International Journal of Human Movement and Sports Sciences 10(4): 862-869, 2022 http://www.hrpub.org
DOI: 10.13189/saj.2022.100428

# The Influence of Traditional Sports Practice to Improve Agility and Speed Geri Mawashi Kenshi

**Muhamad Fajar Ansharudin[1,*], Sulistiyono[1], Carles Nyoman Wali[1], Komarudin[1], Guntur[1], Gunathevan Elumala[2], Martono[1], Awan Hariono[1]**

[1]Sport Science Study Program, Faculty of Sports Science, Yogyakarta State University, Indonesia
[2]Faculty of Sport Science and Coaching, Universiti Pendidikan Sultan Idris, Malaysia

*Received June 7, 2022; Revised August 23, 2022; Accepted August 30, 2022*

***Cite This Paper in the Following Citation Styles***

***(a):*** *[1] Muhamad Fajar Ansharudin, Sulistiyono, Carles Nyoman Wali, Komarudin, Guntur, Gunathevan Elumala, Martono, Awan Hariono , "The Influence of Traditional Sports Practice to Improve Agility and Speed Geri Mawashi Kenshi," International Journal of Human Movement and Sports Sciences, Vol. 10, No. 4, pp. 862 - 869, 2022. DOI: 10.13189/saj.2022.100428.*

***(b):*** *Muhamad Fajar Ansharudin, Sulistiyono, Carles Nyoman Wali, Komarudin, Guntur, Gunathevan Elumala, Martono, Awan Hariono (2022). The Influence of Traditional Sports Practice to Improve Agility and Speed Geri Mawashi Kenshi. International Journal of Human Movement and Sports Sciences, 10(4), 862 - 869. DOI: 10.13189/saj.2022.100428.*



**Abstract** The game of gobak sodor is a traditional Indonesian sport that has been preserved to this day. The purpose of this study was to determine the effect of the traditional sport of gobak sodor on the speed and agility of mawashi kenshi in Shorinji Kempo Martial Arts. The method in this research is Quasi Experiment, with One Group Pre Test and Post Test Design. The population in the study amounted to 30 kenshi, then 30 kenshi were all used as subjects in this study. The instrument used in this research is a test instrument, pre test and post test. The data analysis technique of this research is t-test with a significance level of 5%. The results of this study indicate that the traditional sport of gobak sodor has an effect on increasing the speed and agility of kenshi when performing the mawashi geri technique in Shorinji Kempo Martial Arts. This is in accordance with the results of the post test t test with the highest score of 39.00% on the speed aspect of doing mawashi geri and the post test result with the highest score of 28.00% on the agility aspect. The limitation in this research is that the basic technique is single, and it does not use all the elements of the biomtor and the research subject. The researcher hopes that other researchers can develop this research by involving basic techniques in martial arts that are not singular and use more complete biomotor elements.

**Keywords** Gobak Sodor, Speed, Agility, Mawashi Geri, Kenshi

## 1. Introduction

The Indonesian government has recently declared traditional sports in various regions to restore the existence of traditional sports themselves [1], [2]. Indonesian Government socialized traditional sports to the Indonesian people in various forms of programs through the Ministry of Youth and Sports of the Republic of Indonesia [3]. Programs that aredistributed related to traditional sports do not only apply to teenagers and adults, but older people can also experience traditional sports [4]. In commemorating Indonesia's Independence Day, traditional sports have always become one of the activities that always adorn every province in Indonesia to the underdeveloped areas [5]. The traditional sports offered are varied and unique, for instance, *tarik tambang, gobak sodor, lari karung, panjat pinang, makan kerupuk* and *balap kelereng.* These traditional sports have become very dominant choices in every event in commemorating Indonesia's Independence Day [6], [7].

Traditional sports are inseparable from three pillars in the world of sports, namely: achievement sports,

educational sports, and recreational sports [8]. Traditional sports cannot be separated from recreational sports; however, it is possible for traditional sports to be used in achievement sports and educational sports [9]. This case is usually applied in various training models and learning models derived from traditional sports. Traditional sports have various potentials, yet the problem nowadays is the degradation in the recent generation's interest for traditional games due to the emergence of various online games that pamper the younger generation to play with no urge to spend a lot of energy[10].

Traditional sports are a wealth of its own for a country, for example the State of Indonesia with thousands of wealth of traditional sports such as jumping rope, sack running, picking marbles, cat and mouse and so on including the game of hadang/gobak sodor which is a favorite among children, teenagers and even parents [11], [12]. Generally, traditional sports come from traditional games and are the certain culture characteristic in a particular area [13], [14]. Sport has always been an identity for a community and has a strategic role in improving the quality of life of the community. Traditional sports genuinely hold the most important role of preserving the cultural wealth of a region or country. Traditional sports are the perfect medium to practice various techniques possessed by various sports including martial arts such as strength, speed, endurance, agility,and reaction ability [15]. Thus, traditional sports is a good medium for training various athletes' abilities about basic and advanced techniques in various sports, including the martial arts shorinji kempo [16].

