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Dear Readers,

In front of you is a new issue of the Journal "Sports Science and Health". With each new number, the interest of our colleagues in publishing papers is increasing, and the international character of the Journal is growing, which shows the continuity and justification of the existence of the Journal "Sports Science and Health".

In this issue, we can boast of 12 papers by authors from Bosnia and Herzegovina, Serbia, Croatia, North Macedonia, Algeria, Ukraine and Indonesia. The topics of the papers are interesting and diverse: relationships between students' motor skills and basketball skills, the importance of early diagnosis of carpal tunnel syndrome, analysis of anthropometry, physical condition and archery skills as a basis for talent identification, analysis of physical exercise and the level of physical fitness of Indonesian health workers, differences between anthropometric and physical characteristics of children in urban and rural areas, latent hypertension and dysautonomia in athletes with prehypertension during a one-year training cycle, the influence of the use of deductive and inductive methods on the verbal interaction of physical education and sports teachers, the effects of high-intensity interval training and game-based training of high school football players age, the connection between goal orientation, self-esteem, situational motivation and satisfaction in sports among young karate players, The role of parents in directing children to extracurricular sports activities, the traditional model of sports-based physical education in improving the character and critical thinking of elementary school students, The influence of organized physical exercise on the time spent in MVPA of elementary school students.

The Editorial Board of the Journal would like to thank all the authors, as well as the reviewers who, with their participation, improved and improved the quality of the Journal itself. We hereby invite everyone to continue to send us your paper to our email address (www.siz-au.com) in order to continue working on the improvement and strengthening of the Journal.

We would like to take this opportunity to wish you happy and successful New Year 2023.

JOURNAL EDITORIAL

Dragi čitaoci,

Pred vama je novi broj Časopisa "Sportske nauke i zdravlje". Sa svakim novim brojem zainteresovanost naših kolega za objavljivanje radova je sve veća i raste međunarodni karakter Časopisa, čime pokazujemo kontinuitet i opravdanost postojanja Časopisa "Sportske nauke i zdravlje".

U ovoj broju uvrstili smo 12 radova, autora iz Bosne i Hercegovine, Srbije, Hrvatske, Sjeverne Makedonije, Alžira, Ukrajine i Indonezije. Tematika radova je zanimljiva i raznovrsna: relacije motoričkih sposobnosti i košarkaških vještina učenika, značaj rane dijagnostike sindroma karpalnog tunela, analiza antropometrije, fizičkog stanja i streličarskih vještina kao osnovu za identifikaciju talenata, analiza fizičkog vježbanja i nivoa fizičke spremnosti indonežanskih zdravstvenih radnika, razlike između antropometrijskih i fizičkih karakteristika djece u urbanim i ruralnim područjima, latentna hipertenzija i disautonomija kod sportista sa prehipertenzijom tokom jednogodišnjeg ciklusa treninga, uticaj upotrebe deduktivnih i induktivnih metoda na verbalnu interakciju profesora fizičkog vaspitanja i sporta, efekti intervalnog treninga visokog intenziteta i treninga zasnovanog na igri fudbalera srednjoškolskog uzrasta, povezanost ciljne orijentacije, samopoštovanja, situacione motivacije i zadovoljstva u sportu kod mladih karatista, uloga roditelja u usmjeravanju djece u vannastavne sportske aktivnosti, tradicionalni model učenja fizičkog vaspitanja zasnovan na sportu u usavršavanju karaktera i kritičkom mišljenju učenika osnovnih škola, uticaj organizovanog fizičkog vježbanja na vrijeme provedeno u MVPA učenika osnovnih škola.

Uredništvo Časopisa zahvaljuje svim autorima, ali i recenzentima koji su svojim učešćem unaprijedili i poboljšali kvalitet samog Časopisa. Ovim putem pozivamo sve da nam i dalje šaljete svoje radove na našu mail adresu (www.siz-au.com) kako bi i dalje radili na unapređenju i jačanju Časopisa.

Ovom prilikom želimo da vam svima poželimo sretnu i uspješnu Novu 2023. godinu.

UREDNIŠTVO ČASOPISA

ANALYSIS OF PHYSICAL EXERCISE AND PHYSICAL FITNESS LEVEL OF INDONESIAN HAJJ HEALTH WORKERS

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Abstract: This study aims to determine the understanding of prospective Hajj health workers regarding physical exercise and performance from the aspects of cardio-respiration, BMI, fat percentage, and body age. This research is mixed methods research that combines quantitative and qualitative approaches with a transformative design strategy. The population of this study were all prospective Hajj health workers in the city of Yogyakarta. The sample used in this study were 31 people. The data collection technique used is observation, written release. Performance data obtained through the Rockport test, BMI, body fat percentage, and age. Qualitative data analysis was carried out through interactive analysis in the form of data collection, data reduction, data presentation, and finally drawing conclusions. Quantitative data analysis uses the average rating to find out the average performance level of prospective haj health workers. shows that the understanding of physical exercise in prospective Hajj health workers increases (from not knowing to knowing). Most of the haj health workers understand more about material on measuring physical fitness, steps of physical exercise, principles of exercise, models of physical exercise, and physical training programs for preparation for hajj. The results of the performance of prospective health workers, there are 71% in the average category based on cardiorespiratory, 48.4% are overweight based on BMI, 61.3% are categorized as normal based on fat percentage, and 71% are in the elderly category based on body age. An understanding of the physical development and performance of prospective Hajj health workers must be prepared and improved in stages, because Hajj health workers do not only work while in Mecca and Medina, but also during preparation for health and fitness coaching.

Keywords: physical training, performance, cardio-respiration, BMI, body age.

INTRODUCTION

Hajj is the fifth pillar of Islam, and it is mandatory for Muslims to perform Hajj at least once in their life if they are financially and physically able (DA. Abdelmoety et al., 2018: 1). Hajj is a series of prayers that combine physical and spiritual activities. According to Auliadina (2019) activities in the pilgrimage are 70% physical activities and the remaining 30% spiritual worship. Judging from its historical background, the Hajj is a lesson of faith in Allah SWT as was done by Prophet Ibrahim, his wife Hajar, and his son Ismail, where they reached the highest level of faith in Allah (Rasyid, 2018).

Worship during Hajj includes walking around the Kaaba, a cube-shaped building in Mecca which is considered the holiest site in Islam, followed by Sa' i i.e., walking between two hills (Safa and Marwa) seven times, each a distance of about 450 m, for a total of 3.15 km. In addition, traveling 14.5 km to the desert of Arafah, the night is spent in Muzdalifah where the collected gravel should be dumped the next day in Mena (about 5 km from Makkah) (Abdullah Al Shieni, 2012:123). As we know, Indonesia is one of the most populous Muslim countries in the world with a population of more than 231 million people (Kemenag RI, 2018) followed by Pakistan and India. This makes Indonesia get a quota of more pilgrims than the Saudi Arabian government. The basic quota for Hajj pilgrims from Indonesia is currently in slot number 211,000, which is divided into 194,000 regular quotas and 17,000 special quotas. The request for additional hajj quota is made because the number of hajj candidates from Indonesia continues to increase every year. In addition, the government also proposed an increase in the hajj quota from 4,100 slots to 4,200 slots (Fiqhislam.com., 2020).

Pilgrims and health workers are dominated by adults and the elderly. As we know that with age, body functions will decrease. Decreased body function can cause problems in the cardiorespiratory system, flexibility, muscle

strength, and muscle endurance. Therefore, Hajj pilgrims and Hajj health workers should prepare well physically, so they can participate in the series of Hajj rituals safely to become a Mabror Hajj (Auliadina, 2019). Indonesian Hajj health workers, have an important role to complete its implementation. The team of Indonesian Hajj health workers who will serve Allah's guests, of course, are required to stay healthy and fit, considering that the task as the Indonesian Hajj health team is very heavy starting from preparation and while in Mecca and Medina, to returning to Indonesia. In addition to being required to have good fitness, Indonesian Hajj health workers also need to understand physical exercise. For this reason, measuring the knowledge of the pilgrims is very important because it will provide evidence that they are really ready to serve the pilgrims as well as possible (Bokhary, 2020). According to Putra (2020) Hajj pilgrims need to prepare physically because most of the Hajj is physical, namely Tawaf (walking around the Kaaba), Sa'i (running slowly from Mount Safa to Mount Marwah and turning around), throwing the jumrah, etc. An understanding of the physical exercise program that has been implemented since the beginning, will contribute to the personal self of the Hajj Health Workers to always maintain his fitness. If the hajj health officer as a change agent who directly handles everything in the field knows well the physical training program, he will be easier to explain to prospective pilgrims to prepare for fitness. This is because the hajj health officer is the right person for the prospective hajj pilgrims. This will be a different view and a big question for prospective pilgrims if the health workers for Hajj do not understand the physical exercise program for prospective pilgrims.

Abd-Ellatif (2021) explains that the health risks that can affect the congregation are not only from geographical conditions, long trips, and hajj activities, but also from the history of the congregation's illness before coming to Saudi Arabia. In order to stay healthy in these conditions and carry out a series of worship properly, officers must provide understanding and education about the importance of preparing for Hajj as well as possible.

As explained by Thirafi (2018), the health readiness of hajj pilgrims can affect their level of anxiety. Some indications of anxiety include shaking, sweating, palpitations, panic, tension, confusion, and loss of concentration. Indeed, the ratio between officers and the number of congregants is inadequate when viewed from the conditions in the field (Abdul Choliq, 2018:39-40). With the limited number of officers, prospective hajj officers must be prepared early in their performance to serve pilgrims well. In addition, hajj officers must know how to serve pilgrims who pay attention to religious rules, fitness levels or various diseases, by protecting their privacy (Ridda, 2019). Hajj activities become an annual agenda, so that improvements in various aspects of service improvement through human resources/hajj officers are always pursued by the government. Hajj officers who have a healthy and fit body need to carry out health and fitness measurements continuously. In addition, it would be very good for prospective hajj health workers to prepare for health and fitness from an early age. However, there are several prospective hajj health workers who have not routinely carried out measurements or preparations related to Cardio-respiratory, Body Mass Index (BMI), fat percentage, and previous body age.

A healthy, ideal body is not only seen from the physical aspect but can also be seen from the 4 (four) basic component aspects of physical fitness, those are cardio-respiration endurance, muscle strength and endurance, flexibility, and body composition (Auliadina, 2019). The way to figure out a person's cardio-respiration endurance is the determination of the intake volume O_2 (VO_2 Max) that a person can use to oxidize nutrient molecules to produce energy. VO_2 Max is the maximum amount of oxygen that can be consumed during intense physical activity until the occurrence of fatigue condition. The VO_2 Max value depends on the condition of cardiovascular, respiration, hematology, and muscle ability. Putra (2020) explained that maximum aerobic capacity or maximum oxygen consumption (VO_2 Max) is the indicator of personal physical fitness. VO_2 Max is the maximum oxygen that can be distributed from the lungs to the muscles of the body in millimeters or minutes/kilograms of body weight. The higher the VO_2 Max, the better a person's ability to exercise and concentrate and be fitter than people with a low VO_2 Max. Auliadina (2019) adds that VO_2 max is determined by some aspects such as age, gender, heart function, muscular aerobic metabolism, exercise habit, genetics, multivitamin, and nutrition statuses such as Body Mass Index (BMI), belly circumference, and fat percentage. Fat percentage becomes one of important factors to determine VO_2 max ability. If someone has higher fat percentage, so VO_2 max ability will lower. In contrary, the higher muscle mass, the higher VO_2 max (Jayanti, 2019). BMI represents a weight adjusted to the height of the body and aims to represent fat mass, fat free mass, and body fluids. Scientific evidence suggests that a high BMI is associated with overweight and obesity that is a predictor for all causes of mortality (Somlak Vanavanan et al, 2018:241). From the data collected by Utami (2021) about Body Mass Index (BMI) condition of Hajj pilgrims in West Java, Indonesia during 2017-2019, found that 45.47%

has normal BMI level, 4.6% has under normal BMI level, 36.36% Hajj pilgrims has above normal BMI level, and the rest 13.54% categorized as obesity. To be a Hajj health worker who is healthy and has high mobility and fast service, prospective Hajj health workers must be able to control their weight.

