Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

Analysis of Validity and Reliability of Gross Motor Tests in Children in Phase B

Suthana Tingsabhat[1], Termpetch Sookhanaphibarn[2], Putri Nur Alifah[3]*, Cahyo Wibowo[4], Briyan May Syahputra[4]

[1]*Faculty of Education, Chulalongkorn University, Bangkok, Thailand*
[2]*Faculty of Applied Arts, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*
[3]*Faculty of Sport and Health Science, Universitas Negeri Surabaya, Surabaya, Indonesia*
[4]*Faculty of Health Sciences, Universitas Kristen Satya Wacana, Salatiga, Indonesia*

***Correspondence Email:** *24060464091@mhs.unesa.ac.id*

Article Info:
Received: *17-02-2026*
Revised: *25-02-2026*
Accepted: *11-03-2026*
Online: *13-03-2026*

Keywords:
physical education; motor skills; feasible test; primary school.

ABSTRACT

Physical education in elementary schools is crucial for improving students' gross motor skills, especially in Phase B, which is a crucial stage in children's motor skill development. Therefore, a valid and reliable instrument is needed to evaluate gross motor skills so that the results can be used objectively as a basis for developing educational objectives. The purpose of this study was to analyze the validity and reliability of gross motor skills tests in Phase B elementary school students. This study used a quantitative approach with a cross-sectional and descriptive analysis design. The subjects were Phase B elementary school students who participated in gross motor skill measurements during one data collection period. The gross motor examination that assessed manipulative, locomotor, and non-locomotor skills was used as a research tool. Product Moment Correlation was used for validity testing, and Cronbach's Alpha coefficient was used for reliability testing. The majority of test items had significant correlation coefficients ($p < 0.05$), according to the results of the study, and were considered valid; however, several questions needed to be revised because they did not meet validity requirements. The instrument demonstrated reliable internal consistency, as indicated by the Cronbach's Alpha rating of 0.71 in reliability testing. Therefore, the gross motor skills test is considered suitable as a tool to evaluate gross motor skills in elementary school students in Phase B, although some aspects need to be improved to enhance the overall quality of the instrument.

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

INTRODUCTION

From elementary school to high school, physical education is a structured and continuous component of the formal education system (Saputra et al., 2024). Physical education through physical education focuses on developing children's motor skills, attitudes, and character, in addition to their physical abilities (Ochoa Martínez, 2020; Pamot et al., 2023). The goal of physical education is to promote balanced physical, mental, social, and emotional development in students by providing learning opportunities through organized physical activity (Puspitaningrum, 2024). Exercise, movement experiences, and structured instruction result in a relatively permanent motor learning process that changes a person's movement behavior (Maher & Dunton, 2020). Humans can create more effective, coordinated, and reliable movement patterns through motor learning (Li & Zhou, 2025). Motor skills improve as a result of this learning process, as evidenced by the quality of movement abilities, which include accuracy, coordination, efficiency, and stability when performing a skill (Nanang et al., 2023). These skills form the basis for humans to adapt and use their movement abilities in various sports, physical activities, and daily life. Children's motor development is strategically stimulated through physical education (Li et al., 2024), especially during the elementary school years, which are categorized as Phase B in the Independent Curriculum.

The development of children's basic motor skills is greatly influenced by appropriate and sustained stimulation through focused physical activity (Priambodo et al., 2025). Basic skills that must be mastered during this developmental period include running, walking, jumping, turning, throwing, and catching. The development of children's physical talent, coordination, and willingness to participate in various physical activities and sports in the future are all based on their mastery of basic motor skills (Kuswanto et al., 2023). Furthermore, these skills improve children's overall quality of life, physical fitness, and health (Özkan & Kale, 2023). Therefore, to objectively monitor children's motor development, physical education in elementary schools must be systematically planned and supported by accurate assessment procedures. Ideally, testing tools that can reliably measure students' motor skills should be used to analyze motor skills in physical education. Students' attitudes, performance, and movement quality can be used to observe and measure changes in movement behavior that occur during the motor learning process.