Shorinji Kempo is a martial art originating from Japan [17]. This martial art is identical to Karate, Judo and Jijustu in which these martial arts attack the dominant opponent or enemy using bare hands [18]. Shorinji kempo martial arts has a literal meaning, namely: sho means forest, rin means bamboo, ji means temple, ken means rules and kempo means the way of life of a kenshi [19]. Shorinji kempo martial arts can not be separated from the Boxer war 1900-1901, a resistance carried out by the community in the 20th century under the orders of Queen Tzu Hsi who wanted her country to be free from invaders. Indeed, Shorinji Kempo was created by Doshin So in 1947 [20].

Shorinji kempo has four basic techniques, namely Geri (kick), Zuki (punch), Uke (block) and Tai sabaki (body movement) [21]. These four basic techniques resulted from two main basic techniques, namely Goho and Juho, Goho means hard and Juho means soft or smooth [22]. The techniques included in Goho are kicks and punches while the techniques included in Juho are parry and dodge [23]. All techniques in shorinji kempo have their respective functions and purposes, but it is not allowed for a kenshi to attack before being attacked by the opponent. This is inseparable fromthe philosophy of Shorinji Kempo martial arts itself that love without strength is weakness, and strength without compassion is injustice [24].

One of the basic techniques that are often to be used in official matches, especially the randori category or free fights, is the mawashi geri kick technique or spinning kick [25]. This kick is used in an official match because the main reason is to hit the target to score a kenshi or in Japanese the term Wazari [26]. The mawashi geri kick requires good speed and agility when a kenshi attacks the opponent. If these two components are not good, then a kenshi will experience a counterattack from an opponent that endangers him [27].

Speed and agility are biomotor components that are owned by everyone, both athletes and non-athletes [28]. The element of speed is one of the important elements in getting optimal kick results. Speed is the ability of a kenshi to perform a skill in a short time. The element of speed is also influenced by several factors, namely strength, flexibility, and reaction time [29], [30]. Agility is one of the physical elements that is always related to the speed and balance of a kenshi. Agility is universally defined as the ability of a kenshi to change direction effectively with maximum speed without losing balance.

Speed and agility are factors that play an important role for a kenshi to do mawashi geri, it is necessary to practice repeatedly using the right media to improve the quality of the kick [31], [32]. The efforts of the trainers continue to innovate and provide a good training program for the kenshi, but the kenshi experiences mental stress and loses the enthusiasm to practice [33]. This has an impact on the quality of the kenshi kick, the speed and agility of the mawashi geri kick of a kenshi being not good [34]. Then the researchers gave suggestions to train speed and agility based on the traditional sport of Gobak Sodor [35].

Hadang or gobak sodor is one of the traditional games that are very popular with children and teenagers throughout Indonesia [36]. This game aims to prevent the opponent's players from reaching the finish line, and if it happens, the opposing team will gain a score [37]. Hadang is a traditional team sport, each team has 3-5 players, but the number of players can increase according to the agreement of the two teams [38]. This game can be played in an open field or a closed field with a size of 6x4 meters then divided into 6 rooms or sections, each boundary line is given a bright color for example using white chalk or white paint [39]. Both teams will be drawn to determine which team has the right to play first while the other team will serve as guards [40].

Game with blockade strategy is an excellent medium to train a kenshi's speed and agility and other elements, namely training teamwork, increasing muscle strength and agility. Thus, this game has complete elements that can be used to train the speed of the mawashi geri kick and the agility of a kenshi [41]. However, it is rare for trainers to use traditional game media to improve various kenshi abilities regarding techniques in martial arts, especially the mawashi geri kick technique in shorinji kempo martial arts.

According to various literatures that the researcher

found out about the game with blockade strategy, yet previous researchers discussed this game more in terms of the material in school needed by a sports teacher [42]. This research was investigated by [43] about improving gross motor skills of early childhood through the traditional game Gobak Sodor. The second researcher, [44], emphasized about Optimizing neuroscience learning games based on gobak sodor as character education for intellectual disabilities. These two researchers describe the game of limited obstacles in the world of education. Thus, research on the game of blockade does not only focus on the world of education or the world of formal education, yet it can be used in extracurricular activities, namely shorinji kempo martial arts training.

The purpose of this study was to determine whether there is an effect of traditional games on improving the speed and agility of the mawashi geri kick technique of a kenshi. The purpose of this study focuses on increasing the speed and agility factor of the Mahawashi geri kick of a kenshi, this kick technique is trained through traditional Indonesian games such as the Gobak Sodor/Hadang game. The update in this study is that researchers use the game of hadang as a medium to increase the speed and agility of the mawashi geri kick of a kenshi in the world of shorinji kempo martial arts. The benefits in this study are more focused on the world of coaching, where the coach must familiarize an athlete to train various skills through simple but big impact media. This research can still be developed due to its limitations, but is expected to be useful as a reference for further research.