Considering that the role of Indonesian Hajj health workers is very important in carrying out their duties and providing professional health services, responsive to the needs of prospective pilgrims who will be served, it is necessary to provide Hajj health workers with an understanding of physical exercise, cardiorespiratory performance measurement, BMI, Fat Percentage, and Age.

METHODS

This study uses a quantitative and qualitative approach, with a transformative design strategy. This study aims to determine the understanding of physical exercise and the performance of prospective Indonesian Hajj health workers in terms of the aspects of cardiorespiration, BMI, fat percentage, and body age. The research was conducted at the UNY Sports Building, specifically at the fitness center and track. Understanding Physical exercise for Hajj health workers, in understanding activities that aim to improve or maintain physical fitness. Cardiorespiratory endurance is the ability to continue or endure strenuous tasks involving large muscle groups for long periods of time. BMI is measured by dividing body weight in kilograms by height in meters squared. Fat percentage is the amount of body fat obtained from measurements using the Omron Karada Scan body composition monitor. Body Age is a numerical calculation that shows the age of the body’s metabolic type using the Omron carada scan body composition monitor.

The research population in this study is all prospective Hajj health workers in the city of Yogyakarta, with a total of 31 prospective health workers. Sample with the criteria of prospective Hajj officers who work in the city of Yogyakarta and are registered as prospective officers. The instruments used in this study were: (a) Observation, (b) Documentation, (c) Rockport test, (d) BMI, (f) Percentage of fat, (e) Body age. Cardiorespiratory endurance was tested using the Rockport method, namely sprint or run out according to the maximum ability of the participants with a distance of 1.6 kilometers. The BMI value is obtained by dividing the body weight in kilograms by the height in meters (kg/m²). Body fat percentage and body age measurements were carried out using the Omron Karada scan body composition monitor. BMI is a relatively good indicator of total body composition in population and health-related studies. A person’s BMI can be determined using a nomogram.

Table 1. The Categories of BMI

Category	BMI (kg/m ²)
Skinny	< 18,5
Normal	18,5-24,9
Overweight	25,0-29,9
obesity, Level	
I	30,0-34,9
II	35,0-39,9
III	≥ 40,0

Source: Linda S. Pescatello; associate editors, Ross Arena, Deborah Riebe, Paul D. Thompson. (2014: 64).

Data were analyzed using the SPSS to get an overview of results with its frequency distribution.

RESULTS

Characteristics of prospective Hajj health workers in the City of Yogyakarta based on age and gender. Characteristic data were analyzed using percentage descriptive analysis. The results of the data analysis on the characteristics of the research respondents are as follows.

Table 2. *The Description of Respondents' Age*

Age	Frequency	Percentage (%)
18 – 35 years (early adult)	16	51.6
36 – 55 years (middle age)	15	48.4
56 – 65 years (late adulthood)	0	0.0
Total	31	100.0

The age distribution of the respondents in table 2 shows that most of the respondents are in the early adult age category

The gender characteristics of the respondents are males and females. The results of the characteristics of respondents' gender are as follows:

Table 3. *The Description of Respondents' Gender*

Gender	Frequency	Percentage (%)
Males	15	48.4
Females	16	51.6
Total	31	100.0

The distribution of respondents' gender in table 3 shows that most respondents were female as much as 16 people (51.6%). A total of 15 people (48.4%) were male respondents.

This research Data is the result of measurements of the cardio-respiration endurance, BMI, fat percentage, and body age in the prospective hajj officers from the City of Yogyakarta. Research data were analyzed descriptively in order to facilitate the presentation. The results of the descriptive analysis on this research data are as follow.

Table 4. *Results of Descriptive Analysis*

Data	Min	Max	Mea	Medi	Mod	Std
Cardio-respiration endurance	8.21	15.80	12.27	12.33	8.21	1.85
BMI	19.80	33.11	24.83	25.11	19.80	3.17
Fat Percentage	15.10	36.50	27.31	27.90	28.20	5.30
Body age	28.00	55.00	41.51	43.00	47.00	8.55

1. Cardiorespiratory Endurance
2. The results of data analysis on the cardio-respiration endurance show that the lowest score was 8.21 and the highest score was 15.80. The results of the descriptive statistical analysis determine the average score (M) = 12.27; Median (Me) = 12.33; Mode (Mo) = 8.21, and standard deviation (SD) = 1.85.
3. BMI
4. The results of data analysis on BMI show that the lowest score was 19.80 and the highest score was 33.11. The results of the descriptive statistical analysis determine the average score (M) = 24.83; Median (Me) = 25.11; Mode (Mo) = 19.80, and standard deviation (SD) = 3.17.
5. Fat Percentage
6. The results of data analysis on fat percentage show that the lowest score was 15.10 and the highest score was 36.50. The results of the descriptive statistical analysis determine the average score (M) = 27.31; Median (Me) = 27.90; Mode (Mo) = 28.20, and standard deviation (SD) = 5.30.
7. Body Age
8. The results of data analysis on the body age show that the lowest score was 28.00 and the highest score was

55.00. The results of the descriptive statistical analysis determine the average score (M) = 41.51; Median (Me) = 43.00; Mode (Mo) = 47.00 and standard deviation (SD) = 8.55.

RESULTS OF DATA ANALYSIS

1. Data Categorisation

Data analysis was performed descriptively through categorizing the individual data of the cardiorespiration endurance, BMI, fat percentage, and body age of the prospective hajj officers from the City of Yogyakarta in accordance with the norm. The results of data categorisation are as follows.

a. Cardio-respiration endurance

The data of cardio-respiration endurance were categorized into 3 namely good, adequate, and less. The results of the analysis on cardio-respiration endurance data are as follows.

Table 5. Data Categories of Cardio-respiration Endurance

Cardio-respiration Endurance	Frequency	Percentage (%)
Good	4	12.9
Adequate	22	71.0
Less	5	16.1
Total	31	100.0

According to table 5, it is revealed that most respondents (71%) were at the category of adequate cardio-respiration endurance (22 respondents). A small part (12.9%) of respondents was at the good category (4 respondents).

b. BMI

The data of BMI were categorized into 4 namely skinny, normal, overweight, obesity level I, obesity level II and obesity level III. The results of analysis on BMI data are as follows.

Table 6. Data Categories of BMI

BMI	Frequency	Percentage (%)
Skinny	0	0,0
Normal	14	45,2
Overweight	15	48,4
Obesity Level I	2	6,5
Total	31	100,0

According to table 6, it is revealed that most respondents (48.4%) were at the overweight category of BMI (15 respondents). A small portion (6.5 %) of the respondents was in the category of obesity (2 people).

c. Fat Percentage

The data of fat percentage is categorized into 3 namely ideal, normal, and over. The results of the analysis on fat percentage data are as follows.

Table 7. Data Categories of Fat Percentage

Fat Percentage	Frequency	Percentage (%)
Ideal	5	16.1
Normal	19	61.3
Over	7	22.6
Total	31	100.0

According to table 7, it is determined that most respondents (61.3%) were at the normal category of fat percentage (19 people). A small percentage (16.1%) of respondents was at the ideal fat percentage (5 people).

d. Body Age

The data of body age were categorized into 3 namely younger than the actual age, same as the actual age, and older than the actual age. The results of analysis on body age data are as follows.

Table 8. Data Categories of Body Age

Body Age	Frequency	Percentage (%)
younger than the actual age	4	12.9
same as the actual age	5	16.1
older than the actual age	22	71.0
Total	31	100.0

DISCUSSION

The Ministry of Health of the Kingdom of Saudi Arabia in collaboration with the company Sanofi launched a health campaign entitled “Together for a Healthy Hajj”. This campaign aims to increase the awareness of hajj pilgrims about health requirements during the hajj season (Ridda Iman et al., 2019: 17). Some suggestions for maintaining personal hygiene and health in general are always conveyed by the Saudi Ministry of Health, such as: Guidelines for effective hand washing, following cough procedures, wearing face masks in crowded places, and maintaining personal hygiene (Memish Ziad A et al. al, 2013:331). Meanwhile, the Kingdom of Saudi Arabia also recommends that pilgrims get vaccinated against influenza, tetanus, mumps, and measles (Alqahtani, 2020).

It should be noted that the peak condition of a person’s cardiorespiratory endurance is around the age of 20-30 years and will decrease with age. This happens due to several factors, one of which is an unhealthy lifestyle, ignoring exercise on the grounds of being busy, this has an impact on heart muscle contraction (Auliadina, 2019). Apart from that, Alkhairi (2019) added that routinely doing exercises in preparation for Hajj, pilgrims and health workers must also pay attention to their rest schedule for muscle recovery, so they don’t tire easily.

A person’s understanding of other people, situations or other objects is the result of the learning process. According to According to S. A. Hoeger, W. W. K. & Hoeger (2018), physical exercise is a physical activity that requires planning, structure, and repetition to improve and maintain one’s fitness. Epidemiologists divide physical activity into two categories, namely structured physical activity (sports activity) and unstructured physical activity (daily activities). Understanding of physical training for Hajj health workers needs to be prepared through debriefing that is carried out from the start in an integrated manner between the Ministry of Health and the Ministry of Religion. Good physical exercise preparation needs to be done, because about 70% of hajj activities involve physical activity. In addition, we should know both Hajj pilgrims and health workers should focus on personal hygiene, measure the level of health and fitness, apply proper treatment for congenital diseases i.e., diabetes, allergies, cancer, etc and try to seek medical help if needed (Ibrahim, 2019).

Before undergoing debriefing, the Hajj health officers take a pretest about the knowledge of Hajj and its organizers. Then, after undergoing debriefing, a posttest is given which produces the lowest score of 60 and the highest score of 90.

During their work in Saudi Arabia, the officers will serve in three working areas, namely Makkah, Medina, and Jeddah and Medina airports. Officers working in the Medina and the airport serve about 74 working days. Meanwhile, the officers working in the area of Makkah will be in charge of about 62 working days (Muhammad Hafil, 2019:1). Based on interviews, most of healthcare officers on the City of Yogyakarta understand the materials about measurements of physical fitness, physical training, training principles, physical training models, and the physical training programme for Hajj preparations. According to Alamri (2018), from the findings of a study conducted, pilgrims have a short-term level of understanding. The suggestion is that Hajj officers should provide knowledge about health and preparation for Hajj in small groups with specific and important topics so that they are easy to understand and implement.

