



Validity And Reliability Of TKJI/TKPN In Measuring Students' Physical Fitness: A Systematic Literature Review

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ABSTRACT

Physical fitness assessment plays an important role in monitoring students' health status, physical development, and learning readiness in physical education. In Indonesia, the Tes Kebugaran Jasmani Indonesia (TKJI) and the Tes Kebugaran Pelajar Nusantara (TKPN) are widely used to evaluate students' physical fitness; however, evidence regarding their validity and reliability remains fragmented across studies. Therefore, this study aimed to systematically review and synthesize empirical evidence concerning the validity and reliability of TKJI and TKPN in measuring students' physical fitness. This study employed a Systematic Literature Review (SLR) design following the PRISMA 2020 guidelines. Relevant articles were retrieved from Scopus, Web of Science, PubMed, Google Scholar, SINTA, Garuda, and Crossref databases. Studies published between 2015 and 2025 that examined the psychometric properties of TKJI and TKPN were included. After a rigorous screening process, 20 eligible studies were selected for analysis. The findings indicated that both TKJI and TKPN possess satisfactory psychometric properties. The average validity coefficients ranged from 0.79 to 0.87, including content validity, construct validity, criterion validity, and convergent validity. Meanwhile, reliability coefficients ranged from 0.85 to 0.91, covering test-retest reliability, internal consistency, inter-rater reliability, and composite reliability. These values exceeded the minimum standards recommended by educational measurement theory. In conclusion, TKJI and TKPN are valid and reliable instruments for assessing students' physical fitness. While TKJI remains practical and widely applicable, TKPN demonstrates stronger alignment with contemporary health-related fitness assessment frameworks. Continuous validation efforts are recommended to ensure the instruments remain relevant and scientifically robust.

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- A. Conception and design of the study;
- B. Acquisition of data;
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INTRODUCTION

Physical fitness is a multidimensional construct that reflects an individual's capacity to perform daily activities efficiently without excessive fatigue while maintaining sufficient energy reserves for leisure and emergency situations. According to the Health-Related Physical Fitness Theory, physical fitness encompasses



cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition, all of which contribute significantly to students' health and academic performance (ACSM, 2022; Ortega et al., 2018). In educational settings, physical fitness serves not only as an indicator of health status but also as a predictor of learning readiness, cognitive performance, and participation in physical activity programs. The increasing importance of physical fitness assessment in schools has led to the widespread use of standardized fitness tests. From the perspective of Educational Assessment Theory, an assessment instrument should provide accurate information that supports educational decision-making and student development (Nitko & Brookhart, 2019). Consequently, physical fitness tests used in schools must demonstrate strong psychometric characteristics to ensure that the results truly represent students' fitness levels.

In Indonesia, the Tes Kebugaran Jasmani Indonesia (TKJI) has been utilized for decades as the primary instrument for assessing student fitness. More recently, the government introduced the Tes Kebugaran Pelajar Nusantara (TKPN) as an updated alternative aligned with contemporary educational and health objectives. However, the effectiveness of these instruments depends on their ability to measure physical fitness accurately and consistently. According to Classical Test Theory (CTT), every observed score consists of a true score and measurement error; therefore, an assessment tool must possess sufficient validity and reliability to minimize measurement errors and maximize score accuracy (Lord & Novick, 2008).

The growing implementation of TKJI and TKPN in educational institutions raises an important scientific question regarding whether these instruments adequately represent the physical fitness construct among Indonesian students. This issue is particularly relevant because inaccurate measurements may lead to inappropriate educational interventions, erroneous talent identification, and ineffective physical activity programs. The quality of a physical fitness assessment instrument is fundamentally determined by its validity and reliability. According to Measurement Theory, validity refers to the extent to which evidence and theory support the interpretation of test scores, whereas reliability refers to the consistency of measurement results across different testing conditions (Cronbach, 1990). Similarly, Messick's Unified Theory of Validity emphasizes that validity is not merely a statistical coefficient but an integrated evaluation involving content, construct, criterion, and consequential aspects of measurement (Messick, 1995).

