was calculated for each construct; ICC calculated with a two-way mixed model, absolute agreement, and single measure. *p* value+: paired sample *t*-test, value in bold shows a significant difference. SEM: standard error of measurement; %SEM: standard error of measurement as a percentage; MDC: minimum detectable change. Cronbach's alpha α : >0.7 = good; <0.02 = weak, 0.21–0.40 = fair, 0.41–0.60 = moderate, 0.61 to 0.80 = significant, and >0.80 = excellent. Correlation: >0.81 = excellent, 0.80–0.61 = very good, 0.60–0.41 = good, 0.40–0.21 = acceptable, <0.20 = insufficient. **: shows *p* < 0.01 for item-total correlation.

item 3, where the test scores were higher than the retest scores but with no statistically significant difference. The Cronbach's alpha for the M&C domain composite scores was found to be 0.992, indicating an excellent level of internal consistency. Additionally, for the predilection, adequacy, intrinsic motivation, and PA competence constructs, Cronbach's alpha was >0.7 , indicating excellent internal consistency. The correlation of each item with the composite domain scores for the test and retest was statistically significant, ranging from significant to excellent (ranging from 0.818 to 0.973 and 0.820 to 0.968 for the test-retest, respectively). However, the correlation for adequacy items 1 and 3, and PAC item 1 was moderate and fair, respectively. The reliability of the M&C domain as measured by ICC was 0.983, indicating excellent reliability. Furthermore, for each domain item, ICC ranged from 0.857 to 0.993, indicating excellent reliability of the CAPL-2U M&C domain questionnaire.

Translation, Cross-Cultural Adaptation, and Content validity. The translation, cross-cultural adaptation, and content validity were completed in steps 4 and 6 by ten expert committee members. The expert committee member suggested modifications and changes for appropriate words and phrases to align with children's comprehension. For instance, three PE teachers recommended a few changes to terms that were difficult for the children to understand, such as "aerobic fitness; cardiorespiratory fitness; push, pull, or stretch, and muscular strength" (see supplementary table S1).

The questionnaire's translation process involved both forward and backward translation procedures. The research team, experts, and translators were actively engaged in each step of the process. After completing these procedures, modifications were made to enhance relevance, clarity, and completeness within each domain and construct. A consensus was reached regarding the CAPL-2 Urdu translation after thoroughly assessing its content validity by a panel of ten expert committee members, who agreed that the final version was simple and easy to read.

Face Validity. The CAPL-2U questionnaire's face validity was assessed in step 5 with 15 PE teachers and 35 school children. A few changes were suggested after the pilot testing in step 5 (see supplementary table S1). In general, teachers found the meanings and concepts of the CAPL-2U questionnaire satisfactory and did not face any difficulty while filling it out. Only seven teachers suggested minor changes. Five children were confused while selecting the correct CAPL-2U questionnaire section-1 option, though they understood the question and were given options. Section-3, questions 1-3 were the most time-consuming for the children as ten students were asked to help the researcher clarify and read the question many times before selecting the given options. Overall, no negative feedback was given about the CAPL-2U language. To complete the 18-item questionnaire, participants took a minimum of 10 to 25 minutes, and most participants easily understood the questions. Thus, the face validity did not require any major revisions. All the expert committee members, PE teachers, and students rated the face validity as good and satisfactory

(the final version of the CAPL-2U questionnaire is attached in Appendix A file).

6. Discussions

The significance of physical literacy in fostering overall health and well-being is increasingly recognized. This recognition underscores the importance of scientifically assessing PL in children, considering it encompasses not merely physical abilities but also motivation, confidence, and knowledge essential for participating in physical activity. With the alarming rise in childhood obesity and inactivity, tools that validly and reliably assess PL in children are vital to enhancing health outcomes and preventing chronic diseases in later life. Currently, no tools exist to evaluate physical literacy within the Pakistani population. Addressing this research void, our study translated and culturally adapted the CAPL-2 questionnaire into Urdu, resulting in the CAPL-2U version. This research also offers evidence on the reliability of the CAPL-2U when applied to 8-12-year-old children in Multan, South Punjab, Pakistan. Notably, this is the first study to present evidence on both the reliability and validity of the CAPL-2U questionnaire.

The CAPL-2 protocol has been validated in China [21], Greece [50], Denmark [41], and Iran [51]. Additionally, the questionnaire's reliability has been only established for the Spanish population [20]. Scholars highlight the importance of empirical research to deepen our understanding of PL and advocate for developing and applying PL assessment tools across diverse populations [79]. Analyzing results from different populations allows for a more comprehensive international conceptualization of PL [80]. As a result, there is a growing demand for greater utilization of PL assessment to understand this approach more profoundly [81]. To ensure the validity and reliability of the psychometric properties for specific populations, researchers suggest translating and culturally adapting the CAPL-2 questionnaire [41]; this will involve modifying the questionnaire based on the linguistic and cultural context of the target population [41, 51].