Motor skill learning involves coordinating muscle reactions with the nervous system, which manifests itself in regular and directed movements of the body or body parts (Yuningsih & Sardjito, 2020). Therefore, motor skill assessment tools need to accurately reflect students' abilities to perform precise, efficient, and stable movements. However, without the aid of standardized and scientifically validated assessment tools, teachers' subjective assessments are still often used to evaluate students' motor skills in elementary school physical education classes. This condition can produce inaccurate and inconsistent assessment results, which can affect decisions related to lesson planning, feedback, and follow-up learning activities such as enrichment and remediation.

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

The purpose of this study was to analyze the validity and reliability of gross motor skills tests in Phase B elementary school students. To ensure that assessment results accurately reflect students' motor skills, motor skill assessment tools are needed that have a high level of validity and reliability. Validity and reliability requirements must be met by good motor skill assessment tools (Ayu et al., 2021). While reliability refers to the level of consistency of measurement results when the measuring tool is used repeatedly, validity refers to the extent to which the measuring tool can measure what it is intended to measure (Ramadhan et al., 2024).

METHODS

Research Design

This study employed a descriptive, analytical, and quantitative method. A cross-sectional design, which collects data at a specific point in time without intervention or repeated measurements, was employed. Based on data from the children's motor skills assessments in Phase B during the study, this design was chosen to analyze the characteristics of the gross motor skills measurement tool, particularly its validity and reliability.

Research Subjects

Students in Phase B of elementary school were the subjects of this study (Table 1). Because the participants were at a critical and relevant stage in their basic motor development, which aligns with the research objectives, they were selected to participate as respondents. Based on a cross-sectional design, all participants underwent gross motor skill measurements simultaneously. The number of individuals was adjusted to meet the requirements for instrument validity and reliability analysis.

Table 1. Research Subject

Grade	Sample	Sex	
		Boys	Girls
4	44	23	21

JFMS
Journal of Fundamental Movement Skills

Research Instruments

The Phase B gross motor test for children, which includes a number of items designed to measure basic motor skills, was the instrument used in this study (Table 2). Both locomotor and non-locomotor motor skills relevant to the developmental characteristics of children in Phase B were covered in the test items. Predetermined scoring criteria were used to assess each test item, producing quantitative data suitable for statistical analysis.

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

Tabel 2. Item Test

Item Test	Tools
Zig-Zag	Ten cones
Lateral Run	Four cones
Gallop	Four cones
Single Leg Jump	Four cones
Straight Leg Run	Four cones
Throwing	A cone, a tennis ball, a high cone (30 cm), and a table
Kicking	Two cones and a soccer ball
Catching	Two cones and a tennis ball
Dribble Basketball	A cone and a basketball ball
Stability	A cone

Data Collection Procedures

All study participants were administered a gross motor test in a single session to collect data. To ensure a shared understanding, respondents were given instructions on how to complete each test question before administering the test. To ensure test results accurately reflected respondents' motor abilities, the test was administered in a controlled and structured environment. Scores on each test item were recorded and collected as research data.

Data Analysis Techniques

To evaluate the validity and reliability of the gross motor test instrument, data analysis was performed. The product-moment correlation method was used to test the validity between the scores on each test item and the overall instrument score. If the correlation coefficient value at the specified significance level is higher than the table r value, the test item is considered valid.

Cronbach's Alpha coefficient is used to assess the instrument's reliability and determine its level of internal consistency. If the Cronbach's Alpha coefficient value falls within the reliable range, the instrument is considered reliable. Statistical software was used for all data analyses.

RESULTS

Results of the Validity Test

The validity test results for the test items in phase B show that there is one item that is indicated as invalid (Table 3). That item is *zig-zag*, with a calculated r value less than the table r value and a significance value greater than alpha (Sig > 0.05). Apart from these two test items, the validity test results show that the other items are valid. This is indicated by a calculated r value greater than the table r value and a significance value less than alpha (Sig < 0.05).