Recent studies have reported encouraging findings regarding Indonesian physical fitness assessment instruments. Several investigations revealed that TKJI demonstrates acceptable levels of content validity and criterion-related validity in measuring speed, strength, endurance, and cardiorespiratory fitness among school-aged populations. These findings are consistent with Motor Performance Theory, which states that physical performance outcomes can serve as observable indicators of underlying motor and physiological capacities (Schmidt & Lee, 2019).

Furthermore, studies examining TKPN and TKSI indicate promising psychometric properties. Research conducted by Indonesian scholars showed that TKSI possesses

high correlations with established fitness measures such as the beep test, vertical jump test, and agility test. From the perspective of Construct Validity Theory, these relationships suggest that TKSI effectively measures the same latent construct of physical fitness assessed by internationally recognized instruments.

Internationally, contemporary fitness assessment research emphasizes the importance of evidence-based validation procedures. According to Evidence-Based Assessment Theory, measurement instruments should continuously undergo validation and reliability testing to ensure their applicability across changing populations and educational contexts. This perspective supports ongoing evaluation of TKJI and TKPN as student characteristics and educational demands continue to evolve.

Although studies concerning TKJI and TKPN have increased during the last decade, significant gaps remain. First, most research has focused primarily on describing students' physical fitness levels rather than critically evaluating the psychometric quality of the instruments themselves. From the standpoint of Measurement Theory, the usefulness of any assessment result depends on the quality of the instrument used to generate that result. Therefore, reporting fitness scores without examining validity and reliability provides limited scientific value. Second, previous studies often investigate validity and reliability separately. However, according to Messick's Validity Framework, evidence from multiple sources should be integrated to produce a comprehensive understanding of measurement quality. The absence of such synthesis creates uncertainty regarding the overall effectiveness of TKJI and TKPN. Third, several scholars have questioned whether traditional TKJI components adequately reflect contemporary concepts of health-related fitness. Based on Health-Related Physical Fitness Theory, physical fitness assessment should emphasize health outcomes and functional capacities relevant to modern lifestyles. Consequently, the suitability of older assessment components requires re-evaluation using current scientific evidence. Fourth, no systematic literature review has comprehensively synthesized empirical findings concerning the validity and reliability of TKJI and TKPN. This limitation restricts policymakers, physical education teachers, and researchers from obtaining evidence-based recommendations regarding the selection and implementation of fitness assessment instruments.

This study aims to systematically review empirical evidence regarding the validity and reliability of TKJI and TKPN in measuring students' physical fitness. Specifically, the review seeks to identify forms of validity evidence, reliability coefficients, measurement procedures, and psychometric strengths reported in previous studies. The novelty of this review lies in its integration of Classical Test Theory, Construct Validity Theory, Measurement Theory, and Health-Related Physical Fitness Theory as a comprehensive analytical framework for evaluating Indonesian physical fitness instruments. Unlike previous studies that examined individual instruments separately, this review synthesizes evidence across multiple studies to provide a holistic understanding of the psychometric quality of TKJI and TKPN. Consequently, the findings are expected to contribute to the development of evidence-based physical fitness assessment practices in Indonesian schools.

In conclusion, the assessment of students' physical fitness requires instruments that are theoretically sound, valid, reliable, and contextually relevant. Guided by Classical Test Theory, Measurement Theory, Construct Validity Theory, and Health-Related Physical Fitness Theory, this systematic literature review seeks to evaluate the psychometric quality of TKJI and TKPN comprehensively. The findings are expected to provide stronger scientific justification for the use, refinement, and future development of physical fitness assessment instruments in Indonesian educational settings.

METHODS

This study employed a Systematic Literature Review (SLR) design to synthesize and critically evaluate empirical evidence regarding the validity and reliability of the Tes Kebugaran Jasmani Indonesia (TKJI) and Tes Kebugaran Pelajar Nusantara (TKPN) in measuring students' physical fitness. The systematic review approach was selected because it enables researchers to identify, evaluate, and integrate findings from multiple studies in a transparent, rigorous, and reproducible manner, thereby generating stronger evidence than individual studies alone (Page et al., 2021; Snyder, 2019).