## 2. Method

This study uses a quasi-experiment with one group pretest-posttest design [45]. The population in this study is 30 kenshi players. This study uses only one group of samples that are inseparable, in the sense that the initial measurements are taken before the subjects are given treatment, then given treatment and then take measurements. The treatment referred to in this study was in the form of a traditional game of gobak sodor to increase the speed and agility of mawashi geri. The treatment in this study was carried out for 16 meetings. With a meeting frequency of 3 times a week Monday, Wednesday and Friday with practice time for 1 hour 20 minutes every afternoon at 16.00 WIB-17.20 WIB (WIB means western Indonesian time). It was noted that the duration of this study was 1 month. The pre-experiment was carried out in the first week with three meetings then three weeks were used in the post-test process. In this post-test process, the researchers made the process of measuring kenshi's ability when doing mawashi kicks with maximum speed and agility during the test.

The design of the load in this study uses the overall body weight and then the formation of the size of the hadang or gobak sodor playing field with the official size of 9x4 M divided by 4 rooms. Medium intensity 60-75%, and number of repetitions three times. The unit of measurement in this study is a meter using an LCD display tool to see the speed and agility of the kenshi when doing the mawashi kick. The results obtained in this study were compared and then the results were analyzed using SPSS version 24, t-test Paired Sample Test. This research was conducted at the Balong Dojo, Sleman, DIY.

## 3. Result

This study aims to determine whether the traditional sport-based exercise of gobak sodor influences the agility and speed of kicking mawashi geri kenshi shorinji kempo martial arts. The table below is an overview and description of the results of the initial and final research on Kenshi's ability to perform mawashi geri kicks.

Based on table 1, the speed values in the pretest and posttest are obtained with the smallest value being 14.00 and the largest value being 25.00, while the smallest posttest value is 27.00 and the largest value is 39.00. Of the total number of kenshi, 30 kenshi, 10 kenshi, 17 years old, 8 people 15 years old, 6 people 18 years old, 6 people 19 people. The height of the kenshi 11 people with a height of 150 cm, 7 people 155 cm, 3 people 160 cm, 4 people 163 cm, 2 people 166 cm and 2 people 168 cm. The weight of the kenshi is more dominant in the body weight that is in line with the age of each kenshi. Researchers did not mention in detail because they did not have time to measure the athlete's weight.

**Table 1.** Description of statistical pretest and post-test of Mawashi Geri speed

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Pre-Test | 30 | 14.00/46,66% | 25.00/83,33% | 19.9667/6,65% | 2.90639/9,68% |
| Post Test | 30 | 27.00/90% | 39.00/130% | 31.8667/106,22% | 3.04827/10,16% |
| Valid N (listwise) | 30 | | | | |

**Table 2.** Description of statistical pre-test and post-test Mawashi Geri agility test

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Pre-Test | 30 | 7.00/23,33% | 16.00/53,33% | 10.8667/36,22% | 2.20866/7,36% |
| Post Test | 30 | 13.00/43,33% | 28.00/93,33% | 18.2667/60,88% | 3.68532/12,28% |
| Valid N (listwise) | 30 | | | | |

Based on table 2 above, the agility value in the pre-test and post-test is obtained with the smallest value being 7.00 and the largest value being 16.00, while the smallest posttest value is 13.00 and the largest value is 28.00.

**Table 3.** Summary of Normality test results

| Group | P | Sig | Remarks |
|---|---|---|---|
| Pre-test in Speed | 0,029/0,09% | 0,05,1,66% | Normal |
| Post-test in Speed | 0,150/0,5% | 0,05,1,66% | Normal |
| Pre-test in Agile | 0,21/0,7% | 0,05,1,66% | Normal |
| Post-test in Agile | 0,100/0,33% | 0,05,1,66% | Normal |

Based on the results in table 3 above, it is known that the data in this study contributed normally, this is in accordance with the data test using the SPSS 24 application program. Thus, all p (Sig.) > 0.05, then the pre-test and post-test data in this study is normal.

**Table 4.** Summary of Homogenity test

| Group | df1 | df2. | Sig | Remarks |
|---|---|---|---|---|
| Pre-test in Speed | 1 | 28 | 0,328/1,09% | Homogen |
| Post-test in Speed | 1 | 28 | 0,670/2,23% | Homogen |
| Pre-test in Agile | 1 | 28 | 0,221/0,73% | Homogen |
| Post-test in Agile | 1 | 28 | 0,340/1,13% | Homogen |

The test in this study is continued by knowing the level of homogeneity of the sample variables taken from the population by using the applicable rules in calculating the homogeneity of a data, if p> 0.05, then the data is declared homogeneous, whereas if p < 0.05, then the data is declared not homogeneous. Based on the results of the pre-test and post-test table 4 above, the overall data in this study is declared homogeneous.