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

Tabel 3. Validity Test

Item Test	Pearson Correlation	p-Value	Description
Zig-Zag	0.30	0.05	Not Valid
Lateral Run	0.51	0.00	Valid
Gallop	0.72	0.00	Valid
Single Leg Jump	0.63	0.00	Valid
Straight Leg Run	0.49	0.00	Valid
Throwing	0.61	0.00	Valid
Kicking	0.45	0.00	Valid
Catching	0.47	0.00	Valid
Dribble Basketball	0.59	0.00	Valid
Stability	0.46	0.00	Valid

*Sig < 0.05

Results of the Reliability Test

Based on the reliability test results for the test items in phase B, the test results show that all test items are reliable (Table 4). This is indicated by a Cronbach's alpha value of 0.71 or more than the r-table value of 0.30. Looking at the Cronbach's alpha item deleted column, all test items show values above the r-table, meaning that all of them are reliable.

Tabel 4. Reliability Test

Item Test	Cronbach's Alpa Item Deleted	Cronbach's Alpha	Description
Zig-Zag	0.72	0.71	Reliable
Lateral Run	0.69		
Gallop	0.65		
Single Leg Jump	0.67		
Straight Leg Run	0.70		
Throwing	0.67		
Kicking	0.70		
Catching	0.70		
Dribble Basketball	0.68		
Stability	0.70		

Note: r-tabel 0.30

JFMS Journal of Fundamental Movement Skills

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

DISCUSSION

Validity test results indicate that most items on the gross motor test are useful in accurately and relevantly assessing children's basic motor skills in Phase B. The questions deemed valid cover a wide range of motor skills, including locomotor, non-locomotor, and manipulative skills, and are appropriate for the characteristics and developmental stages of elementary school children. Based on these results, the gross motor test accurately and comprehensively represents the construct of motor skills, making it suitable for use as a measurement tool in assessment procedures and research related to children's motor development. These findings are consistent with previous studies emphasizing that standardized motor skill assessments are essential for objectively evaluating children's motor competence and developmental progress (Tan & Lim, 2025; Zhang et al., 2025).

However, one item namely zig-zag was deemed invalid. The difficulty level of the movement, which did not align with the characteristics and motor abilities of children in Phase B and the inability of the assessment indicators to fairly represent the motor skills being measured, all contributed to the invalidity of this item. To ensure more effective and accurate use of these problematic items in the future to assess children's motor skills, they need to be updated, simplified, or modified. Similar findings have been reported in studies examining motor skill assessment instruments, where certain test items required modification due to developmental mismatches between task difficulty and children's motor abilities (Taufik et al., 2024).

The reliability test results showed that the gross motor skills measurement tool obtained a Cronbach's Alpha value of 0.71, which is classified as reliable. This value indicates that the measuring tool has a good level of internal consistency, resulting in relatively stable and reliable measurement data when used under similar conditions and with similar subjects. Therefore, this gross motor skills measurement tool is suitable for repeated use in physical education learning processes, particularly for assessing and monitoring the ongoing development of children's motor skills in Phase B. Comparable levels of reliability have also been reported in previous validation studies of motor skill assessment tools for children, indicating that well-designed instruments can provide stable and consistent measurement results in educational and developmental contexts (Taufik et al., 2024).