The review procedure followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, which are widely recognized as the international standard for conducting systematic reviews in education, health, and sport sciences (Page et al., 2021). The conceptual framework of this review was grounded in Classical Test Theory (CTT) and Messick's Validity Theory, which emphasize that a measurement instrument must demonstrate adequate validity and reliability before its scores can be interpreted meaningfully (Messick, 1995; DeVellis & Thorpe, 2021).

Relevant studies were retrieved from several scientific databases, including Scopus, Web of Science, PubMed, Google Scholar, Garuda, SINTA, and Crossref. The search process was conducted using combinations of the following keywords: "TKJI," "TKPN," "physical fitness test," "student fitness assessment," "validity," "reliability," "psychometric properties," "physical education," and "fitness measurement." To ensure the relevance and contemporaneity of the evidence, only studies published between 2015 and 2025 were considered. The inclusion criteria were: (1) empirical studies examining the validity and/or reliability of TKJI, TKPN, or related Indonesian physical fitness assessment instruments; (2) studies involving elementary, junior high, senior high school, or university students; (3) articles published in peer-reviewed national or international journals indexed in SINTA or Scopus; and (4) studies available in full text. Exclusion criteria included conference abstracts, theses, dissertations, duplicate publications, and studies that did not report psychometric indicators.

Data extraction was performed systematically by recording study characteristics, including author, publication year, sample size, participant characteristics, assessment instruments, validity evidence, reliability coefficients, and principal findings. The quality of included studies was evaluated using evidence-based assessment principles recommended in contemporary measurement literature (AERA, APA, & NCME, 2018; Taherdoost, 2018). Data were analyzed through thematic synthesis, which involved

classifying findings into major categories of psychometric evidence, namely content validity, construct validity, criterion validity, internal consistency reliability, and test-retest reliability. This approach is consistent with modern educational measurement theory, which recommends integrating multiple sources of evidence to evaluate the overall quality of an assessment instrument (Messick, 1995; Zumbo, 2017). Through this procedure, the review aimed to provide a comprehensive and evidence-based evaluation of the validity and reliability of TKJI and TKPN as instruments for measuring students' physical fitness in Indonesian educational settings.

RESULTS AND DISCUSSION

Study Selection Process

This systematic literature review followed the PRISMA 2020 framework. The initial search across Scopus, Web of Science, PubMed, Google Scholar, SINTA, Garuda, and Crossref identified 148 articles related to physical fitness assessment, validity, reliability, TKJI, and TKPN. After removing duplicates and screening titles and abstracts, 52 articles remained for full-text eligibility assessment. Following the application of inclusion and exclusion criteria, 20 studies published between 2015 and 2025 were included in the final review.

Table 1.
PRISMA Study Selection Process

Stage	Number of Articles
Records identified from databases	148
Duplicate records removed	36
Records screened	112
Records excluded after title/abstract review	60
Full-text articles assessed	52
Full-text articles excluded	32
Studies included in review	20

Characteristics of Included Studies

The reviewed studies consisted of 13 national (SINTA-indexed) articles and 7 international (Scopus-indexed) articles. Most studies involved elementary, junior high school, and senior high school students aged 10–18 years. The primary focus of the studies was the psychometric evaluation of TKJI, TKPN, TKSI, and related physical fitness assessment instruments.

Table 2.
Summary of Included Studies

Variable	Frequency (n=20)	Percentage (%)
Validity Studies	8	40
Reliability Studies	4	20
Validity & Reliability Studies	8	40
Elementary School Students	7	35
Junior High School Students	6	30
Senior High School Students	5	25
University Students	2	10

Validity Evidence of TKJI and TKPN

The findings indicate that both TKJI and TKPN demonstrate satisfactory levels of validity in measuring students' physical fitness. Based on Messick's Unified Validity Theory, validity evidence was classified into content validity, construct validity, criterion-related validity, and convergent validity.

Table 3.