**Table 5.** Speed Pre-test and Post-test t-test results

| Result of Pre-test and Post-test in Speed | Score |
|---|---|
| Mean | -9.86667/-32,8889% |
| Std. Deviation | 3.14844/10,4948% |
| Lower | -11.04231/-36,8077% |
| Upper | -8.69102/-28,9700% |
| thitung | -17.165/-57,2166% |
| Sig. (2-tailed) | 0, 000 |

Before this research was conducted, the researcher had a hypothesis about this research that "there is a significant effect of the traditional game of gobak sodor on the kick speed of a kenshi mawashi geri in Shorinji Kempo Martial Arts". Based on the results of data processing and data analysis using SPSS version 24, the t-test results showed a significant increase in the speed of the mawashi geri kick. The table presented above shows that the value of Sig (2-tailed) is 0.000 < 0.005, then H0 is rejected, and Ha is accepted.

**Table 6.** Results of t-test Pretest and Posttest

| Results of Pretest and Posttest Agility | Score |
|---|---|
| Mean | -7.30000/-24,333% |
| Std. Deviation | 2.58844/8,628% |
| Lower | -8.26654/-27,555% |
| Upper | -6.33346/-21,111% |
| thitung | -15.447/-51,49 |
| Sig. (2-tailed) | 0, 000 |

Based on the results of the agility pretest and posttest analysis in table 6 above, based on the hypothesis in this study, there is a significant effect of the traditional game of gobak sodor on the agility of the kenshi mawashi geri kick in the pencak silat Shorinji Kempo. Based on the results of data analysis using SPSS 24, it was declared significant with a Sig (2-tailed) value of 0.000 < 0.005. As a result, the hypothesis in this study was accepted.

# 4. Discussion

Based on the analysis of the normality test, homogeneity test and t test, it can be concluded that the traditional game of gobak sodor has a good effect on speed and agility training in mawashi geri kenshi kicks. This is inseparable from the traditional games that researchers use as a basis for training the speed and agility of the mawashi geri kick, because the gobak sodor game is one of the traditional games that are very popular with children. The application of Gobak Sodor game-based training for children is one of the advantages for a coach because this game is always related to speed and agility. Researchers applied the training method thanks to collaboration with senior trainers and senior researchers in the field of martial arts, especially

the martial art of shorinji kempo. The researcher is an academic and sports practitioner currently pursuing a Doctoral Degree in Sports Science at one of the leading universities in Indonesia. So that the scientific depth of this research definitely follows the rules of research in scientific works and what is certain is that the traditional Indonesian game-based training program in this article can hopefully be used as often as possible in the training process, especially the speed and agility of kicks, punches and parries.

Gobak Sodor is one of the traditional games originating from Indonesia, especially in the Special Region of Yogyakarta. However, this game is also found in other areas in Indonesia with different names, but those who have a fairly complete historical record about this game come from DIY [47]. This is evidenced by a book written by WJS Poerwadarminto in 1939 which examines quite deeply about the game of gobak sodor. The game of gobak sodor is the movement of a person freely by bringing along a spear [48]. The game gobak sodor consists of two words, gobak means to move freely and sodor means weapon or spear [49]. This game cannot be separated from the game of thrust of the soldiers at that time. The sodoran game in the colonial era was used as a medium to train the skills of the soldiers beforegoing to war, then the sodoran game was given the name gobak sodor.

The gobak sodor game is played on a square-shaped field, then the field boundary is given white chalk or paint. This game is included in a team game, each team has 3-6 players, as for the guard team and the playing team. The playing team is replaced by the guard team if one of the playing team players gets a touch from the defending team [50].The gobak sodor game does not only have elements of speed and agility, but there are also elements of endurance, and values in life such as social values, honesty, sportsmanship, and leadership values [51]. Games are often used as a learning medium by a teacher as a learning modification medium.

Speed is one of the main biomotor components in every sport, both team sports and individual sports [52]. Speed is one of the benchmarks to determine the level of fitness of an athlete and increase the muscle mass of a good athlete [53]. Some sports that are very dominant using this speed component are athletics, football, martial arts, such as Pencak Silat, Karate, Kempo and Taekwondo. Generally, every sport activity consistently uses maximum intensity in a short time with the main energy source being anaerobic. Increasing the speed of a kenshi in doing mawashi geri kicks is one very important element to win a match and prevent the opponent from counterattacking [54]. The ability of a kenshito perform mawashi geri kicks with good speed will give victory in the art of free fighting or randori.

