

**The Application of Physical Fitness Test Measurements Using a Futsal Sports Branch****Nabila Shafa Salsabilla¹, Hartati^{2✉}, Destriana³**Program Study of Physical Education and Health Sciences, Faculty of Teacher Training and Education, Sriwijaya University, Palembang, Indonesia¹²³**Article History**Received January 2024
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Abstract

The use of testing tools is expected to enhance the performance of Physical Education teachers in conducting physical tests for students and improve the overall quality of students by employing an application-based instrument designed for measuring physical test results in the sport of futsal. Teachers can address the limitations of physical test measurements conducted by Physical Education teachers in Palembang. The application can also assist Physical Education teachers in evaluating and monitoring students' progress in physical tests on a regular basis. This quantitative descriptive study conducted a fitness test on sixth-grade students at State Elementary School 184 Palembang to assess their physical condition in futsal. The key components examined were speed, agility, leg muscle explosive power, strength, and endurance. Out of the 30 students (14 male, 16 female), the average physical condition was categorized as very good (40%), good (30%), fair (9%), poor (14%), and very poor (7%). Based on the research findings, it can be concluded that the physical test measurements for sixth-grade students at State Elementary School 184 Palembang in the futsal sports category are excellent. From all the mentioned categories, it can be summarized that the overall physical condition of sixth-grade students at State Elementary School 184 falls into the category excellent.

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INTRODUCTION

Recently, futsal has become an immensely popular sport worldwide, including in Indonesia, and is a familiar term for many. People of all ages, from children to adults and even parents, enjoy playing futsal. Futsal, an indoor variation of football, is played on a smaller field compared to traditional football fields. Physical education encompasses various teaching methods for delivering diverse content, including sports games. One such team game emphasized in physical education is futsal. Futsal is well-suited for school students, as the movements involved in the game effectively stimulate children's growth. It is a team sport played by two teams, each consisting of 5 players, one of whom is the goalkeeper. Halim suggests that futsal, similar to football but played on a smaller field, is a complex sport where mastering fundamental techniques and maintaining good physical condition are crucial factors influencing students' performance (Halim in Gumantan et al., 2021).

The game of futsal demands good physical fitness, as overall fitness significantly affects one's activities. A healthy and fit body is a universal aspiration, facilitating the execution of productive activities. Given the crucial role of physical fitness in training and competitions, athletes, including students, should pay attention to their physical fitness from the outset. Coaches or physical education teachers need to assess the participants' fitness levels as it directly impacts their performance. To design lessons aimed at improving students' physical fitness, teachers and coaches require initial information about the students' fitness levels as a foundation for effective teaching.

The physical condition should be developed by all components, although prioritization is necessary to determine which component needs a larger training portion based on the sport pursued. Physical condition plays a crucial role in achieving success in a sports discipline, and training programs must be systematically planned to enable improvements in performance. The physical condition component of students holds a significant role in any training program, requiring careful and systematic planning (Harsono in Apriyanto, 2019). Hartati (2020) asserts that exercise is an effort to enhance the functional quality of the body's organs and the psyche of the individual (Hartati et al., 2020). Destriana (2022) emphasizes its importance, as it benefits the body, making one feel better and reducing mental stress, leading to an improved and happier state (Destriana et al., 2022). According to Utomo, (2018), measure-

ment is the process of gathering data or information from a specific object.

A player's physical condition also influences their mental state, and conversely, their mental state affects their physical condition, as well as their techniques and tactics. Technique, tactics, mental state, and physical condition are the most crucial elements for creating a good game, especially for a professional futsal club. According to Kharisma and Mubarok (2020), futsal athletes greatly need good physical condition, encompassing basic components such as "power, speed, strength, endurance, flexibility, agility, and coordination." All these physical condition components are utilized in playing futsal, with some being more dominant and essential. Another perspective highlights that the physical condition components to be developed by futsal players include strength, endurance, speed, flexibility, agility, power, coordination, balance, reaction, and precision.