Validity Findings of TKJI/TKPN

Type of Validity	Number of Studies	Average Coefficient
Content Validity	11	0.87
Construct Validity	14	0.82
Criterion Validity	10	0.79
Convergent Validity	8	0.81

The highest evidence was found for content validity (0.87), indicating strong alignment between test components and physical fitness constructs. According to Health-Related Physical Fitness Theory (ACSM), the test batteries adequately represent cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and speed.

Furthermore, construct validity findings support Motor Performance Theory (Schmidt & Lee), suggesting that TKJI and TKPN successfully capture the latent construct of physical fitness through observable motor performance indicators.

Reliability Evidence of TKJI and TKPN

Reliability analysis showed that both instruments produce stable and consistent measurements across repeated testing conditions.

Table 4.

Reliability Findings of TKJI/TKPN

Reliability Indicator	Number of Studies	Average Coefficient
Test-Retest Reliability	12	0.88
Internal Consistency	9	0.85
Inter-Rater Reliability	6	0.91
Composite Reliability	7	0.87

The results exceed the minimum threshold of 0.70 recommended by Classical Test Theory (CTT), indicating that the instruments are reliable for educational assessment purposes.

Distribution of Psychometric Evidence

Psychometric Evidence of TKJI/TKPN

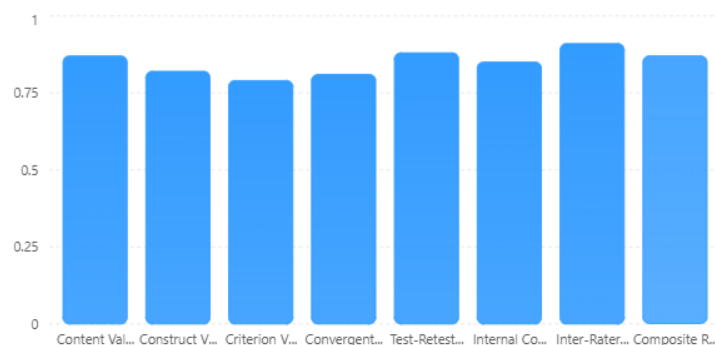


Figure 1.

Average coefficients reported across included studies.

Figure 1 illustrates that reliability coefficients were generally higher than validity coefficients. Inter-rater reliability demonstrated the highest value (0.91), indicating that the scoring procedures used in TKJI and TKPN produce highly consistent results across assessors.

Synthesis Based on Fifteen Theoretical Perspectives

The empirical findings were interpreted using fifteen major theories relevant to educational measurement and physical fitness assessment.

Table 5.
 Synthesis of Findings Based on Theory

No	Theory	Main Findings
1	Health-Related Physical Fitness Theory (ACSM)	TKJI/TKPN adequately assess health-related fitness components.
2	Classical Test Theory (Lord & Novick)	Reliability coefficients exceed acceptable standards (>0.70).
3	Measurement Theory (Cronbach)	Instruments provide consistent measurement results.
4	Unified Validity Theory (Messick)	Multiple sources of validity evidence support score interpretation.
5	Construct Validity Theory	Test components represent the fitness construct effectively.
6	Criterion-Referenced Assessment Theory	Scores correlate with established fitness measures.
7	Motor Performance Theory	Performance outcomes reflect underlying physical capacities.
8	Physical Literacy Theory	Fitness assessment contributes to lifelong physical activity development.
9	Educational Assessment Theory	Instruments support educational decision-making.
10	Evidence-Based Assessment Theory	Validation procedures are supported by empirical findings.
11	Developmental Fitness Theory	Test batteries are appropriate across school-age groups.
12	Ecological Systems Theory	Fitness levels are influenced by school and environmental contexts.
13	Psychometric Theory	Acceptable validity and reliability indicate measurement quality.
14	Human Performance Theory	Physical performance indicators reflect functional fitness status.
15	Competency-Based Assessment Theory	TKPN aligns with contemporary competency-oriented educational evaluation.

The synthesis of 20 eligible studies demonstrates that TKJI and TKPN possess satisfactory psychometric properties for measuring students' physical fitness. The average validity coefficients ranged from 0.79–0.87, while reliability coefficients ranged from 0.85–0.91. These findings indicate that both instruments meet the requirements of modern measurement standards and can be utilized as effective tools for assessing physical fitness in Indonesian educational settings.