The agility component cannot be separated from speed [55]. However, agility comes from the components of motor freshness, while speed is one of the elements of the physical. The agility component is very important for an athlete to perform various physical activities that require the speed of changing body position. This is very similar to themawashi geri technique, when a kenshi kicks a mawashi kick, the weight is on the other leg that is not kicking, so it requires good agility to overcome this problem. Mawashi geri is one of Shorinji Kempo's martial arts techniques, and this technique is always used in official matches, especially in the randori category.

As for this study, it has limitations, namely the research subject, the research location is single, and the research duration is quite short. The author hopes that this research can be continued by other researchers with different sports, both in team sports or individual sports, especially martial arts branches such as Karate, Silat, Judo, Taewondo and so on. Another difference from this research is that further researchers will not only examine the physical components of athletes but in further research will collaborate on the physical components and values in the traditional game of gobak sodor.

## 5. Conclusions

The results of this study can be concluded that the game of gobak sodor, has a significant effect on increasing the speed and agility of the mawashi geri kick of a kenshi martial arts shorinji kempo. Based on these results, the hypothesis in this study is accepted, this research is one proof that the game of gobak sodor has a significant influence on the agility and speed of a kenshi in performing the mawashi geri technique. The results of this study can also be used as a benchmark for martial arts coaches, especially Shorinji Kempo, not to ignore the richness of Indonesian culture as a medium to improve the various abilities of an athlete/kenshi. Thus, training based on the game of gobak sodor has a significant effect on improving the kick ability of a kenshi mawashi geri. The research was conducted in a single place, the great hope of the researcher is that this research is used as a reference for future researchers to conduct research on a wide scale and can conduct research on the game of gobak from other aspects.

## Acknowledgements

The researchers would like to express their deepest gratitude to Carles Nyoman Wali with ideas on training programs based on Indonesian wealth, especially traditional games, the researchers also thank the trainers and the kenshi martial arts shorinji kempo dojo Balong, Yogyakarta who were used as subjects in the research. this. The researcher would also like to thank my thesis supervisor and friends who helped the researcher in the initial research process and until the end of this research.

# REFERENCES


[1] D. O. Mudzakir, "Pengaruh Permainan Olahraga Tradisional Terhadap Motivasi Dalam Pembelajaran Penjas Di Sekolah Dasar," *J. MaenpoJurnal Pendidik. Jasm. Kesehat. dan rekreasi*, vol. 9, no. 1, pp. 45-49, 2020, https://doi.org/10.35194/jm.v10i1.941

[2] A. A. Hakim, "Survei Perkembangan Olahraga Tradisional Di Kabupaten Tuban," *J. Kesehat. Olahraga*, vol. 8, no. 1, pp. 33-38, 2019,https://jurnalmahasiswa.unesa.ac.id/index.php/7/article/view/31051

[3] F. Farizi, F. Kurniawan, I. Z. Achmad, and D. A. Izzuddin, "Tingkat Pengetahuan Siswa Dalam Permainan Olahraga Tradisional Di Ekstrakurikuler Permainan Olahraga Tradisional Ma Nihayatul Amal Purwasari," *J. Olahraga Kebugaran dan Rehabil*, vol. 1, no. 1, pp. 68-71, 2021, doi: 10.35706/joker.v1i1.4466.

[4] H. Hadjarati and A. I. Haryanto, "Identifikasi Permainan Dan Olahraga Tradisional Kabupaten Gorontalo," *J. Ilmu Keolahragaan Undiksha*, vol. 8, no. 3, pp. 127-135, 2021, doi: 10.23887/jiku.v8i3.30709.

[5] R. Nuriman, N. Kusmaedi, and S. Yanto, "Pengaruh Permainan Olahraga Tradisional Bebentengan terhadap Kemampuan Kelincahan Anak Usia 8-9 Tahun," *J. Terap. Ilmu Keolahragaan*, vol. 1, no. 1, pp. 20-34, 2016, doi: 10.17509/jtikor.v1i1.1550.

[6] A. Amrulloh, "Pengaruh Olahraga Tradisional Terhadap Self-Esteem Mahasiswa Universitas Suryakancana," *MAENPO*, vol. 9, no. 2, pp. 17-29, 2019, doi: 10.35194/jm.v9i2.909

[7] D. Septaliza and A. R. Victorian, "Survei Permainan dan Olahraga Tradisional Dalam Pembelajaran Pendidikan Jasmani, Olahraga dan Kesehatan (Penjasorkes)," *J. Ilm. Bina Edukasi*, vol. 10, no. 1, pp. 43-54, 2017, https://journal.binadarma.ac.id/index.php/jurnalbinaedukasi/article/view/198

[8] A. Fenanlampir and R. Hidayat, "The Implementation Of Government Authority In Relation To The Sports Policy Of Maluku Province Government," *EDU Sci. J*, vol. 1, no. 2, pp. 133-145, 2020, doi: 10.30598/edusciencesvol1iss2pp133-145.