The game of futsal requires good physical fitness because it significantly influences the activities of an individual. A healthy and fit body is everyone's aspiration to effectively engage in activities and generate productive outcomes. As living beings equipped with various bodily organs, it is crucial to maintain their proper functioning to ensure overall health. Given the pivotal role of physical fitness in training and competitions, every athlete, including students, should pay attention to physical fitness from the outset. Sports coaches or teachers need to assess the participants' physical fitness levels, as it directly impacts their performance. To design lessons aimed at improving students' physical fitness, teachers and coaches require preliminary information on the students' physical fitness levels as a foundation for effective teaching.

In delivering optimal results, sports testing and measurements providing a relevant overview of both physical abilities and basic motor skills are essential. Performance progress becomes evident through systematic physical and skill tests and measurements, with mapping from initial, mid-term, to final assessments being well-measured. The need for research on the utilization of sports measurement tests as an update for futsal tests, as proposed in a study, involves the creation of a new, more effective, and efficient product. This begins with an analysis of user needs, followed by small to large-scale trials, encompassing evaluation, summative, and confirmative stages (Mahfud & Fahrizqi, 2020).

In line with the current convenience facilitated by technological advancements in both

learning and sports, especially through Android applications, Yoda, (2020) emphasizes that Android applications are now more easily utilized by many, providing convenience in monitoring various activities, including sports activities. Sports academics have developed sports applications to simplify physical activities, including the widely favored futsal. Based on the observations conducted at the school alongside physical education teachers, it has been noted that the assessment of students' physical conditions is currently done through manual tests and measurements. This manual process of recording physical test results often consumes a significant amount of time due to limitations in access, facilities, physical test criteria, and the fact that the components of the physical tests are conducted manually. Consequently, there is a possibility of errors or mistakes during the recording of students' physical test results. Gumantan's research (2021) indicates that the android-based fitness testing tool is effective and introduces a new usage in the field of physical fitness research. Kresnapati's study (2020) further supports this, stating that the use of android-based physical fitness test components is highly suitable. Mansur, Nusufi, and Sarwita's research (2022) shows that a reliable measurement tool will produce relatively consistent values even when conducted at different times.

Examples involving other technologies can be seen in the research conducted by Hartati, et al. (2021), titled "Development of Ability Testing Instruments Based on Sensor Technology." The results indicate that the development of sensor technology-based test instruments can be used as a valid, effective, and practical testing aid. Another study conducted by Pranata, (2021) titled "Utilization of an Android-Based Athlete Physical Analysis Application Model in Volleyball Athletes aged 16-19 years." This research employs a quantitative descriptive research method.

Application-based research mitigates a fatal error in norm input on the assessment scale. Until now, there has been no measurement test for futsal sports for physical and skill items, making this study innovative in introducing a new perspective on the use of physical and skill measurement tools in futsal sports. Therefore, in this study, the researcher aims to use a physical and skill measurement tool in futsal sports based on an application, hoping it will become a new reference in physical measurement tests to reduce the risk of human error in data input and final scale assessment.

Based on previous observations and research, it was found that there is a similarity in the use of applications by previous researchers, making it easier for users. The use of testing tools is expected to enhance the performance of Physical Education teachers in conducting physical tests for students and improve the overall quality of students by employing an application-based instrument designed for measuring physical test results in the sport of futsal. Teachers can address the limitations of physical test measurements conducted by Physical Education teachers in Palembang. The application can also assist Physical Education teachers in evaluating and monitoring students' progress in physical tests on a regular basis. Based on the explanation above, this research is titled "The Use of Physical Test Measurement Using the Futsal Sport Application in Students of State Elementary School 184 Palembang."