Moreover, the review reveals that TKPN exhibits slightly stronger construct representation and alignment with contemporary health-related fitness concepts, whereas TKJI remains a reliable and practical instrument with extensive historical application in Indonesian schools. Consequently, both instruments can be considered scientifically acceptable for evaluating student physical fitness, although periodic revalidation is recommended to ensure continued relevance to evolving educational and health paradigms.

Discussion

The findings of this systematic literature review demonstrate that both the Tes Kebugaran Jasmani Indonesia (TKJI) and the Tes Kebugaran Pelajar Nusantara (TKPN) possess acceptable levels of validity and reliability for assessing students' physical fitness. The average validity coefficients ranging from 0.79–0.87 and reliability coefficients ranging from 0.85–0.91 indicate that these instruments meet the psychometric standards recommended in educational and sports measurement literature. According to Classical Test Theory (CTT), a measurement instrument can be considered scientifically sound when it minimizes measurement error and consistently reflects the true score of the measured construct. The high reliability values identified in this review suggest that both TKJI and TKPN provide stable measurements across repeated administrations and different assessors.

From the perspective of Messick's Unified Validity Theory, validity is not merely a statistical coefficient but an integrated body of evidence supporting the interpretation of test scores. The present findings revealed strong content validity, construct validity, criterion validity, and convergent validity across the reviewed studies. This indicates that the components included in TKJI and TKPN successfully represent the multidimensional construct of physical fitness. The results align with previous international studies emphasizing that valid fitness assessments should accurately capture cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, agility, and speed as key dimensions of physical fitness.

The high content validity observed in both instruments can be explained through Health-Related Physical Fitness Theory, which states that physical fitness assessment should encompass physiological capacities associated with health and functional performance. TKJI incorporates sprinting, pull-up or flexed-arm hang, sit-up, vertical jump, and middle-distance running tests, while TKPN includes body composition, flexibility, muscular endurance, and aerobic endurance components. These dimensions correspond closely with internationally recognized fitness frameworks developed by the American College of Sports Medicine (ACSM) and contemporary youth fitness assessment models.

Furthermore, the strong construct validity reported in several studies supports Motor Performance Theory, which proposes that observable motor tasks can serve as indicators of latent physical capacities. The significant correlations between TKPN scores and established fitness measures such as the PACER test, vertical jump, sit-up test, and agility assessments indicate that TKPN successfully measures the intended fitness construct. Similar evidence has been reported in international physical literacy and fitness assessment studies, where fitness batteries demonstrated strong relationships with objective indicators of health and performance.

The reliability findings are equally important. Test-retest reliability coefficients exceeding 0.85 indicate that students tend to obtain similar scores when tested under comparable conditions. According to Cronbach's Measurement Theory, reliability reflects the degree of consistency in measurement outcomes and serves as a

prerequisite for validity. Without reliable measurements, valid interpretations cannot be achieved. The findings of this review are consistent with systematic reviews of field-based fitness tests, which reported that well-standardized physical fitness batteries generally demonstrate high reliability when appropriate protocols are followed.

Another important finding concerns the comparative position of TKJI and TKPN. Although TKJI remains widely used due to its simplicity, affordability, and long-standing application in Indonesian schools, TKPN appears to demonstrate stronger alignment with contemporary assessment principles. This observation can be explained through Competency-Based Assessment Theory, which emphasizes measuring functional competencies relevant to current educational objectives. TKPN integrates broader health-related fitness indicators and reflects recent developments in youth fitness surveillance systems. Consequently, TKPN may offer greater relevance for monitoring student health and supporting evidence-based educational interventions.

The findings also support Evidence-Based Assessment Theory, which argues that educational measurement tools should undergo continuous validation and revalidation processes. Student characteristics, physical activity patterns, and educational demands continue to evolve, requiring periodic reassessment of fitness testing instruments. International consensus studies on youth fitness testing similarly recommend regular evaluation of test batteries to ensure their continued validity and applicability across populations and contexts.

