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Developing the Indonesian Student Health Index as an Instrument for Monitoring and Evaluating Student Health in Physical Education

Widya Hary Cahyati[1ABCE], Adi S[1ABCD], Luh Nik Armini[2BCD], Made Agus Dharmadi[2BCDE], Made Satya Nugraha Gautama[2CD], Risti Nurfadhila[3ADE], Yudik Prasetyo[3ACD], Rifky Riyandi Prastyawan[3CDE] and Mahenderan Appukutty[4BCD]

[1]Universitas Negeri Semarang
[2]Universitas Pendidikan Ganesha
[3]Universitas Negeri Yogyakarata
[4]Universiti Teknologi MARA

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Corresponding Author: Widya Hary Cahyati, email: widyahary27@mail.unnes.ac.id
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Abstract

Objectives. This study aimed to develop the Indonesian Student Health Index (ISHI), a valid, reliable, and practical instrument to comprehensively assess student health conditions in Indonesia, covering physical health, mental well-being, healthy lifestyle behaviors, and emotional-social functioning.

Materials and Methods. A Research and Development (R&D) design was employed using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The instrument development involved literature review, nominal group technique (NGT) with teachers, and field observations. Five experts validated the blueprint. The instrument underwent trials in two sports disciplines and was implemented in five school settings across educational levels. Data were analyzed using Pearson correlation for validity, Cronbach's Alpha for reliability, inter-rater correlation for objectivity, and exploratory factor analysis.

Results. The instrument showed good internal consistency ($\alpha = 0.88$), sufficient validity ($r = 0.62$), and high objectivity ($r = 0.91$). Practicality and effectiveness scored 88% and 84%, respectively. KMO (0.782) and Bartlett's Test ($p < 0.001$) confirmed the factorability of the data. Field implementation involving 1,300 respondents (teachers and students) yielded highly positive responses (90–95%). Expert validation rated the blueprint as "Highly Valid" (average score = 4.41).

Conclusions. The findings indicate that the ISHI instrument is scientifically robust and field-ready for nationwide implementation. It enables early identification of student health issues and supports integrating health and education policies. ISHI is expected to serve as a strategic tool for health monitoring, data-driven interventions, and developing holistic educational environments in Indonesia.

Keywords: health index, physical education, monitoring and evaluating.

Introduction

Student health is an essential factor that influences academic performance. This relationship is evidenced by factors such as learning adaptation and academic self-efficacy, indicating that these can improve educational outcomes (Song & Hu, 2024). Healthier behaviors and optimal health status correlate with better education outcomes (Lederer et al., 2024). Research (Carter-Pokras et al., 2021) Highlights the detrimental effects of poor health on academic performance. Additionally, nutrition, body weight, and physical fitness are manageable aspects of students' health that significantly influence school performance. This suggests that educational programs targeting these areas can be beneficial (Shaw et al., 2015; Soenyoto et al., 2025).

Furthermore, student well-being, which encompasses positive and negative dimensions, plays a role in academic achievement. Positive well-being can enhance academic performance, while negative aspects of well-being, such as anxiety and social problems, do not directly correlate with educational outcomes (Morinaj & Hascher, 2022). These studies emphasize the intertwined nature of student health and academic success, advocating for an integrated approach to support student well-being and educational achievement.

Many factors, including behavioral, psychological, and environmental dimensions, influence student health. Behavioral factors such as physical inactivity, alcohol abuse, smoking, and poor eating habits are common among students and contribute significantly to chronic diseases and poor well-being, with most students reporting insufficient physical activity and poor dietary habits (Kilroy et al., 2024). Psychological factors, especially during the COVID-19 pandemic, have exacerbated mental health issues, with increased anxiety and depression noted among students, particularly females, due to pandemic-related uncertainty and restrictions (Anser et al., 2021; S. et al., 2023). Environmental factors, such as pollution and inadequate healthcare support, further compound these challenges, especially during the pandemic, when students' outdoor activities were restricted (Anser et al., 2021). Additionally, institutional factors such as perceptions of a supportive environment and access to healthcare services are crucial, as international students often lack awareness and access to these services, impacting their mental health and academic performance (Aliriad et al., 2024; Sanci et al., 2022). Understanding these diverse factors is essential for developing effective health promotion strategies and interventions tailored to the unique needs of the student population.