In the aspect of physical training loads, the understanding of the healthcare officers of the City of Yogyakarta is good. It is evidenced that the Hajj healthcare officers responds quickly to training frequency, training duration, and training types. For the training intensity, the Hajj healthcare officer is still in need to equalize the perception between the maximal heart rate and workout intensity from outside loads such as the Gym Machine. In the principles of physical training, the understanding of healthcare officers of the City of Yogyakarta can be demonstrated with the ability to explain well about the principles of *overload*, *progression*, *reversibility*, and the principle of *specificity*. In addition, circuit training is effective for improving physique fitness (Susanto et al, 2021: 100).

In the model of physical training, the understanding of Yogyakarta's healthcare officers is focused on brisk walk. Hajj healthcare officers think that by conducting regular brisk walk, physical fitness can be maintained so that it is beneficial in the service of pilgrims while in the Holy Land. According to Yudik Prasetyo et. Al. (2017:112) a combination treatment of aerobic – weight training conducted by providing brisk walk-weight training in the form of brisk walk with a distance of 1.6 km, repetition per training session 1-2 times, 2-3 minutes break between sessions, 18-20 minutes of duration, then resting for 5 minutes, continued with 8 repetitions of weight training, set 1-2, 2 minutes recovery between sets, and 8-10 posts can be used as an increase in physical fitness (cardio-respiration endurance, flexibility, muscle fitness, body composition) of prospective elderly pilgrims. The understanding of the Hajj healthcare officer is already good, but it needs to be improved in terms of physical training models, so that not only brisk walk, but also for the better performance of the Hajj healthcare officers to be combined between the brisk walk with weight training.

In the physical training program, the understanding of healthcare officers of the City of Yogyakarta can be demonstrated with the ability to explain training sessions, regular and systematic trainings, training programmes, training objectives, training aimed at one's ability, gender, and age. The healthcare officers of the City of Yogyakarta argue that physical trainings for the improvement of physical fitness for adolescent are different from one for the elderly. The Hajj healthcare officers need to understand elderly characteristics in guiding the elderly hajj pilgrims. In the studies of psychology and guidance and counseling, there is a psychosocial theory delivered by Erik H. Erikson. He describes the development of individual psychosocial ranging from children to elderly (Erikson, 1993). So that, health officers have to build Hajj pilgrims' motivation to do exercise for Hajj preparation both internal factors like the high willingness in doing healthy habits and external factors such as bringing professional coach, relationship, etc. (Prasetyo, 2020).

Over the years, Hajj has been the challenge of large public health that requires full attention from a number of sectors. The Ministry of Health has the fundamental mission during the Hajj season focusing on the best health care provision for pilgrims, continuous expansion of healthcare facilities, and the assignment of qualified healthcare personnel. Besides of that, Al-Hajri (2020) says that the confidence of all Hajj health workers in doing their duties can make the programs run well. Some factors that affect officers' quality such as the readiness in organizing services, focusing on technique of Hajj pilgrimage, having informative and communicative understanding, also can maximize managing times. Hajri (2020) also adds that having ability in making relationship, translating, and understanding in medical aspects also can make pilgrims more confident in doing Hajj. However, Hajj pilgrimage every year has different challenges for both officers and pilgrims. This explained by Mirza (2020), he says that every healthy system and services quality is based on some barometers include the confidence of workers in doing their jobs.

All sectors work in a multidisciplinary team approach to include prevention, curative, and promotion of the health needed by pilgrims in order to achieve the stated objectives (Abdel Hadi Hassn Eltahir, 2000: 14). To provide the best service, prospective healthcare officers should have a good performance. The performance of the prospective healthcare officers can be seen from the aspects of cardio-respiration, BMI, fat percentage, and body age.

Almuzaini, et. al. (2021) quotes the data from World Health Organization (WHO) where the climate change is one of five the most dangerous condition causing death. Temperature differences because of geographical location is a challenge for Hajj pilgrims. The Holy City Mecca as the location of Hajj pilgrimage is located in west side of Kingdom of Saudi Arabia (KSA), which characterize desert with extremely high temperature during the day. It is totally different with climate condition in Indonesia. Some indication of Heat Related Illness (HRI) such as fatigue, vomit, faint, hyperthermia, neurologic distraction, low blood pressure, and organs failure. Responding this case, Almuzaini adds that its important to train Hajj health officers regularly, so they will more maximal to give service Hajj pilgrims.

According to Mughal Faraz et. al. (2018: 1-2) in the year of 2017, The Saudi Arabian Ministry of Health stated that there were 643 deaths occurring during a Hajj season. From this death, 18% is associated with heart attack, 15% due to myocardial infarction, 3% sepsis, and 2% heatstroke. Pilgrims can come to health centres with various illnesses; Respiratory diseases accounted for 61% of the presentation, problem of musculoskeletal for 18%, dermatological for 15%, and gastrointestinal for 13%. According to Rahman Juma et al. (2017: 388), the cardiovascular disease was the leading cause of hospitalization and intensive care. Respiratory problems or infection is the most common disease happen during Hajj and Umrah. As stated by Dauda (2019) and explained by Utama (2019) that most of Hajj pilgrims got respiratory infection when they stay at Mecca and Madinah. This condition happen because of crowded, extreme climate, pollution, and infected by other pilgrims. Khan (2020) adds, besides of respiratory infection, there are some disease that commonly happen such as digestion problems, skin and eyes allergic, etc. Niu (2019) explains that viruses can spread quickly if there are 3 aspects, those are person/animal who carry the virus, medium to spread the viruses (in the air/water drop/touch) and person who are easily infected viruses.

Almalki reported in the hajj study that from 110 hospitalised patients from 20 different countries, there was 34% of them having ischemic heart disease, 20% having high blood pressure, and 17% having the prevalence of stroke. According to Madani, more than 60% of receptions of intensive care units in 7 hospitals in Mina and Arafat are due to cardiovascular. Among these cases, myocardial infarction and left-ventricular failure is the highest occurrence. Furthermore, cardiovascular events are the leading cause of death during the pilgrimage. In 2008, 66% (446) of deaths were caused by cardiovascular disease among Indonesian pilgrims. Based on the data, the implementation of Hajj can be run properly if the function of cardiorespiratory endurance as the indicator of one's fitness to be observed and prepared in advance.

Cardiorespiratory endurance is one of the most important components of physical fitness (Getchell, 1979:13). The higher the oxygen intake, the more a person's life reserves. This shows that cardiorespiratory endurance is a representative indicator to describe physical fitness status. Based on research data, most of the respondents (71%) are in the adequate category on their cardiorespiratory endurance. A small proportion of respondents (12.9%) are in the good category of cardiorespiratory endurance (4 respondents). This shows that prospective hajj health workers still need to improve their cardiorespiratory endurance by conducting systematic, regular, and measurable training. Exercises are performed by involving the large muscles of the body, performed 3-5 times per week, continuously, starting with warm-up, core activity, and cool-down.

Meanwhile, Rustika (2020) says that the health of Indonesian Hajj pilgrims is a complicated case because based on audit management result in Hajj 2012-2014 ago, there are many Hajj pilgrims are not implement *isthitaah* during Hajj pilgrimage. *Isthitaah* is a term that combines three requirements of Hajj pilgrimage, those are faith ability, financial ability, and physical ability. Those three aspects is important because it will make Hajj pilgrims feel more confident and safe.

The healthier participants, the more participants prepared for mass meetings, the more likely it will be to succeed. To ensure success, efforts must be made to be able to know the risks and actions taken before attending the pilgrimage. It includes vaccination campaigns, information about environmental conditions, and fitness or stamina levels required to participate in the pilgrimage securely (Ridda Iman et al., 2019: 6).

Abe et al. (1997) convey that aerobic exercise with the frequency of 3-5 times per week as recommended by ACSM can decrease subcutaneous fat mass and visceral fat. Hodder & Stoughton (1997) convey that aerobic gymnastics can lower the body fat percentage, as well as adding muscle myofibril, solid bone structure, and connective tissues. Fitness is influenced by nutritional status (body fat composition). VO_2 max largely depends on body mass and lean body mass, whereas excessive fat mass imposes an unfavorable burden on cardiac function and oxygen intake by working muscles. It is suggested that the reduction of oxygen uses by adipose tissues during exercise reduces the

overall VO_2 max (Chatterjee et al., 2004). Auliadina (2019) adds that VO_2 max also affected by gender. The differences of VO_2 max between male and female is related to the differences of body size and composition. Physiologically male body is different with female body, which female body has more body fat than muscle if compared with male's body. That is why female has low VO_2 max level. Besides of that, the differences in hemoglobin concentrate level also affecting body ability to get high VO_2 max level. Female hemoglobin degree is higher than male, this fact shows that oxygen tied by hemoglobin cannot be distribute well.

Body composition is a comparison of body weight with fat to weight without fat. Body fat is stored in adipose tissues that resides between the skin and the muscles, especially on the abdomen, pelvis, arms, and back (Djoko PI, 2000:56). Evaluation on body composition is one of the essential components for Body Fitness assessments. Based on the research data, most respondents (61.3%) were at the normal category of body fat percentage (19 people). The small portion of the respondent (16.1%) was at the ideal category of body fat. This indicates that the prospective healthcare officers of Hajj still need to keep his body fat percentage to be ideal in order to be able to perform mobility services to the Pilgrims well. Someone's nutritional status can be measured by Body Mass Index, belly circumference, and body fat percentage. Body Mass Index (BMI) can be measured by counting body height (meters) per body weight (kilograms). The lower Body Mass Index, the higher maximum oxygen capacity. On the other hand, the higher Body Mass Index, the lower maximum oxygen capacity (Auliadina, 2019).

Excessive Body Mass Index can be caused by over consumption or due to lack of activity. Fat deposits in the body can cause narrowing of the blood vessels so that the cardiorespiratory system works extra to be able to supply the need of oxygen of the cells and the entire body tissues (Saudail Ghomim, 2017: 84). Based on obtained data, most of the respondents (48.4%) were at the category of overweight (15 people). A small portion of the respondents (6.5%) was in the category of obesity (2 people). Auliadina (2019) explains, it is important to measure belly circumference which is can determine the height of fat degree inside the stomach generally. Belly circumference can be measured by girth measuring tape on the belly. From the explanation above, it indicates that the healthcare officers of Hajj need to control the body weight along with healthy and nutritious meal menus, as well as doing aerobics such as: brisk walk, jogging, biking, and aerobic gymnastics. Prospective healthcare officers of Hajj who do not want to make adjustment between energy input and energy output will result in overweight. Doing exercise can improve personal health both dynamic and static. Dynamic health is the ability to perform physical activity in a good way (Prasetyo, 2020).

Metabolic age is a numerical calculation that shows the age of the body in terms of the type of metabolism. If the body age is higher than the birth age, it indicates overweight or obesity. If the metabolic age is lower than the birth age, it indicates that the body is in good condition, healthy, getting lower, and getting healthier. Based on the data, there are 71% of respondents who are categorized as older than their actual age. This shows that prospective health workers have experienced a decrease in the type of metabolism. Under these circumstances, prospective hajj health workers should make better preventive efforts so that the body is always healthy and fit in order to provide excellent service to pilgrims.