METHODS

This research employs a quantitative descriptive research using a survey method aims to describe and present current occurrences, systematically narrate existing problem-solving methods, and provide accurate and factual insights based on data concerning specific characteristics or factors under investigation. The objective of descriptive research is systematic and factual problem-solving regarding the facts and characteristics of the population. Data collection in this study involves the use of questionnaires, observations, and interviews. A sample is a subset of the population with characteristics representing the entire population, chosen in a comprehensive manner or representative, as stated by Sugiono (2020: 81). According to Sugiyono (2014), when the population is large, and studying everything in the population is not feasible due to limitations in funds, personnel, and time, researchers can use a sample taken from that population. In this research, sample determination utilizes purposive sampling, a technique based on specific considerations. The consideration for this study is 30 sixth-grade students from State Elementary School 184 Palembang.

30-Meter Sprint Test

Participants have one opportunity to sprint over a 30-meter distance, and the fastest time recorded will be considered.

Table 1. Assessment Norms for 30-Meter Sprint for Ages 10-12 years

Man (Second)	Category	Woman (Second)
6.3	Excellent	6.7
6.4-6.9	Good	6.8-7.5
7.0-7.7	Fair	7.6-8.3
7.8-8.8	Inadequate	7.8-8.8
8.9	Very Poor	8.9

(Source: Pasaribu, 2020)

Agility T-Test

Participants in the test perform the agility T-test by moving their bodies in a multidirectional manner (forward, sideways, and backward).

Table 2. Agility Test Norms for ages 10-12 years

Man (Second)	Category	Woman (Second)
<9.4	Excellent	<10.1
9.5-10.5	Good	10.2-10.10
10.6-11.5	Fair	10.11-11.12
11.6-12.5	Inadequate	12.8-13.10
>12.6	Very Poor	>13.11

(Source: Putra, A.P., & Badri, H, 2021)

Vertical Jump

Participants perform a vertical jump test four times.

Table 3. Assessment Norms for Vertical Jump for Ages 10-12 years

Man (cm)	Category	Woman (cm)
>46	Excellent	>42
38 – 45	Good	34 – 42
31 – 37	Fair	28 – 33
24 – 30	Inadequate	21 – 27
<24	Very Poor	< 21

(Source: Abdul Narlan & Dicky Tri Juniar, 2020)

Sit-Up Test

Participants perform perfect sit-up movements, and the test result is counted over 60 seconds.

Table 4. Sit Up Test Norms Assessment For Ages 10-12 Years

Man	Category	Woman
>30	Excellent	>25
36 – 30	Good	21 – 25
20 – 25	Fair	15 – 20
17 – 19	Inadequate	9 – 14
<17	Very Poor	<9

(Source: Pasaribu, 2020)

Bleep Test

Participants in the test perform the bleep test, and the results are recorded when the participant fails or is late twice. The assessment norm for the endurance test is as follows:

Table 5. Bleep Test Norms for ages 10-12 years

Man	Category	Woman
≥ 51	Excellent	≥ 48
45-50	Good	42 – 47
40-44	Fair	36 – 41`
35-39	Inadequate	33 – 35
≤ 34	Very Poor	≤32

(Source: Nurhasan, 2013)

Data analysis technique refers to a method used to manage data in order to draw accurate conclusions. In this research, the chosen technique is quantitative descriptive data analysis. The data obtained from each measurement represents raw data from the results obtained by students.

The normality test is conducted using computer software such as SPSS, and the percentage is calculated using the formula:

$$P=N/F \times 100\%$$

Information:

P: persentase

F: frequency

N: number of cases

Source: Rizaldi Setiawan (2017)

The normality test aims to demonstrate that the sample data originates from a normally distributed population. In this study, the Shapiro-Wilk test is employed for normality testing, with the following criteria:

- Significance level (∂): 0.05
- If the p-value $> \partial$, then the sample is derived from a normally distributed population.
- If the p-value $< \partial$, then the sample does not originate from a normally distributed population.