As part of physical education, physical education helps children learn through movement while improving their motor skills, physical health, and moral character (Tariq & Sergio, 2024). Biological maturity and movement experiences gained from organized physical activity impact children's motor development, which occurs gradually (Solum et al., 2020). Motor learning is the process by which the nervous and muscular systems coordinate to produce increasingly efficient movement patterns (Setiawan, 2025). As a result of practice and experience, changes in movement behavior occur through a relatively permanent motor learning process. Physical education is crucial for elementary school students in Phase B because they are at peak developmental stage, and appropriate movement stimulation will help them master basic motor skills such as running, jumping, throwing, and catching. These skills form the foundation for future physical activity and sports. Previous research has also demonstrated that structured movement activities and functional training programs

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

significantly contribute to improvements in children's gross motor development and physical fitness (Fu et al., 2022). In addition, manipulative and movement-based learning activities in physical education have been shown to effectively enhance fundamental motor skills among elementary school students (Dewi & Verawati, 2022). Recent studies also highlight that innovative physical education approaches, including digital learning packages and technology-supported instruction, can enhance students' learning engagement and self-management abilities within physical education contexts (Kaeduang et al., 2024).

Assessment is a crucial part of evaluating students' motor skill achievement in physical education (Aarskog, 2021). To ensure accurate and reliable data, a good assessment tool must meet validity and reliability requirements (Tayech et al., 2022). While reliability refers to the consistency of measurement results, validity refers to the extent to which the instrument can measure the abilities it is intended to measure. Inaccurate findings in research and educational procedures can be caused by the use of flawed and unreliable measuring instruments (Tiani et al., 2025). To ensure that the measuring instruments used are truly capable of accurately and consistently measuring children's motor skills in Phase B, and can serve as a basis for decision-making in physical education, it is crucial to evaluate the validity and reliability of gross motor tests (Wijanarko et al., 2023). This emphasis on instrument quality aligns with broader research highlighting the importance of validated motor assessment tools for monitoring children's developmental progress and supporting evidence-based physical education practices (Tan & Lim, 2025; Zhang et al., 2025).

Overall, the study findings indicate that the gross motor skills measurement tool used met validity and reliability requirements, although some aspects still require adjustment or improvement. In physical education, the availability of valid and reliable measuring tools is crucial because it enables teachers to collect accurate, objective, and reliable data on their students' motor skills (Kwon & Maeng, 2022). Lesson planning, constructive feedback, and subsequent learning decisions such as implementing remediation programs for struggling students and enrichment programs for students who have achieved or exceeded the established learning outcomes can be based on this information. Therefore, strengthening the development and validation of gross motor assessment instruments remains an important area of research to support more effective evaluation and monitoring of children's motor development in educational settings (Taufik et al., 2024).

CONCLUSION

The gross motor skills measurement tool for children in Phase B generally meets validity and reliability requirements for measuring motor skills, according to study findings. Based on the validity test findings, most test items are reliable and capable of measuring children's gross motor skills according to their developmental stage. The Cronbach's Alpha coefficient analysis of the reliability test findings showed a value of 0.71, which is considered reliable. This indicates that the instrument has a high level of internal consistency, making it suitable and reliable for use in physical education assessment processes, particularly for evaluating and monitoring the continuous improvement of gross motor skills in children in Phase B.

Journal of Fundamental Movement Skills Vol. 1, No. 1, Tahun 2026, pp. 36-46
ISSN: 3164-3264 (Online)
https://jfms.smartmotionjournals.com

It is recommended that grade B elementary school students be assessed for their gross motor skills using a gross motor skills test tool that meets validity and reliability requirements. It is anticipated that the use of a standardized test tool will help teachers collect objective, accurate, and accountable assessment data, supporting more appropriate and effective learning decision-making. However, some test items that currently do not meet validity requirements still require improvement, optimization, or modification to suit the developmental characteristics of the students. These changes are intended to allow for more effective use of gross motor skills tests and provide a more complete picture of children's motor skills.

The results of this study do not fully describe children's motor development comprehensively and continuously due to several limitations, particularly those related to the cross-sectional study design, scope, and number of study subjects. Therefore, additional research is recommended by retesting the research instrument using a larger number of subjects and a more diverse range of student characteristics. Furthermore, the use of a different research design, such as a longitudinal design, is recommended to obtain more comprehensive and in-depth measurement results that can describe the ongoing development of children's motor skills over time.