CONCLUSION AND SUGGESTIONS

Prospective medical officers in carrying out their duties need to have a good understanding of physical training and performance, because the pilgrims served are a lot and having different characteristics (age, gender, education levels). Cardio-respiration endurance has a relationship with body fat. The higher endurance of cardio-respiration, the lower the body fat is. In addition, the body age that becomes an indicator of cell mass age is also significant to the Hajj healthcare officers. The understanding of physical training and performance of prospective Hajj healthcare officers must be prepared and increased gradually, because the Hajj healthcare officer does not only work while at Makkah and Medina, but also during the health and fitness coaching preparation for their own selves as officers and fitness coaching for prospective pilgrims. It is important to improve the quality of Hajj services in the future.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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DIFFERENCES BETWEEN CHILDREN'S ANTHROPOMETRIC AND PHYSICAL FITNESS CHARACTERISTICS URBAN AND RURAL AREAS

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Abstract: Purpose: The paper aims differences between children in urban and rural area of anthropometric characteristics and physical fitness in children aged 13 years old. Material and Methods: The sample of entities is 80 children aged 13 years old male, who are divided into two sub-groups such as 40 children from the center of Prishtina and 40 children from the village Bardhosh of Prishtina. The sample of variables consists of 10 anthropometric variables and physical fitness, from those in anthropometric characteristics are variables and struck 3 of them 7 physical fitness. Results: Children from urban areas have shown better values for anthropometric characteristics, while children from rural areas have shown better performance physical fitness indicators. The T-test confirmed statistically significant differences only in the variables with body mass ($p=0.030$), body mass index ($p=0.004$). Courses in physical fitness have statistically significant differences in almost all variables vertical jump ($p=0.072$), sit-up me worth ($p=0.000$) upper-back ($p=0.009$), sit and reach ($p=0.065$) overhead medicine ball throw ($p=0.009$). While in the body mass index (BMI) classification these body mass variables have shown significant differences ($p=0.000$), body mass index ($p=0.000$), standing long jump test (Mean Diff. 5.8, $p=.078$), sit-up ($p=0.000$), upper-back ($p=0.003$) and sit and reach ($p=0.050$). Conclusions: We can find that children from urban areas have shown better value in anthropometric characteristics, while children from rural areas have shown better value in physical fitness.

Keywords: Differences, urban and rural areas, anthropometric, physical fitness, children.

INTRODUCTION

Economic and social factors exert a greater influence on the development of somatic features than the development and function of children. It is more important to consider living in urban settlements and the number of children in the family is very important for children with good physical health (Siniarska et al., 2021).

In this case, these two factors are related to each other and constitute a very important and interesting combination. However, a type of socio-economic model can develop and modify the physical and biological development of a young human body. Many opinions from different authors analyze the above factors which emphasize the fact that depending on the area of residence, well-off families provide better conditions for the development of their children. In contrast (Mack-Inocentio et. al.,D, 2020)found no relation between the motor performance capabilities and the size of the population. Further, the results of the MOMO study conducted in Germany show that the motor performance capabilities of children and juveniles from rural and urban areas do not differ (Thomas et al., 2021) but that children and juveniles from rural areas have a twice as high chance of being physically active outdoors at least four times a week (Jarani et al.,2016). Several studies have correlated the performance level with different lifespan condition leading researchers to assess a shared protocol for testing physical performance. Indeed, since 1988 within Council of Europe (CE) the EUROFIT battery test was accepted by numerous European countries as an uniformed procedure for the assessment of health-related, functional and motor status of people. Differences within gender and manhood, intellectual disability, living areas influence (urban or rural) or sport practice have been investigated in different country (not only in Europe) (Mack-Inocentio et al., 2020). However, evidence is still inconclusive, since it was recently found that children participating in sport clubs demonstrate higher fitness indices, over a 4-year period, as compared to their non-participating peers, irrespective of living area (urban or rural) (Golle K., 2014; Tsolakis et al., 2022). According to data from the Kosovo Agency of Statistics (KAS), the population of Kosovo lives mainly in rural areas with 62%, while in urban areas with 38% (ASK, 2011). It should be noted that in the Municipality of

Pristina mainly the population is in the urban area, while a smaller number in the rural area. In this paper its main purpose is the differences between children in urban and rural area of anthropometric characteristics and physical fitness in children aged 13 years.

METHODS

Participants and Study Design

The sample of subjects is 80 children who are 13-year-old male children. They are divided into two sub-groups such as 40 children from the center of Pristina and 40 children from the village of Bardhosh in the Municipality of Pristina. In this case, the children of the lower secondary school of pre-university education were evaluated, who voluntarily participated in this study. Before the study started, in coordination with the school principal and the teachers of Physical Education, Sports and Health, only 13-year-old children were selected. All participants were informed of the risks, benefits, and nature of the study before the experiment began. The statements of the parents with their consent signed by all subjects based on the Helsinki Declaration were also taken.

Anthropometric and physical testing

Anthropometric Measurements: The sample of variables consists of 10 anthropometric and physical fitness variables, of which anthropometric variables are 3 while of that physical fitness are 7 skills. Body mass is estimated in light clothing and without sneakers with an accuracy of up to 0.1 kg (Tanita BC530), while body height is estimated with a stadiometer with an accuracy of up to 1 cm (SECA, Germany). Body mass index (BMI) is a value derived from a person's mass (weight) and height. BMI is defined as body mass divided by the square of body height, and is expressed in units of kg/m², resulting from mass in kilograms and height in meters (Lahav et al., 2021).

Evaluation of Physical Fitness: Assessment of explosive strength in this scope are included tests. The two tests for evaluating explosive strength were the Standing Broad Jump (SBJ) and the Vertical Jump Test (VJT). They were performed in accordance with the described protocols (Thomas, et al., 2021). Repetitive strength - Two tests have been included in this ability, such as sit-up test for 30 seconds (Sit-Up) and Upper-back test for 30 seconds (Upper-back). The tests were performed on fixed leg sit-ups, while Upper-back arms fixed on the feet resting on the ground for a time of 30 seconds. These tests measure the endurance of the abdominal, thigh and arm muscles (Richard, et al., 2020). The sit and reach were administered with a standard protocol with trained technicians using a sit-and reach box (Ayán Pérez, et al., 2020). The participant sat on the floor with the legs extended, shoulder width apart, and feet flat against the box. With one hand on top of the other, the participant slowly slid the hands across the top of a ruler attached to the top of the box until maximum reach was attained. The participant completed three reaches and the best reach was recorded. Measurements were recorded to the 25 cm and converted to centimeters for analysis.

Overhead Medicine Ball Throw: Subject stands behind the starting line with feet slightly apart in line with shoulders, then he throws medicine ball overhead. Two tests are performed and the longest distance is reported in cm. This test evaluates the upper limb strength (Wenjuan et al., 2022). 10x5 m Shuttle run test (10x5): Subject is required to run back and forth as fast as possible ten times, along a 5 m course. Test is performed twice, and the best performance is chosen and expressed in decimals. This test evaluates speed of movement, agility, and coordination (Siniarska, et al., 2021; Tsolakis, et al., 2022).

Before carrying out this paper-experiment, the researchers involved in the project participated in the training to guarantee the standardization, validity and reliability of the measurements. The tests were part of the EUROFIT test batteries, validated and standardized by the European Council. In the data processing methodology was used the program SPSS version 22. In which are presented the statistical parameters and the analysis of the T-test for testing two independent groups among themselves where the statistically significant differences are presented. In this case the classification of body mass index (BMI) will be done.

RESULTS

Table 1. Anthropometric and physical fitness characteristics between urban and rural areas

	Total (80)		Urban (40)		Rural (40)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Body mass (kg)	41.1	8.3	43.2	7.6	39.2	8.5
Body height (cm)	1500.9	82.7	1507.8	75.7	1494.1	90.0
Body mass index (kg/m ²)	18.1	2.5	18.9	2.46	17.28	2.47
Standing long jump test (cm)	135.6	14.7	134.0	17.1	137.7	11.7
Vertical jump test (cm)	19.6	4.1	17.6	3.9	21.6	3.2
Sit-up (sec.)	19.5	4.1	17.5	3.9	21.4	3.3
Upper-back (sec.)	22.9	63	21.2	6.3	24.7	5.1
Sit and reach (cm)	-2.5	6.9	-3.9	6.2	-1.0	7.5
Overhead medicine ball throw (cm)	291.9	56.4	275.6	59.6	308	48.5
10x5 shuttle test (sec.)	416	5.2	41.5	5.6	41.6	4.6

According to the inspection in table 1. in anthropometric variables and physical fitness, see that children from urban areas have higher values in anthropometric variables, while in rural areas have higher values in physical fitness. In the variable body mass in urban areas they showed an average value of 43.2 (7.6), while in the rural area it showed an average value of 39.2 (8.5), while body height in the urban area showed an average value of 1507.8 (75.7), while in the rural area it showed an average value of average 1494.1 (90.0). It should be noted that the body mass index of children in urban areas have shown value within normal limits, while in children from rural areas have shown low values of underweight. In this case it should be noted that the variable thigh circumference in children in the urban area has an average value of 45.8 (5.6), while in the rural area with an average value of 42.3 (5.4). Other variables have approximate results between urban and rural area in anthropometric space. Significant difference was shown by all tests between children from urban and rural areas, except the 10x5 shuttle test. The variable stranding long jump test in children in the rural area with a value of 137.7 (11.7) while the urban area has a value of 134.0 (17.1), while the variable vertical jump test has a value of in the rural area has a value of 21.6 (3.2), while the urban area with value 17.6 (3.9). The sit-up variable in rural areas has a value of 21.4 (3.3), while in urban areas it has a value of 17.5 (3.9), while the upper-back has a value in rural areas has a value of 24.7 (5.1), while the urban area with results 21.2 (6.3). The sit and reach variable has a value in the urban area showed a low value of -3.9 (6.2), while in the rural area with a value of -1.0 (7.5), while the variable overhead medicine 3 ball throw has a high value in the rural area of the result 308 (48.5), while in the urban area with a value of 275.6 (59.6).

Table 2. Differences between anthropometric and physical fitness of urban and rural

	Urban Mean/Std. Dev.	Rural Mean/Std. Dev.	Sig.	Mean Diff.
Body mass (kg)	43.2(7.6)	39.2(8.5)	0.030	-4.0
Body height (cm)	1507.8(75.7)	1494.1(90.0)	0.462	-13.7
Body mass index (kg/m ²)	18.9(2.46)	17.28(2.47)	0.004	-1.6
Standing long jump test (cm)	134.0(17.1)	137.7(11.7)	0.331	3.2
Vertical jump test (cm)	17.6(3.9)	21.6(3.2)	0.072	2.2
Sit-up (sec.)	17.5(3.9)	21.4(3.3)	0.000	4.0
Upper-back (sec.)	21.2(6.3)	24.7(5.1)	0.009	3.4
Sit and reach (cm)	-3.9(6.2)	-1.0(7.5)	0.065	2.9
Overhead medicine ball throw (cm)	275.6(59.6)	308(48.5)	0.009	32.7
10x5 shuttle test (sec.)	41.5(5.6)	41.6(4.6)	0.970	.0

According to the data presented by urban and rural areas we see that we have significant differences between the two areas. The body mass variables showed statistically significant differences in value (Medan Diff. 4.0 $p = 0.030$), the body mass index variables showed statistically significant differences in value (Mean diff. 1.6, $p = 0.004$). While the physical fitness, vertical jump test with value (Mean Diff. 2.2 $p = 0.072$), then sit up with value (Mean Diff. 4.0, $p = 0.000$), upper back variable with value (Mean Diff. 3.4 $p = 0.009$), sit and reach (Mean Diff. 2.9, $p = 0.065$) and the variable overhead medicine ball throw value (Mean Diff. 32.7, $p = 0.009$).