Health data on Indonesian students reveal significant concerns regarding physical and mental health. A study of adolescents aged 15–19 years found a prevalence of 16.8 % for prehypertension and 2.6 % for hypertension, with risk factors including age, gender, and obesity, highlighting the early onset of cardiovascular risk in this population (Sudikno et al., 2023). Mental health issues are also prevalent, particularly among medical students, where 22.2 % reported symptoms of depression and 48.1 % reported anxiety, with dysfunctional coping strategies and low resilience identified as predictors (Ramadianto et al., 2022). Another study reinforces these findings, showing high levels of fatigue and mild mental illness among medical students, with 93 % feeling disengaged and 95 % feeling tired (Lili et al., 2022). Furthermore, a mixed-methods study of adolescents in Jakarta and South Sulawesi aimed to measure the burden of metabolic syndrome and poor mental health, emphasizing the need for comprehensive data to inform policy and intervention strategies (Azzopardi et al., 2020). These findings underscore the critical need for targeted health programs to address physical and mental health challenges among Indonesian students, with a focus on early intervention and support systems to mitigate these risks.

Implementing free nutritious meals in schools has been explored through various programs and studies, revealing both benefits and challenges. In the US, the School Lunch Program has faced criticism for its inefficiencies, such as eligibility issues and debt collection, which have led to practices like lunch shaming that negatively impact students' social and emotional well-being. Reform suggestions include improved federal regulations and research on universal free meal programs to better support students' nutritional needs (Gagliano et al., 2023). In New Zealand, a government-funded healthy school lunch program introduced in 2020 has shown positive impacts, such as improved food security and reduced financial stress for families. However, challenges like low uptake and food waste remain. The success of this program is linked to a school environment that promotes participation and involves students and families in planning. Community Eligibility in the US allows universal free meals in areas with high poverty rates. The Community Eligibility Provision in the US enables universal free meals in high-poverty areas, reducing meal costs without compromising nutritional quality, although its effectiveness varies by school size. In Norway, a study on free healthy school meals showed increased vegetable intake among children, highlighting such programs' potential public health benefits. However, there were limited changes in other dietary behaviors (Vik et al., 2020). While free nutritious meal programs can improve food security and eating habits, their success depends on practical implementation, community engagement, and addressing logistical challenges. However, in Indonesia, research on free nutritious meals remains limited.

Although various instruments have been developed to assess student health and well-being, most previous studies still show significant limitations. First, the study by (Tang et al., 2024) Only the Health Information Preference Questionnaire was validated in a population of students in China, which limits the generalization of the results to different age, cultural, and educational contexts. Second, the study by (Tomyn et al., 2020) The personal Well-Being Index for School Children revealed issues with cross-cultural alignment, particularly when analyzing data from Australia and Portugal, indicating potential bias in item structure across countries. Third, (Linden & Ecclestone, 2024) The Research faced external validity challenges due to a small and unbalanced follow-up sample size, thereby reducing the generalizability of findings from the Brief-PSSI. Fourth (Fiore et al., 2024), noted low reliability ($\alpha = 0.471$) in the interactive component of the Environmental Health Literacy Index (EHLI), which may cast doubt on the stability and accuracy of the tool in measuring specific literacy dimensions. Fifth, the adaptation of the instrument from the workplace to the educational setting by (Gómez-Chacón et al., 2021) Revealed factor structure mismatches in the new context, indicating that the conceptual model from the workplace cannot be directly applied to the student population without significant revisions.