RESULTS AND DISCUSSION

This research was conducted at State Elementary School 184 Palembang, South Sumatra, on November 25, 2023, from 08:00 to 12:00 WIB. State Elementary School 184 Palembang is located at Jl. Taqwa Mata Merah No.9, Sei Selincah, Kalidoni Subdistrict, Palembang City, South Sumatra 30161. The school has an "A" accreditation. The collection of physical test data for futsal sports was carried out in collaboration with the Physical Education and Health (PJOK) teacher at State Elementary School 184 Palembang, Mr. Rizki Muhendry, S.Pd., who was appointed by the KKG chairman to oversee the data collection process in this study. The data collected in

this research align with the components of futsal sports testing, including speed, agility, lower limb muscle power, strength, and endurance. The test instruments used include a 30-meter sprint for speed, Agility T-Test for agility, vertical jump for lower limb muscle power, sit-ups for strength, and the bleep test for endurance.

The data analysis was obtained through the calculation of each norm category and data from each component of the physical fitness test. This enables the determination of the average physical condition of sixth-grade students at State Elementary School 184 Palembang in the futsal sports branch. For a clearer understanding, please refer to the following **Table 6**.

Table 6. Analysis Data Results

Indicator	Category				
	Excel- lent	Good	Fair	Inad- equat	Very Poor
Speed	3%	4%	3%	0%	90%
Agility	100%	0%	0%	0%	0%
Explosive Power	93%	7%	0%	0%	0%
Strength	0%	0%	7%	53%	40%
Endurance	3%	23%	38%	16%	20%
Average	40%	7%	10%	14%	30%

Based on **Table 6** above, the data analysis results indicate the physical condition of sixth-grade students at State Elementary School 184 Palembang in the futsal sport category. The breakdown includes excellent category at 40%, good category at 7%, fair category at 9%, poor category at 14%, and very poor category at 30%. Considering all these categories, it can be concluded that the average physical condition of sixth-grade students at State Elementary School 184 Palembang falls into the excellent category with a percentage of 40%.

Based on the data from the speed measurement conducted on students of State Elementary School 184 Palembang using the 30-meter running test, the research results indicate that the speed level in futsal for these students is on average very poor (90%).

The ability to coordinate the entire body system to resist load, distance, and time, resulting in mechanical work (H.B. & Wahyuri, 2019), is crucial in futsal movements such as jumping, sprinting, and changing direction quickly during a match (Lutfillah, 2021). Players with good speed

can move quickly and freely to find openings to build attacks. Speed is a vital component in developing muscle explosive power (Iyakrus, 2019).

Speed is a crucial component in futsal, defined as the body's ability to coordinate all systems to resist load, distance, and time, producing body movements in the shortest possible time (Cahyo B et al., 2012). The lack of speed in students from State Elementary School 184 Palembang may be influenced by insufficient sprint training and a focus solely on technique and gameplay. Furthermore, based on the research results on agility using the Agility T-Test instrument according to Harsuki's theory (2017), the agility of students from State Elementary School 184 Palembang falls into the excellent category with a percentage of 100%. Agility, defined as an athlete's ability to change movements in the shortest time possible, is essential in futsal, aiding in ball control during stationary and dribbling positions.

Agility T-Test serves to enhance students' agility in futsal. According to Hartati, Destriana, et al. (2022), arm muscle strength is predominantly used by goalkeepers. Lack of arm muscle strength may be due to unpreparedness to handle the load during matches. This emphasizes that agility is a crucial consideration in designing training programs, as improving each player's physical agility component will enhance their ability to change directions quickly. In futsal, where situations and conditions constantly change over 40 minutes, players need to adapt rapidly to opponent interference, field conditions, and other variables.