Table 3. Anthropometric and physical fitness based on BMI

	Non-Overweight Mean/Std.Dev	Overweight/Obese Mean/Std.Dev	Sig.	Mean Diff.
N (%)	47	33		
Body mass (kg)	36.3 (5.2)	48.1 (6.9)	0.000	-11.78
Body height (cm)	1489.4 (84.9)	1517.3 (78.4)	0.140	-27.8
Body mass index (kg/m ²)	16.2 (1.2)	20.7(1.4)	0.000	-4.5
Standing long jump test (cm)	138.1(14.0)	132.2(15.1)	0.078	5.8
Vertical jump test (cm)	26.9(6.1)	25.7(4.5)	0.365	1.1
Sit-up (sec.)	21.0(3.9)	17.6(3.5)	0.000	3.4
Upper-back (sec.)	24.5(5.1)	20.6(6.3)	0.003	3.9
Sit and reach (cm)	-3.7(7.1)	-.6(6.5)	0.050	-3.1
Overhead medicine ball throw (cm)	288.42(47.3)	297.0(67.8)	0.504	-8.6
10x5 shuttle test (sec.)	41.0(4.5)	42.4(5.8)	0.221	-1.4

After classifying the body mass index, two levels of the body mass index are categorized, such as low weight and normal weight in table 3. In this case significant differences are presented in the groups which are classified in the group of low weight with normal weight. The variable body mass has shown significant differences in value (Mean Diff. 11.78, $p = 0.000$), the variable body mass index has shown significant differences in value (Mean Diff. 4.5, $p = 0.000$). In the physical fitness, the standing long jump test has a significant difference in value (Mean Diff. 5.8, $p = .078$), the sit up test has a significant difference in value (Mean Diff. 3.4, $p = 0.000$), the upper back test has a difference significant value (Mean Diff. 3.9, $p = 0.003$) and the sit and reach test have significant differences in value (Mean Diff. 3.1, $p = 0.050$). The variables body height, leg length, arm length, wrist width, vertical jump test, overhead medicine ball throw and 10x5 shuttle test did not show significant differences between the two groups.