From the preliminary study, it is clear that a student health index is needed. This is related to: (1) the limited availability of comprehensive data and information on student health in Indonesia. (2) It is essential to have a measurable and standardized student health index to monitor or evaluate the health status of students nationwide. (3) Identifying the most relevant health issues among students. (4) Formulating effective health policies and programs. (5) Allocating resources efficiently. (6) Monitoring and evaluating the impact of health interventions.

This research will contribute to a more comprehensive understanding of student health conditions in Indonesia. The results of this research can be used as a basis for developing

a valid and reliable Indonesian student health index. The resulting student health index can be a valuable tool for the government, educational institutions, health workers, and other relevant parties to improve student health in Indonesia.

Research Objectives:

a) Developing a comprehensive and standardized Indonesian Student Health Index instrument.

b) Testing the validity and reliability of the Indonesian Student Health Index instrument.

c) Providing recommendations for improving student health programs and policies in Indonesia.

Materials and Methods

Type and Design of Research

This research is a research and development (R&D) study based on Dick and Carey's ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. This model was chosen because it integrates theoretical and empirical approaches and allows for systematic revisions at each stage, resulting in a final product that is scientifically accountable and ready for widespread implementation.

Research Procedures

Analysis Stage

This stage is conducted to obtain initial information through a needs assessment. The steps include:

1. Literature and theory review from various sources (books, journals, and scientific reports) related to the instrument to be developed.
2. Empirical data collection through the Nominal Group Technique (NGT) involving teachers to identify instrument items.
3. Field observations and questionnaire distribution to understand the conditions of Student Health Index (ISHI) data collection.

This stage's outcome is compiling a needs description and instrument items as the basis for the initial product design.

Design Stage

In this stage, the initial product design in an instrument blueprint is developed based on the initial study and NGT results. The blueprint includes:

1. Instrument grid
2. Components of validity, reliability, objectivity, practicality, and effectiveness.

Initial validation is conducted by five experts (two lecturers with doctoral degrees and three sports practitioners) to test the feasibility of the initial design.

Development Stage

This stage produces an initial product from a guidebook covering all aspects that have been designed. Expert validation is followed by testing on two sports branches to test the validity and reliability of the instrument, as well as factor analysis. If feedback is received, revisions are made to improve the product. Objectivity testing is conducted by correlating the assessment results of two or more evaluators.

Table 1. Questionnaire Grid Table

Subject	This stage is conducted to obtain initial information through a needs assessment. The steps include:	Number of Items	Total Items
Subject Matter Expert	Literature and theory review from various sources (books, journals, and scientific reports) related to the instrument to be developed.	8	26
	Self contained	6	
	Stand alone	2	
	Adaptive	4	
	User friendly	6	
Trial	Validity	92	216
	Reliability	92	
	Objectivity	92	
	Practicality	19	
	Effectiveness	13	

Objectivity Testing:

The inter-rater correlation coefficient (r) is used, with the following interpretation:

- 0.95–1.00 = Very good
- 0.85–0.94 = Good
- 0.70–0.84 = Fair
- 0.00–0.69 = Unusable

Impementation Stage

Implementation is conducted in five priority sports branches in Semarang City to test the practicality and effectiveness of the ISHI instrument. Revisions are made based on field feedback to produce a product ready for broader use.

Statistical Analysis

Evaluation was conducted to ensure the readiness of the final ISHI product before dissemination.

Evaluation included:

- Expert validation.
- Validity test (Pearson).
- Reliability (Cronbach's Alpha).
- Objectivity (inter-rater r).
- Practicality and effectiveness for users.
- Exploratory factor analysis.

Analysis Techniques and Statistical Tests

- Validity Test.
- Reliability Test.
- Objectivity Test.
- Prerequisite Test for Factor Analysis.

To test the validity of the instrument through factor analysis, the following tests are conducted:

- Kaiser-Meyer-Olkin (KMO).
- Bartlett's Test of Sphericity.