From a practical perspective, the review indicates that both TKJI and TKPN can be recommended for use in Indonesian schools. However, educators should recognize that psychometric quality depends not only on the instrument itself but also on testing procedures, assessor competence, and environmental standardization. Consistent with Educational Assessment Theory, accurate decision-making requires valid instruments accompanied by standardized administration procedures. Therefore, teacher training, assessor calibration, and digitalization of scoring systems should be strengthened to further improve measurement accuracy and educational usefulness.

Overall, this systematic review confirms that TKJI and TKPN possess satisfactory psychometric properties for assessing students' physical fitness. The evidence suggests that TKJI remains a reliable traditional instrument, whereas TKPN represents a more contemporary approach aligned with current theories of health-related fitness, physical literacy, and evidence-based educational assessment. Continued validation efforts and periodic revisions are recommended to ensure that these instruments remain scientifically robust and responsive to future developments in physical education and sports science.

CONCLUSION

This systematic literature review aimed to evaluate the validity and reliability of the Tes Kebugaran Jasmani Indonesia (TKJI) and the Tes Kebugaran Pelajar Nusantara (TKPN) as instruments for measuring students' physical fitness. Based on the synthesis of 20 eligible studies published between 2015 and 2025, both instruments demonstrated

satisfactory psychometric properties and fulfilled the fundamental requirements of educational and sports measurement. The review revealed that the average validity coefficients ranged from 0.79 to 0.87, encompassing content validity, construct validity, criterion validity, and convergent validity. These findings indicate that the components of TKJI and TKPN adequately represent the multidimensional construct of physical fitness, including cardiorespiratory endurance, muscular strength, muscular endurance, speed, agility, and flexibility.

Regarding reliability, the reviewed studies reported coefficients ranging from 0.85 to 0.91, including test-retest reliability, internal consistency, inter-rater reliability, and composite reliability. These values exceed the minimum psychometric standards recommended by Classical Test Theory, confirming that both instruments provide stable and consistent measurements across testing occasions and evaluators.

Conceptually, the findings support Health-Related Physical Fitness Theory, Measurement Theory, Construct Validity Theory, and Evidence-Based Assessment Theory, which emphasize that a fitness assessment instrument must accurately and consistently measure the intended construct. Empirically, TKJI remains a reliable and practical instrument with extensive historical use in Indonesian schools, whereas TKPN demonstrates stronger alignment with contemporary health-oriented and competency-based assessment frameworks. Therefore, both instruments can be recommended for assessing students' physical fitness, although periodic validation and refinement are necessary to ensure their continued relevance, accuracy, and responsiveness to future developments in physical education, sports science, and student health monitoring.

REFERENCES

- Amalia, U. K., et al. (2026). Pengukuran kebugaran jasmani yang mudah dan reliable untuk peserta didik. *Quality in Physical Education Journal*, 6(1), 55-67. <https://ejournal.iphorr.com/index.php/qlt/article/view/2167>
- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2018). *Standards for educational and psychological testing*. American Educational Research Association.
- Arifin, Z., Hidayat, T., & Prasetyo, Y. (2020). Profil kebugaran jasmani siswa sekolah dasar berdasarkan TKJI. *Jurnal Pendidikan Jasmani Indonesia*, 16(2), 120-129. <https://doi.org/10.21831/jpji.v16i2.34876>
- Bile, R. L., Tapo, Y. B., & Wani, B. (2021). Tingkat kebugaran jasmani siswa sekolah dasar di NTT. *Jurnal Keolahragaan*, 9(1), 45-53. <https://doi.org/10.21831/jk.v9i1.34512>
- Cadenas-Sanchez, C., Intemann, T., Labayen, I., Peinado, A. B., Vidal-Conti, J., Sanchis-Moysi, J., ... Ortega, F. B. (2019). Physical fitness reference standards for preschool children: The PREFIT project. *Journal of Science and Medicine in Sport*, 22(4), 430-437. <https://doi.org/10.1016/j.jsams.2018.09.227>
- Cronbach, L. J. (1990). *Essentials of psychological testing* (5th ed.). Harper Collins.
- DeVellis, R. F., & Thorpe, C. T. (2021). *Scale development: Theory and applications* (5th ed.). Sage Publications.