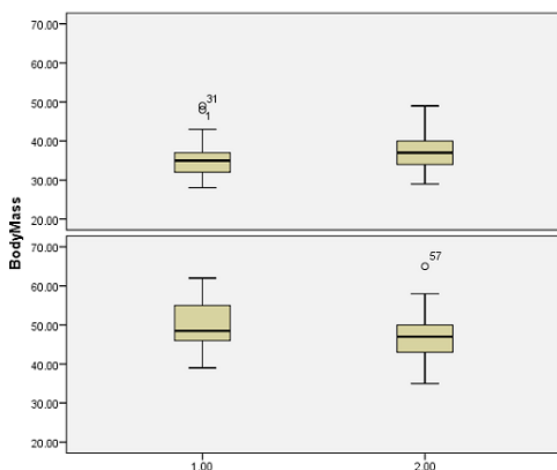


Figure 1. Body Mass

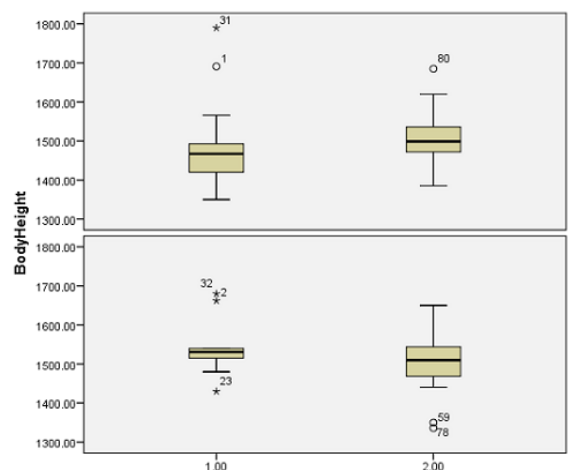


Figure 2. Body Height

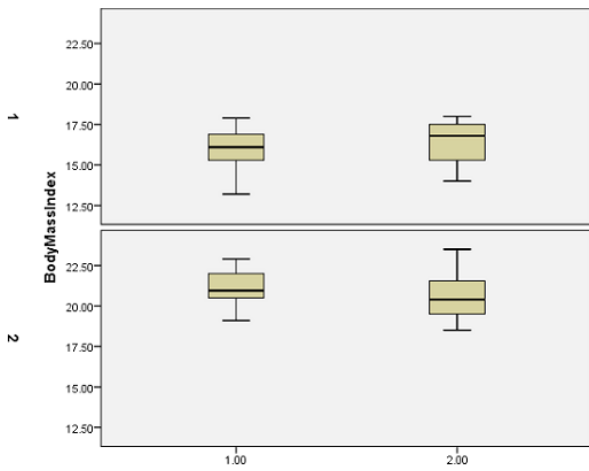


Figure 3. Body Mass Index

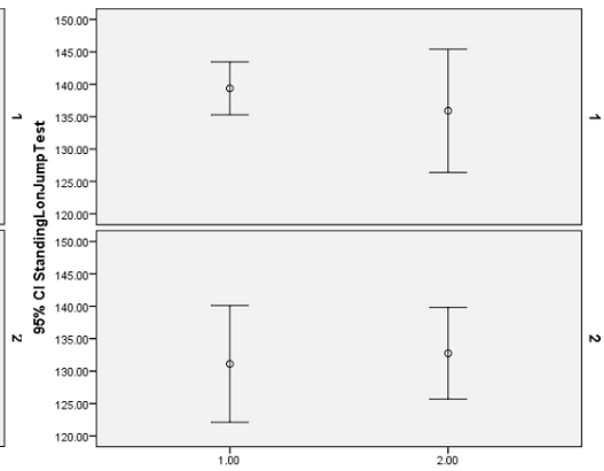


Figure 4. Standing Lon Jump

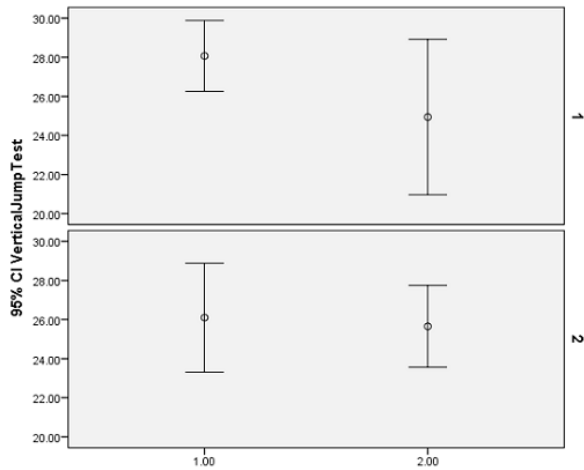


Figure 5. Vertical Jump

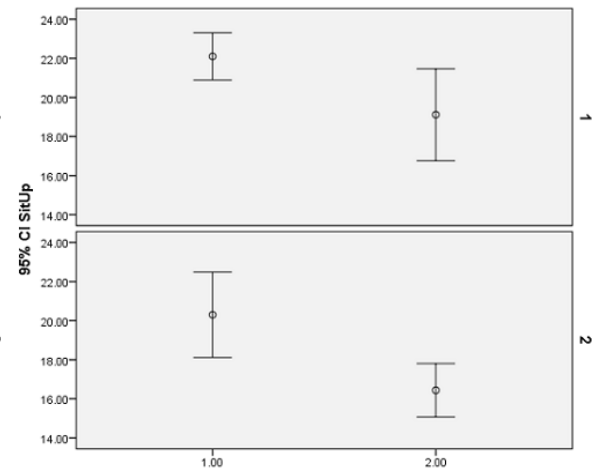


Figure 6. Sit Up

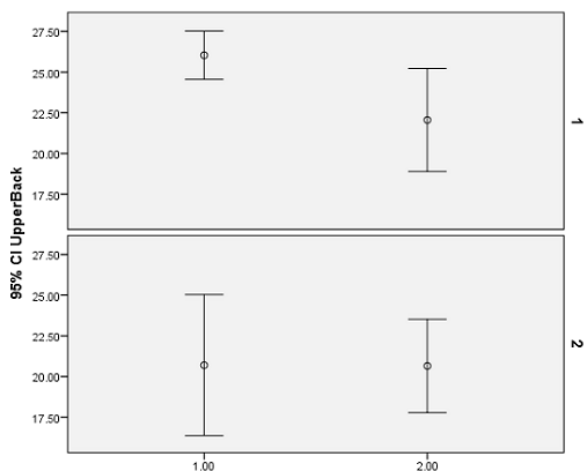


Figure 7. Upper-Back

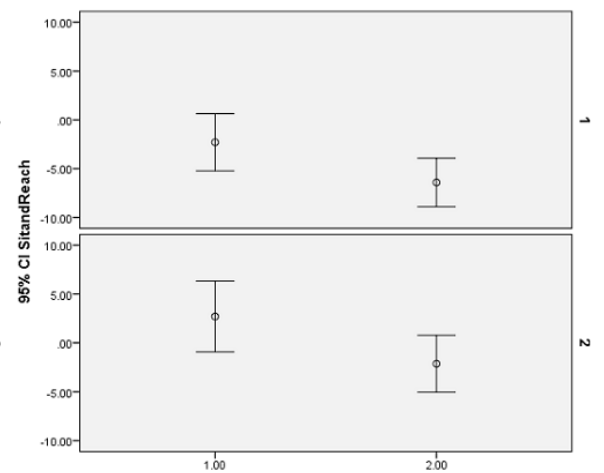


Figure 8. Sit and Reach

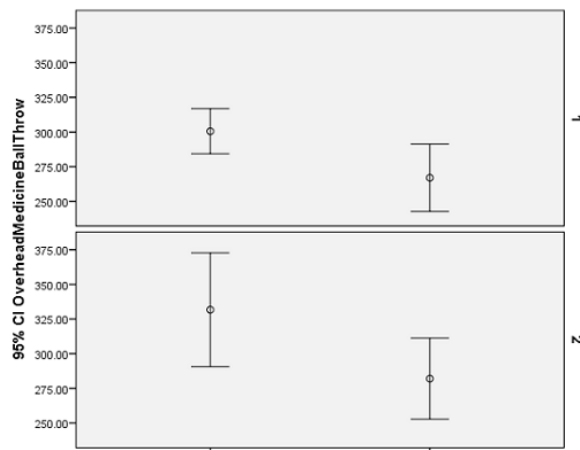


Figure 9. Overhead Medicine Ball Throw

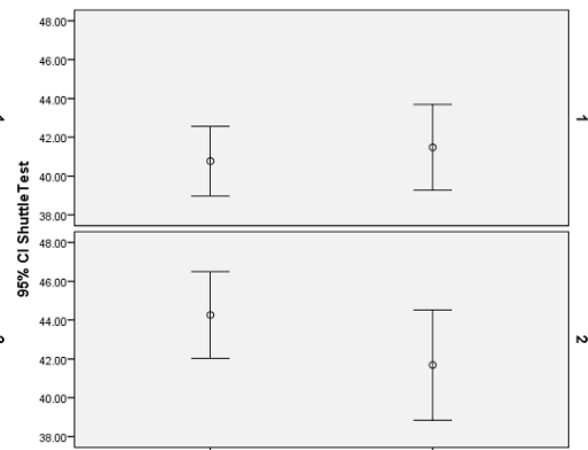


Figure 10. Shuttle test

DISCUSSION

According to this paper presented it is seen that anthropometric and physical fitness characteristics of children from urban and rural areas are given. The basic characteristics and statistically significant differences between the two groups, presented as children of urban and rural areas, are also presented in detail and described. In their paper, they studied the effects of social influences in the urban environment on the motor performance skills and activity level of preschool children. It has been reported that children from urban areas are deprived of the level of physical activity and physical fitness as it is due to urban living conditions and free time of children in daily life (Greier et al., 2013). Their study analyzed the effects of social influences on the motor performance capabilities in the urban area of Berlin (Germany), but it did not analyze differences between urban and rural areas. Most studies on the motor performance capabilities in relation to the size of the population have focused on elementary school children and juveniles, while aged children have rarely been analyzed in this context. This is the objective of this study, in which a representative sample of Tyrolean kindergarten children has been analyzed for influences of rural and urban living areas on the motor performance capabilities. It is important to already detect deficits in the development of motor performance capabilities, since children can be influenced very early and no relevant pre-existing impairments exist at this young age (Ketelhut, et al., 2006). Body mass index and body fat percentage are slightly higher in the urban boys and girls but they do not differ significantly. Urban children perform significantly better in the 20 m dash, standing long jump and timed sit-ups. Urban and rural boys and girls do not differ significantly in the flexibility. This study determined if selected levels of urbanization affected the physical fitness status of children in Croatia. The results suggest that the differences in children's health-related physical fitness profiles are due to the level of urbanization (Ujevic, et al., 2013; Tian, et al., 2021). In contrast, a Turkish study reports, among other things, that no significant differences were found in the cardiopulmonary and motor fitness between the urban and rural group, but the flexibility (SAR and side bending) and muscle endurance (dynamic sit-ups) were significantly higher in the rural group. In addition, flexibility and muscle endurance were significantly higher in the rural children. The significantly lower flexibility, muscle endurance, and strength of urban children might indicate a lower habitual physical activity level (Tinazci, et al., 2009). For example, among Cypriot urban and rural young people, there were significant differences for the standing broad jump, sit-ups, 20m shuttle run, and hand grip tests; there were no significant differences for flamingo balance, sit and reach, plate tapping and speed shuttle run tests (Tinazci, et al., 2009). On the other hand, one study conducted in Greece did not find any difference for the measured physical fitness components (flexibility, muscular fitness, cardiorespiratory, and speed and agility) among rural and urban young people (Tsimeas, et al., 2005). A research realized in Croatia showed that children from urban areas show better results in the fitness test 20 m dash, standing long jump and timed sit-ups. Urban and rural boys and girls do not differ significantly in the flexibility. Also, in the research of (Tsimeas, et al., 2005; Ozdireç, et al., 2005) is determined that children from urban areas achieve better results in certain fitness tests than their peers who live in rural areas. Regarding the impact of anthropometric indicators and physical fitness on body mass index in children living in urban and rural areas in the Republic of Kosovo, we can distinguish that in children of urban areas the impact of statistically significant body mass index (BMI) has the variables body mass, body height and 10x5 shuttle test while in rural children have influence with statistical significance on the body mass index (BMI) have the anthropometric variables mass and body height. Tested the impact of some motor skills on body mass index and some subcutaneous adipose tissue and concluded that motor skills have no statistically significant effect on the variables body mass index, triceps adipose tissue and adipose tissue.

CONCLUSION

In general, this usually seems to have a marked difference in anthropometric characteristics and physical fitness in urban and rural areas. In this case children from urban areas have shown better values in anthropometric characteristics, while children from rural areas in physical fitness have shown better values in all tests. Statistically significant differences were also observed in the variables body mass. While other variables did not show statistically significant differences. In physical fitness significant differences in almost all variables, except the test standing long jump test and 10x5 shuttle test. After classifying the body mass index, the two levels of body mass were categorized, such as low weight and normal weight, in this case we have significant differences in these variables body mass index. We can find that children from the urbane area have shown better values in anthropometric characteristics, while children from rural areas have shown better values in physical fitness.

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LATENT HYPERTENSION AND DYSAUTONOMIA AMONG ATHLETES WITH OFFICE PREHYPERTENSION DURING ONE YEAR TRAINING MACROCYCLE

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Abstract: The research topicality is needed to diagnose in time and correct properly athletes' autonomic dysfunction (especially among sportspeople with pre-pathological states). The study of latent hemodynamic changes and detection of dysautonomia among prehypertension athletes (particularly those who train heavily) is a promising way to raise sportsmen's health and achievements.

The research purpose is a hemodynamic profile study of athletes with office prehypertension during different training macrocycle periods.

Methods. The research comprised 30 athletes of acyclic activity. Their average age was 23.1 (2.71) years. Females were nine individuals (30%). We monitored arterial blood pressure and heart rate in each macrocycle period, carried out the dysautonomia test and established anamnesis and complaints.

Results. For prehypertension athletes, the most challenging moment was the competition period. Therefore, the systolic arterial hypertension rate within preparation, competitive and transition training periods was 17%, 47% and 7% ($\chi^2=14.53$; $p<0.001$) while the diastolic one was 17%, 37% and 7% respectively ($\chi^2=8.75$; $p=0.012$). Significantly, we observed an increasing possibility of arterial blood pressure rise over normal values among dysautonomia athletes during the competition period (RR=3.27 ($p=0.01$); OR=8.33 ($p=0.006$)). However, during the preparation and recovery periods, arterial hypertension possibility was not significant ($p>0.05$).

Conclusions. In the competition period of training macrocycle is highly expectable development of arterial hypertension of latent course in athletes with office prehypertension. Besides, the relative risk of latent arterial hypertension in extra-training time increases if there are other symptoms of dysautonomia, but these changes are not persistent. However, their proper diagnosing and correcting may lead to athletes' better health and achievements

Key words: arterial blood pressure, office prehypertension, dysautonomia, arterial hypertension in athletes.

INTRODUCTION

According to the latest review of the European Guidelines for Management of Arterial Hypertension (Williams, B., et al. (2018), systolic pressure of 130-140 mm Hg and a diastolic pressure of 85-90 mm Hg are regarded as high average values of arterial pressure (prehypertension). In such a pre-pathological state, there is an increasing rate of undesirable cardiovascular problems, e.g., persistent hypertension (Kokubo, Y., & Kamide, K. (2009). In terms of sports activities, there are currently no data on system differences in approaches to predicting and assessing probable risks during arterial blood pressure rise among sportspeople and other persons (Berge, H. M., Isern, C. B., & Berge, E. (2015), Pescatello, L. S., et al. (2019). Athletes' arterial blood pressure increase is noted to depend on physical load (prevalence of cyclic or acyclic exercises). It is the most typical problem within examinations: usually, there are over two-thirds of prehypertension sportspeople among all examined people. Besides, high arterial pressure is considered to influence myocardium change (Hedman, K., et al. (2019). According to our research Brizhatyi, A., et al. (2020), prehypertension athletes are more sensitive to repolarization disorders detected in people with athletic heart syndrome.

The main reasons for arterial blood pressure rise are chronic stress (caused by overtraining) and subsequent autonomic regulation disorders (occurring as inhibited parasympathetic reactions and hyper-activated sympathoadrenal system) (Baumert, M., et al. (2006). Although prehypertension is not regarded as a pathological state, hypertension progress can bring serious consequences. Nevertheless, one should base the hypertension diagnosis on the persistence of detected hypotension changes (Williams, B., et al. (2018). Our works note that top athletes need thorough

screening to search for latent pathologies (particularly, to assess the cardiovascular state) Ataman, Y., Korzh, V., et al. (2019), Ataman, Y., Brizhata, I., et al. (2020). In the case of arterial hypertension, the ambulatory blood pressure checks among football players with average values defined latent hypertension when the rate was 30-50% (Berge, H., Andersen, T., Solberg, E., Steine, K. (2013).

Latent hypertension rises among young and physically active people because of stress and exercise (especially those with high normal arterial blood values (Williams, B., et al. (2018), while cardiovascular risk may occur more often than persistent hypertension. The above-mentioned European guidelines offer the use of the ambulatory or home arterial blood pressure check to detect latent hypertension. However, the ambulatory check has many drawbacks that affect athletes' training significantly. They mainly are training discomfort, daytime activity changes and hemomanometer sleep use. The home arterial blood pressure check does not have such drawbacks. It is more suitable to apply in unusual training circumstances and measure the pressure regularly for the whole day (Vischer, A. S., & Burkard, T. (2016). Since hemodynamic changes occur among athletes (especially those who often practise strength exercise (Kreher, J., & Schwartz, J. (2012), we decided to study arterial blood pressure profiles during three-period in a year training macrocycle. It consists of the preparation, competition and recovery periods (Platonov, V. N. (1997), Garrett, W., Kirkendall, J., & Kirkendall, D. (2000). They differ in physical and emotional loads, flight adaptation challenges, circadian disorders, diets, etc. Such factors may significantly affect athletes' overall health state and arterial blood pressure values.

The research purpose was to study hemodynamic profile of acyclic athletes with office prehypertension during different year macrocycle periods.

MATERIALS AND METHODOLOGY

We conducted our research within a group of 30 athletes (jumping, throwing, hurdling, shot put) at the Sumy State University Sports Medicine Centre in 2017-2021. Weekly training activity of all examined people had been over 8 hours within the last three months until the research began. Athletes accepted the research proposal after an advanced examination during the first ten days of the preparation period. The average age was 23.1 (2.71) years. Females were six individuals 9 (30%). Sports anamnesis duration was 10.1 (2.95) years. Although six persons (23.3%) revealed chronic locomotive problems, they might train and compete. All participants consented to conducting the research and processing their data. The Sumy State University Medical Institute Bioethical Commission considered and approved the issue of bioethical standards compliance within the research.

We measured the office arterial blood pressure via the oscillometric method (with a proper cuff size as to upper arm features, according to standardized principles of office blood pressure measurement) Vischer, A. S., & Burkard, T. (2016), James, G. D., & Gerber, L. M. (2018). Athletes measured their blood pressure twice a day: after waking up and in over 2 hours since the end of evening training. They performed such a procedure for 3-7 days ($M=5.9$ (1.2) days) as to the principles of home blood pressure check (Vischer, A. S., & Burkard, T. (2016), Stergiou, G., Kario, K., Kollias, A., McManus, R., & Ohkubo, T. (2018). Besides, all athletes provided their anthropometric measures and complaints. They also completed the Vein test (Vein, A. (1998), and general examination. The principle mentioned above occurred every four months in the year macrocycle's preparation, competition, and recovery periods. The year preparation period lasted for 228.1 (16.2) days. The competition period was 63.4 (6.1) days. The recovery period (including unplanned ones) comprised 72.0 (6.6) days.