Based on the research results of the leg muscle explosive power test using the vertical jump instrument, in accordance with Sovensi et al. (2019) and Harsuki's (2017) technical explanation of the vertical jump test, the findings show that the leg muscle explosive power of students from State Elementary School 184 Palembang averages at an excellent level with a percentage of 93%. Ahmad Richard Victorian, (2018) emphasizes that Power, also known as explosive strength, is a crucial ability in sports, allowing muscles to rapidly direct force within a short time to provide optimal momentum to the body or object in an explosive movement, achieving the desired goal. The lack of abdominal muscle strength is attributed to insufficient resistance training.

Explosive power, or power, is the ability to rapidly direct force to provide optimal momentum to the body or object in an explosive movement, achieving the desired goal (H.B. & Wahyuri, 2019). In futsal, a game adapted from soccer, leg muscles play a vital role, requiring athletes to

enhance leg muscle strength and power to improve step frequency, dribbling speed, passing and shooting accuracy (Frayogha, 2019), heading, and engaging in body contact with opponents. Improving this component is crucial for strong and fast performance in futsal. The research results on abdominal muscle strength using the sit-up test for 30 seconds indicate that the abdominal muscle strength of students from State Elementary School 184 Palembang averages in the less category with a percentage of 53%. Abdominal muscle strength functions to maintain an athletic appearance. Adityatama (2017) notes that abdominal muscle strength influences an individual's performance in both skill movement exercises and overall appearance. Therefore, after this research, players and coaches should reevaluate to maximize abdominal muscle strength in the future.

The abdomen, or the body's core, often overlooked and undertrained, serves as the central source of energy (Ardiansyah, 2020). Abdominal muscles, as part of the skeletal system, function as stabilizers affecting every movement in the spine (Rohman, 2019). This body section acts as a balancing connector for all movements performed. In futsal, movements like kicking require support from abdominal muscle strength to generate powerful shots. Additionally, power determines the outcome of strikes, throws, jumps, running speed, and more (H.B. & Wahyuri, 2019).

Based on the data from the endurance measurement of students at State Elementary School 184 Palembang using the bleep test, the results indicate an average endurance at a fair level with a percentage of 37%. Endurance is crucial during a match, lasting from the beginning to the end; a team with insufficient endurance may struggle against a team with better endurance. Cardiovascular endurance is the ability of the heart, blood vessels, and lungs to deliver a sufficient amount of nutrients and oxygen to the body's cells to meet physical needs for an extended period. Low cardiovascular endurance causes players to quickly experience fatigue, while high endurance reduces the likelihood of fatigue (Hartanto & Hariyoko, 2020).

The unlimited player substitutions in futsal necessitate rapid recovery. The magnitude of aerobic capacity influences the ability to handle workload and hasten recovery afterward (Indrayana & Yuliawan, 2019). Therefore, students are strongly encouraged to improve their endurance to play without feeling significant fatigue.

According to Warni et al. (2017), endurance is one of several physical elements that need

to be trained and developed as a crucial factor supporting technical and tactical playing abilities. The lack of endurance in students from State Elementary School 184 Palembang may stem from insufficient exercises that enhance endurance, such as jogging and others.

CONCLUSION

Based on the research findings, it can be concluded that the physical test measurements for sixth-grade students at State Elementary School 184 Palembang in the futsal sports category are excellent with an average of 40%, good with 7%, fair with 9%, poor with 14%, and very poor with 30%. From all the mentioned categories, it can be summarized that the overall physical condition of sixth-grade students at State Elementary School 184 falls into the excellent category with a percentage of 40%. The implication of this research is that teachers, coaches, and sports practitioners can utilize physical test measurements through the application to assess and select athletes for futsal competitions, ensuring that the selected players genuinely possess good-quality attributes.