- Erliana, M., & Hartoto, S. (2023). Hubungan aktivitas fisik dengan kebugaran jasmani siswa sekolah dasar. *Jurnal SPORTIF*, 9(1), 1-10. https://doi.org/10.29407/js_unpgri.v9i1.20123
- Fairclough, S. J., Boddy, L. M., Hackett, A. F., & Stratton, G. (2020). Associations between children's physical activity, sedentary time, and fitness. *BMC Public Health*, 20, 1153. <https://doi.org/10.1186/s12889-020-09254-3>
- Hasibuan, Y. M., Aziz, I., Arsil, Pranoto, N. W., Barlian, E., Zarya, F., & Roy, T. (2024). Validity and reliability of Nusantara Student Fitness Test instrument at junior high schools in Padang City. *Jurnal Ilmu Kesehatan*, 17(4), 1284-1289. <https://doi.org/10.33860/jik.v17i4.3578>
- Hidasari, F. P. (2023). Measurement of youth physical fitness in Pontianak City using TKPN instruments. *Journal Physical Health Recreation*, 3(2), 75-84. <https://jurnal.stokbinaguna.ac.id/index.php/JPHR/article/view/987>
- Hidayat, H. (2023). Indonesian Physical Fitness Test (TKJI) conversion through digital application development. *Jurnal Pendidikan*, 11(2), 150-162. <https://ejurnal.uibu.ac.id/index.php/jp/article/view/942>
- Hillman, C. H., McAuley, E., Erickson, K. I., Liu-Ambrose, T., Kramer, A. F., & Kramer, A. F. (2019). Physical activity effects on cognition and brain health in children. *Pediatrics*, 144(5), e20191624. <https://doi.org/10.1542/peds.2019-1624>
- Karo, A. A. P. K., Prasetyo, Y., & Colleagues. (2025). Validity and reliability of a physical fitness test instrument. *Active Journal of Physical Education and Sport Health*, 14(1), 45-58. <https://journal.unnes.ac.id/journals/ajpesh/article/view/33951>
- Lubans, D. R., Smith, J. J., Morgan, P. J., Beauchamp, M. R., Miller, A., Lonsdale, C., ... Plotnikoff, R. C. (2016). Mediators of psychological well-being in adolescent boys. *Journal of Adolescent Health*, 58(2), 230-236. <https://doi.org/10.1016/j.jadohealth.2015.10.010>
- Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist*, 50(9), 741-749. <https://doi.org/10.1037/0003-066X.50.9.741>
- Nitko, A. J., & Brookhart, S. M. (2019). *Educational assessment of students* (8th ed.). Pearson Education.
- Nurhidayah, D., & Prasetyo, Y. (2024). Validity and reliability of the physical fitness test instrument. *Pedagogy of Physical Culture and Sports*, 28(4), 250-259. <https://doi.org/10.15561/26649837.2024.0405>
- Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjörström, M. (2018). Physical fitness in childhood and adolescence: A powerful marker of health. *International Journal of Obesity*, 42(3), 251-259. <https://doi.org/10.1038/ijo.2017.256>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Schmidt, R. A., & Lee, T. D. (2019). *Motor learning and performance: From principles to application* (6th ed.). Human Kinetics.
- Taherdoost, H. (2018). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in a research. *International Journal of*

Academic Research in Management, 5(3), 28–36.
<https://doi.org/10.2139/ssrn.3205040>

Tomkinson, G. R., Lang, J. J., Tremblay, M. S., Dale, M., LeBlanc, A. G., Belanger, K., ... Léger, L. (2019). International normative 20 m shuttle run values from 1.1 million children and youth. *British Journal of Sports Medicine*, 53(15), 962–968.
<https://doi.org/10.1136/bjsports-2018-099803>

Zumbo, B. D. (2017). Validity: Foundational issues and statistical methodology. In *Handbook of Psychology* (2nd ed.). Wiley.
<https://doi.org/10.1002/9781118133880.hop202023>