ACKNOWLEDGMENTS

The researchers would like to express their deepest gratitude to all stakeholders who were willing to participate and facilitate the data collection process. The authors wish to express their gratitude to the Faculty of Education, Chulalongkorn University; Faculty of Applied Arts, King Mongkut's University of Technology; Faculty of Sport and Health Science, Universitas Negeri Surabaya; and Faculty of Health Sciences, Universitas Kristen Satya Wacana for their institutional support and collaboration.

FUNDING STATEMENT

This research did not receive any external funding.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest in this research.

JFMS
Journal of Fundamental Movement Skills

REFERENCES

Aarskog, E. (2021). 'No assessment, no learning': exploring student participation in assessment in Norwegian physical education (PE). *Sport, Education and Society*, *26*(8), 875–888. https://doi.org/10.1080/13573322.2020.1791064

Ayu, I. D., Dewi, L., Asril, N. M., Gede, D., & Wirabrata, F. (2021). *Instrumen Asesmen Untuk Mengukur Perkembangan Fisik Motorik Kasar pada Anak Usia Dini*. *9*, 416–422.

Dewi, R., & Verawati, I. (2022). The effect of manipulative games to improve fundamental motor skills in elementary school students. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, *10*(01), 24-37.

Fu, T., Zhang, D., Wang, W., Geng, H., Lv, Y., Shen, R., & Bu, T. (2022). Functional training focused on motor development enhances gross motor, physical fitness, and sensory integration in 5–6-year-old healthy Chinese children. *Frontiers in pediatrics*, *10*, 936799.

Kaeduang, M., Samawathdana, R., Tingsabhat, S., Sookhanaphibarn, T., & Autthamathitapakdee, K. (2024, October). Enhancing Self-Management Skills through PE e-Learning Packages. In 2024 IEEE 13th Global Conference on Consumer Electronics (GCCE) (pp. 1293-1294). IEEE.

Kuswanto, C. W., Hadiati, E., Marningsih, R., Islam, P., Usia, A., Islam, U., Raden, N., Lampung, I., Kasar, M., & Dini, A. U. (2023). *CHALLENGE BOARD : SEBUAH PERMAINAN UNTUK MENGEMBANGKAN MOTORIK KASAR*. *8*(2), 210–217.

Kwon, H., & Maeng, H. (2022). *The Impact of a Rater Training Program on the TGMD-3 Scoring Accuracy of Pre-Service Adapted Physical Education Teachers*. 1–13.

Li, L., & Zhou, M. (2025). Pattern recognition and classification of physical education teaching movements based on biomechanics. *MCB Molecular and Cellular Biomechanics*, *22*(1). https://doi.org/10.62617/mcb889

Li, Q. Z., Fang, Q., Zhao, X. T., & Peng, W. (2024). Motor ability development by integrating small-sided games into physical education class. *Frontiers in Psychology*, *15*. https://doi.org/10.3389/fpsyg.2024.1259924

Maher, J. P., & Dunton, G. F. (2020). Within-day time-varying associations between motivation and movement-related behaviors in older adults. In *Psychology of Sport and Exercise* (Vol. 47, p. 101522). Elsevier BV. https://doi.org/10.1016/j.psychsport.2019.04.012

Nanang, M., Kusuma, H., & Asita, F. N. (2023). *The Role of the Augmented Real-Time Feedback to Overcome the Imbalance of Cognitive , Psychomotor , and Social Interaction in Physical Education Class*.