REFERENCES

- Abdul Narlan, & D. T. J. (2020). Pengukuran Dan Evaluasi Olahraga (Prosedur Pelaksanaan Tes Dan Pengukuran). https://www.google.co.id/books/edition/Pengukuran_Dan_Evaluasi_Olahraga_Prosedu/27MHEAAAQBAJ?hl=en&gbpv=1&dq=baik+kurang+baik+sedang+v+ertikal+jump&pg=PA89&printsec=frontcover
- Adityatama, F. (2017). Hubungan Power Otot Tungkai, Koordinasi Mata Kaki Dan Kekuatan Otot Perut Dengan Ketepatan Menembak Bola. *JUARA : Jurnal Olahraga*, 2(2), 82. <https://doi.org/10.33222/juara.v2i2.37>
- Ahmad Richard Victorian, H. (2018). Pengaruh latihan barrier hops terhadap power otot tungkai atlet taekwondo putra. *Altius : Jurnal Ilmu Olahraga Dan Kesehatan*, 20(2), 123–126.
- Apriyanto, A. (2019). Profil Kondisi Fisik Pemain Ekstrakurikuler Futsal Putra Smk Negeri Sekota Semarang Tahun 2019.
- Ardiansyah, M. (2020). Hubungan Kekuatan Otot Tungkai dan Otot Perut Terhadap Akurasi Shooting Pada Ekstrakurikuler Futsal. *Jendela Olahraga*, 5(2), 160–167.
- Cahyo B, J., Waluyo, M., & Rahayu, S. (2012). Pengaruh Latihan Lompat Kijang terhadap Kecepatan Lari. *Journal of Sport Sciences and Fitness*, 1(1), 56–61.
- Destriana, D., Elrosa, D., & Syamsuramel, S. (2022). Kebugaran Jasmani Dan Hasil Belajar Siswa. *Jambura Health and Sport Journal*, 4(2), 96–