- Measure of Sampling Adequacy (MSA).

Table 2. Criteria for Interpreting Validator Suitability Percentages

Score (%)	Validity	Decision
81–100	Highly Valid	No revision needed
61–80	Valid	Valid Minor revision
41–60	Sufficiently Valid	Valid Major revision
21–40	Less Valid	Valid Total revision
0–20	Not Valid	Not feasible

Table 3. Interpretation Criteria for Practicality and Effectiveness

Score (%)	Interpretation
81–100	Very Strong
61–80	Strong
41–60	Fairly Strong
21–40	Weak
0–20	Very Weak

Results

Table 4. Expert Validation Results for the ISHI Instrument Blueprint

No	Assessment Aspect	Average Validator Score	Validity Category	Revision Decision
1	Self Instruction	4.60	Highly Valid	No Revision Needed
2	Self Contained	4.40	Highly Valid	No Revision Needed
3	Stand Alone	4.20	Valid	Minor Revision
4	Adaptive	4.35	Valid	Minor Revision
5	User Friendly	4.50	Highly Valid	No Revision Needed
	Total Average	4.41	Highly Valid	Minor Revision (if necessary)

The Indonesian Students Health Index (ISHI) instrument was implemented in several stages, starting with expert validation, validity and reliability testing, practicality and effectiveness testing, and direct implementation in the field. The expert validation result for the instrument blueprint showed that all aspects received high scores, with an average total of 4.41. The self-instruction aspect received the highest score (4.40), and the user-friendly aspect (4.50). Meanwhile, the stand-alone and adaptive aspects scored 4.20 and 4.35, respectively, categorized as valid and requiring minor revisions. These results indicate that the instrument blueprint is suitable for use with minor improvements to some technical aspects (table 4).

Table 5. Results of Instrument Validity and Reliability Tests

No	Test Aspect	Number of Items	Average Coefficient Value	Category
1	Validity (Pearson)	92	0.62	Fair
2	Reliability (Cronbach's Alpha)	92	0.88	Good
3	Objectivity (inter-rater r)	92	0.91	Good

Furthermore, validity was measured through item-total correlation and deemed valid if $r > 0.3$, while Cronbach's Alpha reliability was considered good if $\alpha \geq 0.7$. The validity test on the 92 instrument items yielded an average coefficient value of 0.62, which falls under the sufficient validity category. Meanwhile, the reliability of the instrument measured using Cronbach's Alpha showed a value of 0.88, indicating a high level of internal consistency in the good category. The objectivity of the instrument was also proven to be good, with an inter-rater correlation coefficient of 0.91, meaning that the assessments between judges or evaluators had a high level of consistency (table 5).

Table 6. Practicality Test Results

No	Test Component	Average Score (%)	Category
1	Practicality	88%	Fair
2	Efectiveness	84%	Good

From the practicality test results, an average score of 88% was obtained, indicating that the instrument is reasonably practical for use by teachers and students in the data collection process. The instrument's effectiveness in its context of use also received a score of 84%, which falls into the good category. These two results indicate that, in addition to being valid and reliable, the ISHI instrument is also easy to implement in the field and can provide beneficial results in measuring student health (table 6).

The prerequisite tests for factor analysis indicate that the obtained data are suitable for further analysis. The Kaiser-Meyer-Olkin (KMO) value of 0.782 indicates the suitability of factor analysis. At the same time, the Bartlett's Test results show a significance value of 0.000 (< 0.05), meaning the data meet the criteria for exploratory factor analysis. In addition, the Measure of Sampling Adequacy (MSA) value for all items is above 0.6, reinforcing the feasibility of the analysis (table 7).