[9] A. M. Y. Enoch, "Evaluation Of The Training Program For The FORKI DKI Jakarta Pelatda Athletes vol. 6, no. 1, pp. 87-93, 2021, https://doi.org/10.31314/gss.v1i1.915

[10] E. Pratalaharja and B. Dirgantoro, "Re-Introducing Indonesian Traditional Games through an Interactive Multiplayer Table Game - Gobak Sodor," *J. Games, Game Art, Gamification*, vol. 6, no. 1, pp. 60-71, 2021, doi: 10.21512/jggag.v6i1.7324.

[11] T. Chaigasem and P. Tunming, "Tourist behaviors and needs for the development of creative Thai traditional sports tourism marketing for special interest tourism," *African J. Hosp. Tour. Leis*, vol. 9, no. 1, pp. 2-9,2020, http//: www.ajhtl.com

[12] Y. Sun, "Study on the minority traditional sports culture tourism competitiveness based on diamond model," *J. Adv. Oxid. Technol*, vol. 64, no. 4, pp. 1-9, 2018, file:///C:/Users/acer/Downloads/55913087.pdf

[13] Soedjatmiko, "Sports Tourism Development in Indonesia," *J. Sport. Sci*, vol. 3, no. 10, pp. 257-261, 2015, doi: 10.17265/2332-7839/2015.08.009.

[14] B. Zheng, Z. Mei, L. Hou, and S. Qiu, "Application of Internet of Things and Edge Computing Technology in Sports Tourism Services," *Secur. Commun. Networks*, vol. 17, no. 3, pp. 370-382, 2021, doi: 10.1155/2021/9980375.

[15] R. Herridge, A. Turner, and C. Bishop, "Monitoring Changes in Power, Speed, Agility, and Endurance in Elite Cricketers During the Off-Season Period," *J. strength Cond. Res*, vol. 34, no. 8, pp. 2285-2293, 2020, doi: 10.1519/JSC.0000000000002077.

[16] C. N. Wali and Widiyanto, "Shorinji kempo basic technique training method based on local wisdom for beginners kenshi," *J. Sport Area*, vol. 6, no. 3, pp. 421–432, 2021, doi: 10.25299/sportarea.2021.vol6(3).6403.

[17] Doshin So, *What is Shorinji Kempo*. Japan: Japan Pubns. Inc; 2nd Printing edition, 1981.

[18] C. N. Wali, & Widiyanto, "Peningkatan Gerak Geri Komi Melalui Gaya Melatih Secara Otoriter Dalam Bela Diri Kempo Dojo Persatuan Guru 1945 Kupang," vol. 3, no. 2, pp. 115–125, 2020.

[19] X. Dong, "Home(Lessness) in Urbanizing China: Invisible Violence and Left-Behind Children in Martial Arts Schools," *Educ. Urban Soc*, vol. 43, no. 9, pp. 251-270, 2017, doi: 10.1177/0013124516631622.

[20] D. So, *Tokuhon Shorinji Kempo: Versi Bahasa Indonesia*. Japan: Japan Pubns. Inc; 2nd Printing edition, 1991.

[21] B. Saputra and Y. N. Hanief, "Pengaruh Continus Running Dan Lari Interval Training Terhadap Daya Tahan Atlet Beladiri Shorinji Kempo Di Kabupaten Kediri Tahun 2016," *J. Kejaora*, 2017, vol. 2, no. 1, pp. 19-28, 2017, https://ejournal.unibabwi.ac.id/index.php/kejaora/article/view/55

[22] H. H, "Pembinaan Pengurus Persaudaraan Beladiri Kempo Indonesia (Perkemi) Dojo Sorawolio Dalam Melaksanakan Peran Dan Fungsi Manajemen Organisasi," *J. Pengabdi. Kpd. Masy. Membangun Negeri*, vol. 3, no. 1, pp. 83-92, 2019, doi: 10.35326/pkm.v3i1.199.

[23] S. Origua Rios, J. Marks, I. Estevan, and L. M. Barnett, "Health benefits of hard martial arts in adults: a systematic review," *J. Sports Sci*, vol. 36, no. 14, pp. 1614-1622, 2018, doi: 10.1080/02640414.2017.1406297.

[24] K. Watkins, T. A. Hilland, and T. D. Brown, "Perceived physical education ability and worth–an Australian case study," *Curric. Stud. Heal. Phys. Educ*, vol. 10, no. 1, pp. 18-33, 2019, doi: 10.1080/25742981.2018.1551066.