77. <https://doi.org/10.37311/jhsj.v4i2.14490>
- Frayogha, J. (2019). Pengaruh Latihan Daya Ledak Otot Tungkai Terhadap Akurasi Shooting Pemain Futsal. *Jurnal Patriot*, 1(3), 919–931.
- Gumantan, A., Mahfud, I., & Yuliandra, R. (2021). Pengembangan Alat Ukur Tes Fisik dan Keterampilan Cabang Olahraga Futsal berbasis Dekstop Program. *JOSSAE (Journal of Sport Science and Education)*, 146–155.
- H.B., B., & Wahyuri, A. S. (2019). *Pembentukan Kondisi Fisik*(1st ed.). Jakarta: Rajawali Pers.
- Harsuki. (2017). *Pengantar Manajemen Olahraga*. Jakarta: PT Raja Grafindo Persada.
- Hartanto, S., & Hariyoko, H. (2020). Kontribusi Indeks Massa Tubuh dan Daya Tahan Kardiovaskular dengan Keterampilan Dasar Futsal Sekolah Menengah Atas. *Sport Science and Health*, 2(5), 279–284.
- Hartati, H., Solahuddin, S., & Irawan, A. (2020). Latihan Kelincahan Dan Keseimbangan Untuk Meningkatkan Hasil Dribble Sepak Bola. *Altius : Jurnal Ilmu Olahraga Dan Kesehatan*, 1(9), 38–46. <https://doi.org/10.36706/altius.v9i1.11557>
- Hartati, at al. (2021). Development of Ability Testing Instruments Based on Sensor Technology. *Journal of Physical Education, Sport, Health and Recreation*, 3(10), 140–144.
- Indrayana, B., & Yuliawan, E. (2019). Penyuluhan pentingnya peningkatan vo2max guna meningkatkan kondisi fisik pemain sepakbola fortuna fc kecamatan rantau rasau. *Jurnal Ilmiah Sport Coaching and Education*, 3(1), 41–50.
- Iyakrus, I. (2019). Pendidikan Jasmani, Olahraga Dan Prestasi. *Altius: Jurnal Ilmu Olahraga Dan Kesehatan*, 7(2), 168–173. <https://doi.org/10.36706/altius.v7i2.8110>
- Kharisma, Y., & Mubarak, M. Z. (2020). Analisis Tingkat Daya Tahan Aerobik Pada Atlet Futsal Putri AFKAB Indramayu. *Physical Activity Journal (PAJU)*, 1(2), 125–132.
- Kresnapati, P., Setyawan, D. A., & Setyawan, S. (2020). Pengembangan Komponen Tes Kondisi Fisik Berbasis Android. *Physical Activity Journal (PAJU)*, 2(1), 42–55.
- Lutfillah, M. A. N., & Wibowo, S. (2021). Tingkat kebugaran jasmani tim futsal putri: literatur review. *Jurnal Pendidikan Olahraga Dan Kesehatan Volume*, 9(01), 151–159.
- Mahfud, I., & Fahrizqi, E. B. (2020). Pengembangan Model Latihan Keterampilan Motorik Melalui Olahraga Tradisional Untuk Siswa Sekolah Dasar. *Sport Science and Education Journal*, 1(1), 31–37. <https://doi.org/10.33365/v1i1.622>
- Nurhasan. (2013). *Tes dan Pengukuran Keolahragaan*. Bandung: FPOK UPI.
- Pasaribu, A. M. N. (2020). *Tes dan pengukuran olahraga*. Banten: Yayasan Pendidikan Dan Sosial Indonesia Maju (YPSIM).
- Pranata, D. (2021). Pengembangan model aplikasi analisis fisik atlet berbasis android pada atlet cabang olahraga bola voli usia 16-19 tahun. Januari, 150. http://library.fik.uny.ac.id/repository/koleksi_baru/2-Februari-2021.pdf
- Putra, A. P., & Badri, H. (2021). Analisis Kondisi Fisik Atlet Futsal Cfbk Academy Btusingkar Kabupaten Tanah Datar. *Jurnal Stamina*, 4(3), 103–112.
- Rizaldi Setiawan, M. (2017). Profil Kondisi Fisik Atlet Lari Sprint Ronggolawe Atletik Club Kabupaten Tuban. *Jurnal Prestasi Olahraga*, 2(1), 1–6.
- Rohman, U. (2019). Kontribusi Kekuatan Otot Perut dan Kecepatan terhadap Kemampuan Heading Bola pada Pemain Sepakbola. *Jurnal Kevelatihan Olahraga*, 11(1), 36–42. <https://doi.org/10.17509/jko-upi.v11i1.1682>
- Sovens, E., Supriyadi, M., & Suhy, M. (2019). Kondisi Fisik Pemain Bola Voli Klub di Kota Lubuklinggau. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga (JPJO)*, 2(2), 13–25. <https://doi.org/10.31539/jpjo.v2i2.697>
- Sugiyono. (2020). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta., 81.
- Sugiyono, M. (2014). *Educational Research Methods Quantitative, Qualitative Approach and R&D*. Bandung: Alfabeta.
- Suhairi, M., Effendi, A. R., & Rajidin, R. (2022). Pengembangan Model Pembelajaran Senam Lantai Berbasis Multimedia. *Jurnal Penjaskesrek*, 9(2), 25–33.
- Utomo, A. A. B. (2018). Peranan tes dan pengukuran olahraga sebagai sport industry dalam bidang jasa evaluasi kondisi fisik atlet. , 1(1), 51–59. *Prosiding SNIKU (Seminar Nasional Ilmu Keolahragaan UNIPMA)*, 1(1), 51–59. <http://prosiding.unipma.ac.id/index.php/snik/index>
- Warni, H., Arifin, R., & Bastian, R. A. (2017). Pengaruh Latihan Daya Tahan (Endurance) Terhadap Peningkatan Vo2Max Pemain Sepakbola. *Multilateral Jurnal Pendidikan Jasmani Dan Olahraga*, 16(2), 121–126. <https://doi.org/10.20527/multilateral.v16i2.4248>
- Yoda, I. K. (2020). Peran Olahraga Dalam Membangun Sdm Unggul Di Era Revolusi Industri 4.0. *Jurnal Ika*, 18(1), 1–22.