The current study successfully carried out the translation and cultural adaptation of the CAPL-2 questionnaire into Urdu, resulting in the CAPL-2U questionnaire. The findings showed that expert panel members and participants found the questionnaire to have strong face and content validity, consistent with previous research that demonstrated the benefits of using appropriate methods and techniques [20]. The inclusion of pictures in the questionnaire was effective in helping most children to comprehend the questions and making the questionnaire more engaging [82]. Additionally, a Danish study [41] that utilized a video to aid children who had difficulty reading the questions reported good reliability of the CAPL-2 protocol and emphasized the importance of incorporating such aids in fostering understanding during the cross-cultural adaptation process.

The current study assessed the test-retest reliability of the CAPL-2U questionnaire over a one-week interval across all domains and each subdomain, revealing excellent internal consistency in all four domains. These results surpass those of a previous Chinese study, which reported only low

internal consistency for the composite domain scores of CAPL-2 [21]. The reliability of one construct of the daily behavior domains (self-reported MVPA) showed excellent reliability with an ICC value of 0.930 and high internal consistency with a value of 0.964, which is higher than the normal range [76]. The test-retest reliability results for the daily behavior domains align with a Spanish study [20], which also reported high internal consistency (Cronbach's $\alpha = 0.987$). Furthermore, this study also reported excellent test-retest reliability by reporting ICC values of 0.975, similar to the current research. Additionally, a Finnish study reported the significant test-retest reliability of self-reported MVPA for 11- to 15-year-old children with ICC values of 0.720, comparable to our findings of the current research [83].

The CAPL-2U questionnaire demonstrated high internal consistency in the knowledge and understanding domains, as measured by Cronbach's alpha ranging from 0.906 to 0.992. This was comparable to the results of a Spanish study [20]. The test-retest reliability, indicated by ICC values ranging from 0.827 to 0.986, exceeded the moderate to perfect reliability results reported in another study [20]. The strong correlation between all test items suggests that the questionnaire was effectively translated and adapted to the Pakistani culture; a similar significant correlation was previously reported [20, 43]. Another Chinese study, however, reported a Cronbach's alpha of 0.52, highlighting poor reliability for the K&U domains' composite scores [21]. Our study, in contrast, shows superior results in these domains. Considering the limited literature on the CAPL-2 questionnaire's reliability, this study offers valuable comparative insights. Thus, future research is advised to explore the questionnaire's reliability for each domain- and construct-wise in diverse populations to facilitate further comparisons.

The motivation and confidence domains of the CAPL-2U questionnaire showed high internal consistency for each construct and item. This means the questionnaire consistently measures these constructs over time and across different people. These results were consistent with previous studies in Spain [20] and China [21], which also showed high and acceptable internal consistency for the M&C domains. Dias et al. study reported high internal consistency for the motivation towards physical activity scale, with a value of $\alpha = 0.91$ [84]. Such evidence highlights the strong reliability of the CAPL-2U questionnaire in measuring motivation and confidence. The results showed excellent test-retest reliability for each construct and item of the CAPL-2U questionnaire, as determined by ICC. These results were consistent with Spanish studies where ICC values ranged from significant to excellent [20]. A Spanish study reported almost perfect reliability, with ICC values greater than 0.90. This indicates that the CAPL-2U questionnaire has strong test-retest reliability [85]. Another study provided an omega reliability of 0.7 for the M&C domains, which is lower than the current study [41].

Further, the results showed that the test-retest correlation between the items and their domains was significant and ranged from very good to excellent, except for PAC item 1, which showed a good correlation with its domain. The

correlation between the items and their constructs within the M&C domain was higher than in the previous study [20]. The difference between the test and retest results was nonsignificant for all items in the M&C domain except for PAC item 3. This could be due to the children reporting higher motivation towards physical activity competence during the second test. This result is supported by a Chinese study that found very good reliability for the M&C domains, as indicated by a value of $\alpha = 0.82$ [21]. The consistent results across studies confirm the reliability and validity of the CAPL-2U questionnaire for the Pakistani population.

PL holds substantial potential for holistic child development. However, the absence of reliable and culturally relevant instruments for PL assessment has been a challenge. The current study demonstrates that the Urdu adaptation of the CAPL-2 questionnaire can be considered a reliable tool for assessing PL in Pakistani children. This cultural adaptation provides a valuable opportunity for global comparisons across diverse socioeconomic and cultural backgrounds. Moreover, integrating PL into the Pakistani education system promises enhanced physical education quality, promoting healthier lifestyles and curbing sedentary behaviors among youth.