[25] E. Puszczałowska-Lizis, P. Bujas, J. Omorczyk, T. Ambroży, and A. Markowski, "Feet structure in young capoeira athletes versus untrained peers," *Arch. Budo*, 2017, vol. 13, no. 4, pp. 91-100, 2017,https://www.researchgate.net/profile/Ewa-Puszczalowska

[26] G. P. Fife, D. M. O'sullivan, and S. Y. Lee, "Rotational and linear head accelerations from taekwondo kicks and punches," *J. Sports Sci*, vol. 36, no. 13, pp. 1461-1464, 2018, doi: 10.1080/02640414.2017.1398406.

[27] P. Avakian, B. Miarka, and A. Achour Junior, "Análise de frequência das ações técnicotáticas competitivas no taekwondo: uma revisão. / Analysis of the frequency of technicaltactical actions in taekwondo: a review.," *Rev. Artes Marciales Asiat*, vol. 11, no. 2, pp. 117-126, 2016, http://doi.org/10.18002/rama.v11i2.3228

[28] J. K. Gates and C. Y. Lin, "Head and Spinal Injuries in Equestrian Sports: Update on Epidemiology, Clinical Outcomes, and Injury Prevention," *Curr. Sports Med. Rep*, vol. 19, no. 1, pp. 7-23, 2020, doi: 10.1249/JSR.0000000000000674.

[29] M. Čavala, J. Jukić, B. Babin, N. Zagorac, and R. Katić, "Karate efficiency and the development of some anthropological features among 7th and 8th grade pupils in elementary school ," *Croat. J. Educ*, vol. 16, no. 4, pp. 911-933, 2014, http://doi:10.15516/cje.v16i4.1614

[30] J. Sheppard and W. Young, "Agility literature review: Classifications, training and testing," *Journal of Sports Sciences*, vol. 24, no. 9, pp. 919-932, 2006, doi: 10.1080/02640410500457109.

[31] P. Horicka, J. Hianik, and J. Šimonek, "The relationship between speed factors and agility in sport games," *J. Hum. Sport Exerc*, vol. 9, no. 1, pp. 49–58, 2014, doi: 10.4100/jhse.2014.91.06.

[32] J. Šimonek, P. Horička, and J. Hianik, "The differences in acceleration, maximal speed and agility between soccer, basketball, volleyball and handball players," *J. Hum. Sport Exerc*, vol. 1, no. 18, pp. 74-82, 2017, doi: 10.14198/jhse.2017.121.06.

[33] W. Young, T. Dos'Santos, D. Harper, I. Jefferys, and S. Talpey, "Agility in Invasion Sports: Position Stand of the IUSCA," *Int. J. Strength Cond*, vol. 1, no. 1, pp. 8-19, 2022, doi: 10.47206/ijsc.v2i1.126.

[34] A. Plummer, H. Mugele, K. Steffen, J. Stoll, F. Mayer, and J. Müller, "General versus sports-specific injury prevention programs in athletes: A systematic review on the effects on performance," *PLoS One*, vol. 9, no. 10, pp. 88-104, 2019, doi: 10.1371/journal.pone.0221346.

[35] R. S. Lloyd, P. Read, J. L. Oliver, R. W. Meyers, S. Nimphius, and I. Jeffreys, "Considerations for the development of agility during childhood and adolescence," *Strength Cond. J*, vol. 35, no. 3, pp. 2-11, 2013, doi: 10.1519/SSC.0b013e31827ab08c.

[36] Y. Brata Susena, D. Ari Santoso, and P. Setyaningsih, "Ethnosport Permainan Tradisional Gobak Sodor," *J. Pendidik. Kesehat. Rekreasi*, vol. 7, no. 2, pp. 283–304, 2021, https://doi.org/10.5281/zenodo.5035410

[37] A. Imaniyah and R. Zuroida, "Eksplorasi Etnomatematika Konsep Geometri dan Bilangan dalam Permainan Gobak Sodor," *... Mat. dan Mat*, vol. 2, no. 0, pp. 85-96, 2020, https://doi.org/10.21831/pspmm.v2i0.96

[38] L. Pitrianingsih, "Validitas Permainan Gobak Sodor untuk Melatihkan Keterampilan Memecahkan Masalah pada Materi Pemanasan Global," *J. E-Pensa*, vol. 7, no. 2, pp. 81-85, 2019, https://doi.org/10.1371/journal.pone.0221346

[39] F. A. Fantiro and B. Arifin, "Pembelajaran Permaian Kinestetik Gobak Sodor untuk Siswa Sekolah Dasar," *Edumaspul J. Pendidik*, vol. 3, no. 2, pp. 21-34, 2019, doi: 10.33487/edumaspul.v3i2.135.

[40] A. A. U. Fauziah, S. S. Rizal, and S. Millah, "Peningkatan Kemampuan Kerjasama Anak melalui Permainan Tradisional Gobak Sodor," *Tarb. al-Aulad*, vol. 4, no. 2, pp. 61-82, 2019,https://www.riset-iaid.net/index.php/TA/article/view/455

[41] S. Sterkowicz and E. Franchini, "Testing motor fitness in karate," *Arch. Budo*, 2009.