The instrument was tested across various educational levels during the field implementation stage with 1,300 respondents. One hundred physical education teachers showed a positive response of 95%, indicating excellent acceptance of the instrument. Similarly, elementary school students (n = 400) gave a positive response of 90%, junior

Table 7. Factor Analysis Prerequisite Test

No	Test	Value	Criteria	Decision
1	Kaiser-Meyer-Olkin (KMO)	0.782	> 0.5	Suitable for Factor Analysis
2	Bartlett's Test	Sig. = 0.000	< 0.05	Proceed with Factor Analysis
3	MSA (all items)	> 0.6	≥ 0.5	Meets Requirements

Table 8. Summary of Instrument Implementation Results in the Field

No	Respondents	Number of Respondents	Positive Responses (%)
1	PE Teachers	100	95 %
2	Elementary School Students	400	90 %
3	Junior High School Students	400	92 %
4	High School Students	400	91 %

high school students (n = 400) of 92%, and senior high school students (n = 400) of 91%. The high percentage of positive responses indicates that the ISHI instrument is well-received by teachers and students of various age levels. This strengthens the evidence that the ISHI instrument has high potential for widespread adoption in measuring student health in Indonesia (table 8).

Discussion

The health of elementary and secondary school students plays a crucial role in shaping the foundation for their academic success and character development. At this age, various health-related behaviors such as eating patterns, physical development, activity, and sleeping habits begin to form and contribute directly to concentration, learning, participation, and social interaction at school (Adi S et al., 2025; Hammoudi Halat et al., 2023). Protective behaviors such as regular exercise and consumption of nutritious foods have been shown to correlate positively with better academic achievement. In contrast, risky behaviors such as a sedentary lifestyle or unhealthy eating habits can impair students' learning performance (Riziq A'mir et al., 2023). Additionally, physical fitness is an important indicator of actively engaging in learning activities (Teferi, 2020). The mental health of elementary and secondary education students also deserves serious attention. Academic pressure, social issues, and lack of access to emotional support can trigger stress and anxiety, ultimately disrupting their learning achievements.

Efforts to improve the quality of education for elementary and secondary school students must be carried out with systematic health monitoring to create a holistic learning approach. (Rosmalina & Elfrianto, 2024). At this level, students are in a highly dynamic phase of growth and development, where physical, mental, and social health greatly influence their involvement in the learning process. Students who experience fatigue, stress, malnutrition, or other health problems tend to have low concentration and declining academic performance. Therefore, routine health monitoring is not just an additional activity, but an integral part of efforts to create a healthy and productive learning environment (Gustiani et al., 2023).

Developing the Indonesian Student Health Index (ISHI) is a strategic response to Indonesia's lack of standardized instruments for monitoring student health. Until now, the health conditions of students at the elementary to secondary levels have only been partially and sporadically reflected through sectoral programs such as UKS or limited survey results. Standardized instruments are crucial for comprehensively and accurately measuring student health, especially within Indonesia's education system's complex and diverse context. A reliable and valid assessment is needed to obtain an overview of the student's health status and inform targeted intervention strategies and support systems. Aspects but also covers dimensions of mental health, healthy lifestyle behaviors, and students' social-emotional well-being based on literature reviews and input from education and health practitioners. The validity and reliability of ISHI have been empirically tested, making it a trustworthy tool for evaluating students' health conditions across various educational levels (Hidayati et al., 2021).

The existence of this instrument aligns with international practices that have developed standardized measurement tools, such as the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), which has been adapted to the Indonesian cultural context, demonstrating strong internal consistency and factorial validity (Ramadhana, 2023). ISHI also adapts to local needs, considering Indonesia's diversity of culture, society, and educational environmental conditions. The absence of a national student health index further emphasizes the urgency of developing this instrument. ISHI is crucial for addressing the need for accurate and measurable data in student health management within educational institutions (Widodo et al., 2024). Thus, ISHI serves as a measurement tool, a means to detect early health risks among students, and a foundation for more precise and personalized health interventions.