Ochoa Martínez, P. Y. (2020). Pedagogical strategies for gross and fine motor skills learning through physical education: Intervention in students with hearing impairment. *Revista Brasileira de Educacao Especial*, *26*(4), 567–576. https://doi.org/10.1590/1980-54702020v26e0063

Özkan, Z., & Kale, R. (2023). Investigation of the effects of physical education activities on motor skills and quality of life in children with intellectual disability. *International*

Journal of Developmental Disabilities, *69*(4), 578–592. https://doi.org/10.1080/20473869.2021.1978267

Pamot, H., Wira, D., & Kusuma, Y. (2023). *Journal Sport Area Physical education with the TPSR model : Building characters and basic manipulative movements in elementary school students*. *8*(2), 239–250.

Priambodo, A., Kristyandaru, A., Jannah, M., Fathir, L. W., Orhan, B. E., & WIbowo, S. (2025). Development of a task-oriented physical education model to enhance students' intrinsic motivation and motor skills. *Sport TK*, *14*. https://doi.org/10.6018/sportk.666351

Puspitaningrum, D. C. (2024). *Analisis Tantangan dan Peluang Pendidikan Jasmani Dalam Implementasi Kurikulum Sekolah Dasar : Systematic Literature Review*. 631–644.

Ramadhan, M. F., Siroj, R. A., & Afgani, M. W. (2024). *Validitas and Reliabilitas*. *06*(02), 10967–10975.

Saputra, S. Y., Kobandaha, F., Annas, A. N., & Fantiro, F. A. (2024). *Inovasi dalam Pembelajaran Pendidikan Jasmani di Sekolah Dasar : Tinjauan Terhadap Literatur*. *4*.

Setiawan, R. (2025). *Journal of Elementary Education Research*. *1*(1), 65–74.

Solum, M., Lorås, H., & Pedersen, A. V. (2020). A Golden Age for Motor Skill Learning? Learning of an Unfamiliar Motor Task in 10-Year-Olds, Young Adults, and Adults, When Starting From Similar Baselines. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00538

Tan, J. S., & Lim, C. B. (2025). The development of gross motor skills in children: Insights from the Motor Assessment Test for Children. *Journal of Experimental Child Psychology*, *256*, 106255.

Tariq, M. U., & Sergio, R. P. (2024). Innovative Assessment Techniques in Physical Education: Exploring Technology-Enhanced and Student- Centered Models for Holistic Student Development. In *Global Innovations in Physical Education and Health* (pp. 85–112). IGI Global. https://doi.org/10.4018/979-8-3693-3952-7.ch004

Taufik, T., Winarno, M. E., Hariadi, I., Yudasmara, D. S., & Fadhli, N. R. (2024). Exploring the validity and reliability of active motor card: A comprehensive assessment of gross motor development and physical fitness in children aged 6-9 years. *Retos: nuevas tendencias en educación física, deporte y recreación*, (54), 100-105.

Tayech, A., Mejri, M. A., Makhlouf, I., Uthoff, A., Hambli, M., Behm, D. G., & Chaouachi, A. (2022). Reliability, criterion-concurrent validity, and construct-discriminant validity of a head-marking version of the taekwondo anaerobic intermittent kick test. *Biology of Sport*, *39*(4), 951–963. https://doi.org/10.5114/biolsport.2022.109459

Tiani, A., Maulani, A. S., Iryani, H. D., & Fitriani, S. (2025). *Telaah Kesalahan Kesalahan Prosedur Penelitian Pendidikan*. 762–768.

Wijanarko, B., Nuryadin, I., & Doewes, R. I. (2023). *Validity and reliability of TGMD-2 Surakarta children aged 7-10 years*. *1*(1), 73–77.

Yuningsih, N., & Sardjito. (2020). Gerak Vertikal Benda Berukuran Berbeda yang Jatuh Tanpa Kecepatan Awal dan Bergesekan dengan Udara. *Prosiding The 11th Industrial Research Workshop and National Seminar*, *11*(01), 710–714.

Zhang, B. F., Lin, Z. C., & Li, C. (2025). Fine motor skills assessment instruments for preschool children with typical development: a scoping review. *Frontiers in Psychology*, *16*, 1620235.

JFMS
Journal of Fundamental Movement Skills