We carried out the statistical analysis via the open web resource *socscistatistics.com* keeping medical statistics rules. The average values are indicated as M (SD), where M is means, SD is standard deviations. Discrete variables are shown as a percentage. We compared them by calculating the χ^2 criterion and the Yates correction (Haviland, M. G. (1990). Besides, we contrasted the means of different macrocycle periods via the ANOVA methodology for regular measurements. Rate values were contrasted to determine the χ^2 criterion. We measured the relative risk value (RR) to compute the symptom progress probability. To relate these factors to the arterial blood pressure levels, the odds ratio (OR) was used. The value of $p < 0.05$ was regarded as statistically significant.

RESULTS

We established that typical symptoms of athletes' prehypertension were chronic stress and vegetative dysfunction (table 1). Notably, weakness, sleep and exercise tolerance disorders occurred most often. The competition period

was the hardest: the rate of practically all symptoms was the highest ($p < 0.05$). On the other hand, in case of recovery and no need to keep fit, the symptoms softened (even compared to the preparation period). Remarkably, only two individuals (8%) revealed sleep disorders within the recovery period against five persons (20%) of the preparation period. The Vein index confirmed the obtained data (the vegetative dysfunction integrative index). We found its highest values of 9.44 (6.62) points among athletes of the competition period.

Table 1. Dynamics of anthropometric measures, training activity peculiarities and symptom presence during the year training macrocycle

Measure	Preparation period	Competition period	Recovery period	p
Body weight index (kg/m ²)	24.6 (5.25)	22.92 (4.32)	24.41 (4.37)	<0.001
Adipose tissue percentage	15,88 (3.14)	15,05 (3.71)	19.62 (5.1)	0.002
Average weekly training activity (hours)	18,45 (2.66)	15.35 (3.2)	12.17 (3.80)	<0.001
Weakness for at least 2 weeks	3 (10%)	12 (40%)	4 (13%)	0.008
Sleep disorders	5 (17%)	11 (37%)	2 (7%)	0.013
Higher efforts for standard exercise loads	9 (30%)	15 (50%)	3 (10%)	0.003
Higher sensitivity to cold and heat	6 (20%)	8 (27%)	3 (10%)	0.252
Other vegetative dysfunction symptoms	6 (20%)	9 (30%)	3 (10%)	0.221
Vein index (points)	4.48 (5.16)	9.5 (6.58)	3.22 (3.46)	<0.001
Rest heart rate during office control (beats/minute)	56.7 (10,23)	57.7 (8,72)	60.4 (8,59)	0.023

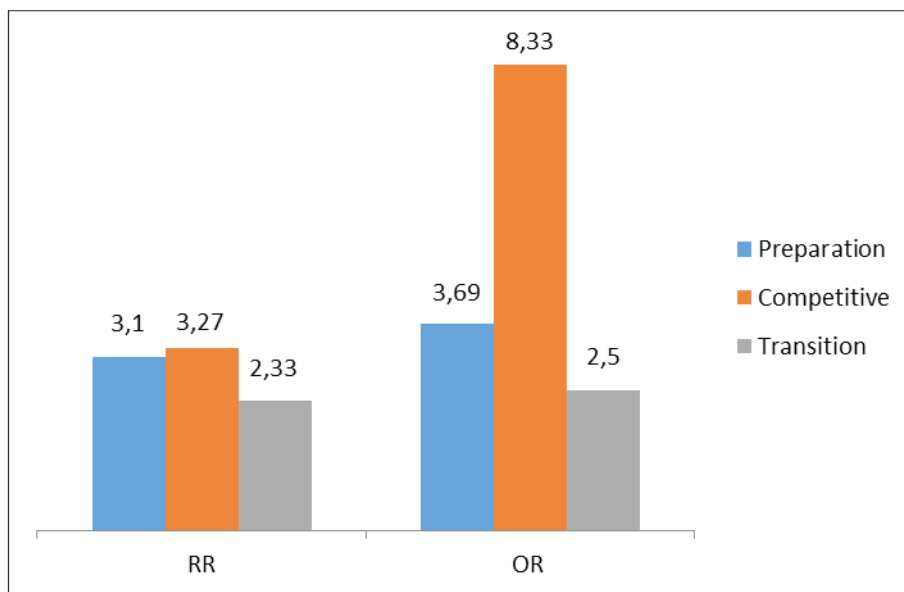
Comparing average office arterial blood pressure values with those of maximal home ones, we established a considerable prevalence of systolic and diastolic pressure for the competition period ($p < 0.001$). Meanwhile, the preparation period showed lower blood pressure values (table 2).

Table 2. Mean office and home arterial blood pressure on different stages of athletes' training

	Preparation period	Competition period	Recovery period	p
Office systolic arterial blood pressure	134.65 (3.36)	136.29 (3.1)	129.58 (7.28)	<0.001
Home systolic arterial blood pressure	136.41 (7.02)	141.91 (10.22)	131.2 (8.51)	<0.001
Office diastolic arterial blood pressure	83.77 (4.57)	85.55 (3.1)	79.45 (4.79)	<0.001
Home diastolic arterial blood pressure	85.2 (6.17)	91.57 (5.25)	80.33 (6.75)	<0.001

Comparing the rate values, we defined that latent arterial hypertension had prevailed in the competition period as well (detected only via home measurement). Therefore, the systolic arterial hypertension rate within three subsequent periods was 17%, 47% and 7% ($\chi^2 = 14.53$; $p < 0.001$) while the diastolic one was 17%, 37% and 7% respectively ($\chi^2 = 8.75$; $p = 0.012$). In three cases (10%), hypertension had an isolated systolic character possibly caused by measurement problems. We also calculated the relative risk (RR) and the odds ratio (OR) of latent arterial hypertension among prehypertension acyclic athletes depending on vegetative dysfunctions (figure 1).

Figure 1. Comparing the relative risk (RR) with the odds ratio (OR) of latent arterial hypertension depending on dysautonomia and training year macrocycle periods



Significantly, we observed an increasing possibility of arterial blood pressure rise over normal values among dysautonomia athletes during the competition period (RR=3.27 (p=0.01); OR=8.33 (p=0.006)). However, during the preparation and recovery periods, arterial hypertension possibility was not significant (p>0.05).

DISCUSSION

Acyclic activity requires exercising variably: one should alternate strength loads with anaerobic energy supply for the highest ones. Such sportspeople usually tend to non-functional overtraining, which is an important reason for athletes' vegetative dysfunction (dysautonomia) (Kreher, J., & Schwartz, J. (2012). Apart from constant overtraining, emotional stress, climate change, current recovery problems before essential competitions, and post-infection consequences can often affect athletes' organisms. These factors influence sportspeople's bodies within a year peculiarly: each macrocycle period differs in medical and biological challenges (Platonov, V. N. (1997). Obviously, athletes have the most substantial effect during intensive training and starts. In this respect, an individual approach to each athlete and study of early vegetative dysautonomia complaints are relevant. However, sometimes it is difficult to differentiate between the complaints themselves (e. g. weakness, exercise tolerance disorders) and chronic fatigue syndrome, lack of psychological support or motivation, etc.

Sports medicine doctors try to detect dysautonomia signs. Remarkably, among examined athletes, they progress as sympathoadrenal system hyperactivation with corresponding clinical implications (Grandou, C., Wallace, L., Impellizzeri, F., Allen, N., & Coutts, A. (2020). The latter can be latent and predict severe physiological dysfunctions. Thus, an ambulatory check of high normal arterial blood pressure (prehypertension) may regard the case as a personal physiological feature. On the other hand, it may imply dysadaptation or vegetative dysfunction. As mentioned in the introduction, prehypertension indicates a pre-pathological state and leads to the risk of persistent arterial blood pressure rise over normal values. A home blood pressure check can define latent hypertension in time (otherwise, one cannot detect it beforehand).

Our research showed that different year macrocycle periods have specific rates and signs of vegetative dysfunction. That concerns such symptoms as weakness, sleep and exercise tolerance disorders. We observed their increasing progress within the competition period. It is this period when a complex of chronic stress factors influences athletes. They may produce significant hemodynamic changes caused by sympathicotonia. The competition period registered the highest systolic and diastolic arterial blood pressure (both by the doctor and at home). Besides, the competition period revealed high rates of detecting arterial hypertension at home (almost every second prehypertension athlete). Additionally, the average home systolic arterial blood pressure exceeded normal values within the competition period and was 141.91 (10.22) mm Hg.

Competition hemodynamic changes tightly concern dysautonomia: we established an almost threefold rise in hypertension relative risk in the case of dysautonomia ($p=0.027$). However, such changes are temporary: during the recovery period, the arterial blood pressure of most athletes normalized (decrease by 10%). Meanwhile, hypertension lowered significantly (systolic pressure drop from 47 to 7%; diastolic pressure drops from 37 to 7%). There was a considerable reduction of heart rate values ($p=0.023$). All these phenomena resulted in a deep vegetative dysfunction recession. Thus, irrespective of no persistent hemodynamic changes among prehypertension athletes, we regard proper dysautonomia detection (latent arterial hypertension) as a way to improve athlete's health and achievements.

CONCLUSIONS

In the competition period of training macrocycle is highly expectable development of arterial hypertension of latent course in athletes with office prehypertension. Besides, the relative risk of latent arterial hypertension in extra-training time increases if there are other symptoms of dysautonomia, but these changes are not persistent. However, their proper diagnosing and correcting may lead to athletes' better health and achievements.

Conflict of interests

The authors confirm the absence of any conflict of interests.

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SIGNIFICANCE OF EARLY DIAGNOSTIC OF CARPAL TUNNEL SYNDROME

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Abstract: Carpal tunnel syndrome (CTS) is the most common compressive neuropathy. The conservative treatment remains the first therapeutic choice in the treatment of mild and moderate CTS. The aim of this paper was to examine the average age of female patients with CTS diagnosed by EMNG, the frequency of bilateral CTS and its correlation with the age, and to determine the grade of electrophysiological damage of the nerve when the CTS diagnosis is confirmed for the first time. The retrospective examination included 187 female patients, aged from 27 to 79, with complains on unilateral CTS. All patients underwent EMNG for confirmation of CTS and the degree of damage to median nerve. Statistical analysis was performed by methods of descriptive statistics, Kruskal-Wallis test, and the Student t-test. The value of $p < 0.05$ was considered statistically significant. The average age of the female examinees was 54.53 years. The bilateral CTS was confirmed in 67.9 %, most often of a moderate degree and more often on the right hand. No statistically significant difference was found in grades of CTS between the analysed age groups of patients that had the bilateral CTS ($p = 0.206$), nor there was a difference in years of life between the patients with unilateral and bilateral CTS ($p = 0.638$). Bilaterality of CTS, as well as the degree of the damage are not connected with age. The patients report timely for the first examination and diagnostics of CTS when there is still a possibility of the conservative treatment.

Key words: Carpal tunnel syndrome, Median nerve, Female.