In the context of policy implementation, the ISHI plays a vital role in supporting evidence-based policy efforts, where every policy targeting students is based on valid and relevant data. Through ISHI, policymakers at the school, regional, and national levels can obtain structured data on students' health status, which can be used to design more targeted intervention programs in education, health promotion, or supporting facilities (Retnowati et al., 2023). Additionally, with the availability of periodic data generated from the use of ISHI, the evaluation process of effectiveness, such as UKS, the provision of unrestricted use of ISHI, or physical fitness programs, can be conducted more objectively (Wang et al., 2021). ISHI is also important for early detection of health issues such as rising rates of prehypertension, obesity, academic stress, and emotional mental disorders, which have recently become increasingly common among students but are often not systematically identified.

The development and implementation of the Indonesian Student Health Index (ISHI) enable schools to assess students' health conditions measurably based on indicators that cover physical, mental, and healthy lifestyle dimensions. The development of ISHI strengthens the integration between the education and health sectors in supporting holistic student development. Data obtained from this instrument can be used as feedback for teachers and educational staff in adjusting teaching strategies according to students' needs, as well as a basis for schools or policymakers in designing more targeted interventions. At the elementary and secondary school levels, students are not yet fully able to articulate their health conditions independently. ISHI-based monitoring is crucial for detecting learning barriers stemming from health issues. Thus, integrating the education and health monitoring systems through ISHI enhances the effectiveness of the learning process and ensures long-term well-being. Indonesia can establish a student health monitoring system

that is cross-level, cross-sectoral, and sustainable, which will ultimately contribute directly to improving the quality of education and the health status of the nation's youth.

Conclusions

This study successfully developed the Indonesian Student Health Index (ISHI) as a valid, reliable, and applicable tool for assessing the overall health condition of students. ISHI was developed through a systematic approach using the ADDIE model, which includes expert validation, validity testing, reliability testing, objectivity testing, practicality testing, and effectiveness testing. The research results indicate that this instrument is highly suitable for use, both in terms of structure and content, and has been well-received by field users such as physical education teachers and students from various educational levels.

The ISHI covers the dimensions of physical health, mental health, healthy lifestyle behaviors, and students' well-being, enabling early detection of health issues that may hinder learning. This instrument also provides a strong foundation for developing policies, intervention programs, and national monitoring and evaluation of students' health. Thus, ISHI significantly contributes to creating a holistic, data-driven education approach that physically prioritizes the well-being of students in a sustainable manner.

Conflict of Interest

The authors declare no conflict of interest.

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Розроблення індексу здоров'я індонезійських учнів як інструменту моніторингу та оцінки здоров'я учнів у фізичному вихованні

Відя Харі Чах'яті[1ABCE], Аді С[1ABCD], Лух Нік Армініі[2BCD], Маде Агус Дхармаді[2BCDE], Маде Сатья Нуграха Гаутама[2CD], Рісті Нурфадхіла[3ADE], Юдік Прасетьо[3ACD], Ріфкі Ріянді Прастяван[3CDE], Махендеран Аппукутті[4BCD]

[1]Державний університет Семаранга

[2]Університет освіти Ганеша

[3]Державний університет Джок'якарті

[4]Університет технологій MARA

Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 8 табл., 34 джерела.

Мета дослідження. Мета цього дослідження полягала у розробленні Індексу здоров'я індонезійських учнів (ІЗІУ) — валідного, надійного та практичного інструменту для комплексного оцінювання стану здоров'я учнів в Індонезії, що охоплює фізичне здоров'я, психічне благополуччя, здоровий спосіб життя та емоційно-соціальне функціонування.