7. Conclusions

In conclusion, based on the results of test-retest reliability and internal consistency analyses, it can be concluded that the Urdu version of the Canadian Assessment of Physical Literacy-Second Edition, named CAPL-2U, is a valid and reliable tool for evaluating Pakistani children's PL. The CAPL-2U can be obtained as Appendix A file and the original English version can be found as Appendix B. Therefore, it is recommended that the complete CAPL-2 protocol be adapted for use in Pakistani children, thus making CAPL-2U a valuable tool for the Pakistani population.

7.1. Key Findings. The Urdu version of the CAPL-2 was effectively translated and culturally adapted for use in Pakistan, following best practices. Modifications were made by an expert committee to ensure its relevance and comprehensibility to Pakistani children. The CAPL-2U exhibited high reliability and internal consistency across the domains of daily behavior, knowledge and understanding, and motivation and confidence, with the daily behavior domain showing near-perfect consistency. Involving 350 school children and utilizing a rigorous translation-back translation method, the CAPL-2U was validated. Both teachers and children confirmed its clarity and relevance during the face validity assessment, necessitating only minor revisions. The study supports the CAPL-2U's use in Pakistan and nations with similar cultural and linguistic contexts, highlighting its sensitivity to track changes in physical literacy over time.

7.2. Novelty of Study. This study is the first comprehensive assessment of the psychometric properties of the CAPL-2 questionnaire for Urdu-speaking Pakistani children, extending its applicability to Urdu-speaking populations, including those in India. Our expanded sample size captures a broader

spectrum of participants from Pakistan, addressing the gaps left by prior validations that were primarily conducted in Western demographics. To ensure the scale's cultural relevance and comprehensibility, we employed a precise process of translation, back translation, and adaptation. Moreover, content and face validity, areas not addressed in previous studies, strengthen our research. Moreover, our adaptation of the CAPL-2 includes visual aids to enhance comprehension of health concepts. Finally, the incorporation of content and face validity, previously overlooked, alongside measures like test-retest reliability, internal consistency, and interrater reliability, the current study offers a robust evaluation of the scale's reliability and relevance for cross-cultural contexts.

7.3. Limitations and Recommendations. While the present study has advanced our understanding of physical literacy assessment in Pakistan, several limitations need consideration. The study did not include other physical literacy assessment tools to assess concurrent validity, making it difficult to say definitively whether the CAPL-2 battery is a valid measure of PL in Pakistani children. Additionally, the limited sample size employed in the study presents a challenge to the generalizability of the results. For findings to have broader applicability, future endeavours must engage larger samples, ensuring a representation that encapsulates variations in anthropometric indices, diverse geographical locations, and a spectrum of socioeconomic statuses within the Pakistani context.

The validation of the questionnaire in other languages is encouraging, and future research should draw inspiration from methodologies adopted by countries such as Greece, China, and Denmark. There is a compelling case for future research to adapt the CAPL-2 battery holistically for Pakistani children. Such adaptations would potentiate the battery's efficacy in discerning Pakistani children's health, PA cognition, and motivational thresholds. Longitudinal studies are encouraged to trace the evolution of physical literacy. Further investigation is also recommended to explore the relationship between PL and other personal development factors, such as creativity and empathy, as well as the influence of family context, including parental PL levels and children's social environment, which is also a promising area for future research. This could help identify physical literacy's benefits for children's overall development. Overall, the study provides a valuable foundation for future research on physical literacy in Pakistani children.

Data Availability

Data can be requested by contacting the corresponding author on a reasonable request.

Ethical Approval

In accordance with the principles outlined in the Declaration of Helsinki, the study was approved by the Shanxi University School of Physical Education in 2020 (letter no. SXULL 201912).

Consent

Informed consent was obtained from the education department, school principals, and parents of participants, either in writing or verbally. All authors agree to publish this paper.

Conflicts of Interest

The authors declare that they have no competing interests.

Authors' Contributions

S.G.H. wrote the main manuscript text and conceptualization, designed the methodology, and did the data curation. S.G.H. and H.K. did the formal analysis. S.M.Z.H.H, S.D.H, S.S.D, and S.U.F. did the data collection and investigation. S.U.F. and G.Y. did the project administration. L.Y. was responsible for the supervision. L.L. and S.D.H. reviewed and edited the final manuscript. All authors have read and agreed to the published version of the manuscript.

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Supplementary Materials

Supplementary 1. The Supplementary Table S1: the Supplementary table S1 provides examples of the major changes made during the translation and cross-cultural adaptation process of the CAPL-2 questionnaire from English to Urdu.

Supplementary 2. Appendix A: comprises the Canadian Assessment of Physical Literacy-Second Edition Urdu Version (CAPL-2U) questionnaire.

Supplementary 3. Appendix B: contains the Canadian Assessment of Physical Literacy-Second Edition (CAPL-2) English version of the questionnaire adopted from <https://www.activehealthykids.org/>.

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