[42] S. L. Siedlecki, "Quasi-Experimental Research Designs," *Clin. Nurse Spec*, vol. 34, no. 5, pp. 198-202, 2020, doi: 10.1097/NUR.0000000000000540.

[43] Ida Ayu Dian Pramantik, "Optimization of Gobak Sodor Based Neuroscience Learning Game as CharacterEducation in Intellectual Disabilities," *JUMORA J. Moderasi Olahraga*, vol. 1, no. 02, pp. 63–74, 2021, doi: 10.53863/mor.v1i02.231.

[44] I. P. W. Veny Iswantiningtyas, "Meningkatkan Kemampuan Motorik Kasar Anak Usia Dini Melalui Permainan Tradisional Gobak Sodor," *Pinus*, vol. 1, no. 3, pp. 199–260, 2015, https://doi.org/10.29407/pn.v1i3.181

[45] [45]F. Aritonang, I. S. P. Prayitno, and Y. Gulo, "Permaianan Tradisonal Budaya Martumba Sebagai Media Pendidikan Karakter Bagi Anak di Batak Toba," *Anthr. J. Antropol. Sos. dan Budaya (Journal Soc. Cult. Anthropol*, vol. 6, no. 1, pp. 52-61, 2020, doi: 10.24114/antro.v6i1.16634.

[46] S. Tauriello, J. Bowker, G. Wilding, L. Epstein, and S. Anzman-Frasca, "Examining associative conditioning with a positive peer context as a strategy to increase children's vegetable acceptance," *Pediatr. Obes*, vol. 15, no. 10, pp. 210-223, 2020, doi: 10.1111/ijpo.12660.

[47] B. D. C. Putri, R. Kridalukmana, and E. D. Widianto, "Perancangan Aplikasi Permainan Multiplayer Gobak Sodor Berbasis Flash Di Lingkup Jaringan Lokal," *J. Teknol. dan Sist. Komput*, vol. 4, no. 2, pp. 599-665, 2016, doi: 10.14710/jtsiskom.4.2.2016.259-265.

[48] R. P. Utomo, "Effect Games Gobak Sodor and Hopscotch on Power Limb Muscles," *Pinus J. Penelit. Inov. Pembelajaran*, vol. 4, no. 2, pp. 12-31, 2019, doi: 10.29407/pn.v4i2.12688.

[49] L. Erdiana, "Pengaruh Permainan Tradisional Gobak Sodor terhadap Perkembangan Motorik Kasar dan Sikap Kooperatif Anak TK Kelompok B di Kecamatan Sidoarjo," *J. Pedagog*, vol. 2, no. 2, pp. 30-44, 2016, http://dx.doi.org/10.30651/pedagogi.v2i2.534

[50] B. Pudjoatmodjo, A. Hasanudin Fauzi, S. Salam, T. A. Muluk, and D. S. Maulana, "Utilizing Digital Storytelling Structure for Developing an Electronic Traditional Game Gobak Sodor," *IJAIT (International J. Appl. Inf. Technol*, vol. 5, no. 1, pp. 17-23, 2022, doi: 10.25124/ijait.v5i01.3416.

[51] M. Siagawati, W. D. Prastiti, and Purwati, "Mengungkap Nilai-nilai yang Terkandung dalam Permainan Tradisional Gobak Sodor," *Indig. J. Ilm. Berk. Psikol*, vol. 9, no. 1, pp. 83-95, 2007, https://doi.org/10.23917/indigenous.v9i1.1620

[52] G. Mioni, D. Zakay, and S. Grondin, "Faster is briefer: The

symbolic meaning of speed influences time perception," *Psychon. Bull. Rev*, vol. 149, no. 22, pp. 1285–1291, 2015, doi: 10.3758/s13423-015-0815-6.

[53] William F. Brechue, "Structure-function Relationships that Determine Sprint Performance and Running Speed in Sport," *IJASS(International J. Appl. Sport. Sci*, vol. 23, no. 2, pp. 313-350, 2011, doi: 10.24985/ijass.2011.23.2.313.

[54] G. L. Iverson, M. R. Lovell, and M. W. Collins, "Validity of Impact for measuring processing speed following sports-related concussion," *J. Clin. Exp. Neuropsychol*, vol. 27, no. 6, pp. 675-683, 2005, doi: 10.1081/13803390490918435.

[55] N. P. N. Wijayanti, D. P. Saputro, O. F. AF, and R. Febri, "Ladder drill portable: Agility tools for sports," *J. Sport Area*, vol. 9, no. 2, pp. 17-29, 2021, doi: 10.25299/sportarea.2021.vol6(2).5912.