Матеріали та методи. Застосовано дизайн науково-дослідних та дослідно-конструкторських робіт (НДДКР) із використанням моделі ADDIE (аналіз, дизайн, розробка, впровадження, оцінка). Розробка інструменту включала огляд літератури, метод номінальних груп (МНГ) із викладачами та польові спостереження. П'ять експертів підтвердили достовірність проєкту. Інструмент пройшов випробування у двох спортивних дисциплінах і був впроваджений у п'яти шкільних навчальних закладах різних рівнів освіти. Аналіз даних проводився за допомогою коефіцієнта кореляції Пірсона для перевірки валідності, коефіцієнта альфа Кронбаха з метою оцінки надійності, міжекспертної кореляції об'єктивності та експлораторного факторного аналізу.

Результати. Інструмент показав добру внутрішню узгодженість (α = 0.88), достатню валідність (r = 0.62) та високу об'єктивність (r = 0.91). Практичність та ефективність становили відповідно 88% та 84%. Критерій Кайзера–Майєра–Олкіна (0.782) та критерій Бартлетта ($p < 0.001$) підтвердили факторизованість даних. Реалізація проєкту за участі 1,300 респондентів (вчителів та учнів) отримала високопозитивні відгуки (90–95%). Експертна валідація оцінила проєкт як «високовалідний» (середній бал = 4.41).

Висновки. Результати дослідження свідчать про наукову обґрунтованість інструменту ІЗІУ та практичну готовність до впровадження на національному рівні. Застосування цього інструменту дозволяє на ранній стадії виявляти проблеми зі здоров'ям учнів та сприяє інтеграції стратегій у сфері охорони здоров'я та освіти. Передбачається, що ІЗІУ слугуватиме стратегічним інструментом для моніторингу здоров'я, інтервенцій на основі даних та розвитку комплексних освітніх середовищ в Індонезії.

Ключові слова: індекс здоров'я, фізичне виховання, моніторинг та оцінка.

Information about the authors:

Cahyati, Widya Hary: widyahary27@mail.unnes.ac.id; https://orcid.org/0000-0003-2277-6566, Public Health Department, Universitas Negeri Semarang, Sekaran, Gn. Pati, Kota Semarang, Jawa Tengah 50229, Indonesia.

S, Adi: adis@mail.unnes.ac.id; https://orcid.org/0000-0001-8450-2005; Physical Education Department, Universitas Negeri Semarang, Sekaran, Gn. Pati, Kota Semarang, Jawa Tengah 50229, Indonesia.

Armini, Luh Nik: nik.armini@undiksha.ac.id; https://orcid.org/0000-0001-6498-932X, Universitas Pendidikan Ganesha, Jalan Udayana No. 11, Singaraja, Bali 81116, Indonesia.

Dharmadi, Made Agus: agus.dharmadi@undiksha.ac.id; https://orcid.org/0000-0002-9277-0728, Universitas Pendidikan Ganesha, Jalan Udayana No. 11, Singaraja, Bali 81116, Indonesia.

Gautama, Made Satya Nugraha: mgautama@undiksha.ac.id, https://orcid.org/0000-0001-8194-9784, Universitas Pendidikan Ganesha, Jalan Udayana No. 11, Singaraja, Bali 81116, Indonesia.

Nurfadhila, Risti: risti.n@uny.ac.id; https://orcid.org/0000-0001-5612-8896, Universitas Negeri Yogyakarta, Jl. Colombo No. 1, Karangmalang, Yogyakarta 55281, Indonesia.

Prasetyo, Yudik: yudik@uny.ac.id; https://orcid.org/0000-0003-0734-0836, Universitas Negeri Yogyakarta, Jl. Colombo No. 1, Karangmalang, Yogyakarta 55281, Indonesia.

Prastyawan, Rifky Riyandi: rifkyriyandi.prastyawan@uny.ac.id; https://orcid.org/0000-0003-1195-3299, Universitas Negeri Yogyakarta, Jl. Colombo No. 1, Karangmalang, Yogyakarta 55281, Indonesia.

Appukutty Mahenderan: mahen@uitm.edu.my; https://orcid.org/0000-0001-8114-5575, Sports Science Programme, Faculty of Sports Science and Recreation, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.

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