INTRODUCTION

The carpal tunnel syndrome (CTS) represents a compressive neuropathy of median nerve at the level of the carpus, which is characterised by physiological proofs of the increased pressure in the carpal tunnel and decrease of nerve function at that level followed by resulting symptomatology (Graham, B., et al. 2016). Prevalence of CTS in the general population ranges from 3 % to 8 %, while in the group of women over forty years of age it is 6 % (Atroshi, I., et al 1999). If not observing the age, the prevalence is higher in women (0.7 % to 9.2 %), compared to 0.4 % to 2.1 % in men (Andersen, J. H., et al 2003). Women develop CTS 4-5 times more often than men with the peak of development between 50 and 59 years and after 80 years of age (Mondelli, M., et al. 2002). There are numerous risk factors among which are age, obesity, diabetes mellitus, rheumatoid arthritis, hypothyroidism and activities that require numerous repetitive movements in the wrist. Women who take contraceptive medications in menopause or use therapeutic oestrogen are also at high risk (Calandruccio, J. H., & Thompson, N. B. 2018).

Clinically, CTS may manifest on one or both hands, whereas the bilateral presentation is more often and ranges from 22 % to 87 %, an average of 69 % (Padua, L., et al. 1998). About half of patients with unilateral symptoms have electrodiagnostically proved bilateral CTS (Singjam, A., et al 2021). The factors that have been observed regarding the bilateral CTS are the age (45 to 65 years) and body mass index (BMI) that is higher than 29 (Zambelis, T., et al.2010; Kouyoumdjian J. A. 1999.). The occurrence of symptoms bilaterally is correlated with the length of the condition (Bagatur, A. E., & Zorer, G. 2001), whereas the occurrence of a stronger clinical presentation and earlier manifestation is on the dominant hand both in right and left-handed patients (Shiri, R., et al. 2007).

CTS is primarily a clinical diagnosis based on symptoms along with the utilisation of provocative tests primarily Tinel and Phalen's test. Electromyoneurographic examination is performed if there is a clinical suspicion of CTS and for deciding on surgical treatment. Nuclear magnetic resonance (NMR), computerised tomography (CT) and ultrasonography are not used in everyday work.

The treatment may be conservative or surgical. Most patients with a mild or moderate degree of CTS have positive responses to the an initial conservative treatment (Calandruccio, J. H., & Thompson, N. B. 2018), with the appli-

cation of orthosis (Hall, B., et al 2013) and local corticosteroid injection in the carpal tunnel (Atroshi, I., et al. 2013). However, other studies indicate a poorer outcome of treatment in patients that have initially received conservative treatment with a delay of the surgical treatment for 6 months than in patients that have initially received the surgical treatment (Cha, S. M., et al. 2016). There is strong evidence of higher treatment benefits after the surgical treatment of CTS after six and twelve months compared to the conservative forms, also orthosis, non-steroidal anti-inflammatory drugs (NSAIDs) and local corticosteroid injections (Graham, B., et al. 2016).

The research aims were to examine the average age of female patients who were electrodiagnostically determined with the presence of CTS, the frequency of the bilateral CTS and its correlation with the age as the risk factor. Also, aim was to determine the degree of electrophysiological damage to the nerve when the female patients receive the electroneurographic confirmation of CTS diagnosis.

METHODS

The research was carried out with the permission of the Ethics Committee of the Institute for Physical Medicine and Rehabilitation “Dr Miroslav Zotović” Banja Luka, the Republic of Srpska, Bosnia and Herzegovina (Decision No 116-01-3108-2/22). The data in the retrospective research were taken from the Cabinet for Electromyoneurography of the Department of Neurorehabilitation IIA of the Institute of Physical Medicine and Rehabilitation “Dr Miroslav Zotović” in Banja Luka. 374 findings of electroneurography were taken over in the period from 2010 to 2021 of female persons 27 to 79 years of age that have electrophysiological confirmation for the CTS diagnosis, and every second patient was included in this study. Therefore, total sample of the study was 187.

Non-inclusion criteria was: presence of systemic disease of the peripheral nervous system, ie injury of bone or soft tissue structures of the areas of carpal tunnel or an injury of median nerve (which would represent a basis for the secondary CTS), also pregnancy and women one year after childbirth.

The finding of electroneurography (ENG) was performed in all patients on device Nicolet EDX (*Natus medical Inc.*) by the same doctor. The electroneurographic finding is a part of the electromyoneurographic finding, which is performed as a routine diagnostic method for diseases of the peripheral nervous system and muscles, and it was conducted according to recommendations (Preston, D. C., & Shapiro, B. E. 2021).

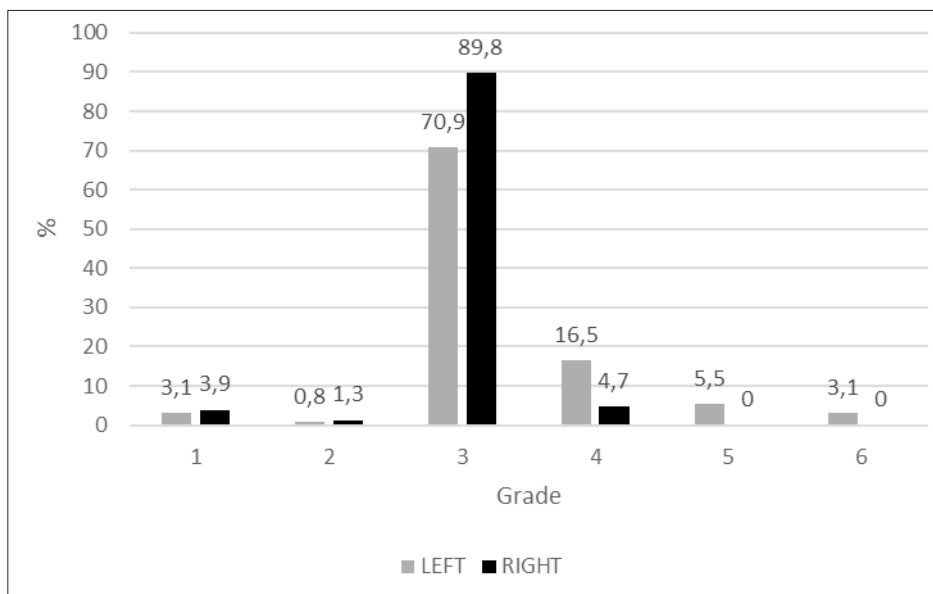
Data that were used in the processing were the age of a female patient, distal motor latency (DML) on both sides, conduction velocity of sensory nerves on both sides and the grade of damage according to the Padua et al scale (Padua, L., et al. 1997): grade 1- Extreme form of CTS: absence of motor and sensory response (SNAP and CMP); grade 2. Severe CTS: absence of the sensory response (SNAP) – a segment of carpus-finger and abnormal DML; grade 3. Moderate CTS: slow conduction (segment of carpus-hand) and abnormal DLM; grade 4. Mild CTS: slow conduction (segment of carpus-hand) and normal DLM; grade 5. Minimal CTS: “standardly negative” finding on hands with abnormal comparative or segmental (< 7-8 cm) tests; grade 6-Negative CTS: normal finding with all tests (including both comparative and segmental tests).

Statistical analysis was performed by the SPSS software, version 25, using methods of descriptive statistics, Kruskal-Wallis test, and the Student t-test.

RESULTS

In the research, data of 187 female patients were analysed and average age of patients was 54.53 years. Of the total of 187 patients that were analysed by ENG, 10.7 % had changes on the left hand, 21.4 % had changes on the right hand and most patients had bilateral CTS (67.9 %).

In cases where ENG proved the bilateral CTS, the changes were most often moderate, but the right hand had more expressed changes compared to the left (Graph 1).



Graph 1: Frequencies of changes on the right and left hand in bilateral carpal tunnel syndrome (CTS) that were confirmed by electroneurography (ENG)

When observing, in the whole sample, the hand that had more expressed symptoms, regardless of unilateral or bilateral localisation in most patients had a moderate symptom (Table 1).

Table 1. Frequency of certain grades (according to the scale of Padua and associates) of carpal tunnel syndrome (CTS) in the sample

Grade	1	2	3	4	5	6
%	1.6	0.5	68.3	19.4	6.5	3.8

Kruskal-Wallis test did not show a statistically significant difference in the grades of changes of median nerve in the carpal tunnel registered by ENG among analysed age groups of patients that had the bilateral carpal tunnel [Group 1 (31-40 years): N = 15, Group 2 (41-50 years): N = 25, Group 3 (51-60): N = 52, Group 4 (61-70 years): N = 22, Group 5 (≥ 71 years): N = 13] [$\chi^2(4, N = 127) = 5.909, p = 0.206$].

When analysing age and presence of unilateral/bilateral CTS, there was no significant difference (unilateral CTS: M = 53.97, SD = 12.44; bilateral: M = 54.8, SD = 10.76) (Student t-test: $t(185) = -0.471, p = 0.638$). The size of the difference in arithmetic means (difference in arithmetic means -0.836, CI: -4.338 to 2.665) was very small ($\eta^2 = 0.0011$).

DISCUSSION

The CTS, the focal attack on median nerve, represents the most common compressive neuropathy of a peripheral nerve. This is mostly a chronic form that develops for years and the symptoms often appear when there is already significant damage to the myelin sheath or even the reduction of the axon. Additional problem is that it affects the population that is still actively working. Therefore, the timely diagnostics and treatment, also the education of the population, play a significant role in maintaining the functionality, but also maintaining the working ability of the affected population.

The paper included female patients, considering that they are being affected by the disease in a significantly higher percentage. The average age of patients was 54.53 years of life, which is also confirmed by literature data (Padua, L., et al. 2016; Newington, L., et al. 2015; Atroshi, I., et al. 2011). A significant number of patients had bilateral CTS despite the exclusion of patients with systemic diseases, such as diabetes mellitus or rheumatoid arthritis. In this results, electrophysiologically 69.7 % of patients had bilateral changes, whereas 10.7 % of patients had changes that were found on the left hand and 21.4 % had changes on the right hand. Literature data state that the bilaterality is

sometimes present in 80.7 % of cases (Singjam, A., et al 2021), even though it is around 60 % in most studies (Padua, L., et al. 1998). There are different interpretations and assumptions for the development of the bilaterality in CTS. Some studies indicate the role of the systemic endocrine diseases (Papanas, N., et al. 2022; Oktayoglu, P., et al. 2015; Toesca, Aet al. 2008; Tang, H. C., et al. 2022), but a newer study denies such a relationship (Low, J., et al 2021). In this study, patients with systemic endocrine diseases were not included. Also, there are data in the literature that years of life impact the increase of bilateral CTS incidence (Werner, R. A., et al. 2004), which is also different from results in this study, where it was shown that age has no impact on the increase of bilateral CTS incidence. Bilaterality of CTS may be time-dependent and clinicians should be aware that patients who present with unilateral CTS are in risk of developing CTS in the contralateral hand (Bagatur, A. E., & Zorer, G. 2001).

Treatment of this disease may be conservative and surgical. A high level of evidence (Graham, B., et al. 2016) is in the successful application of orthosis, local application of corticosteroids in the treatment of CTS, as well as conservative methods, while the evidence is limited for some physical procedures such as ultrasound therapy and laser therapy. The evidence is also strong for the surgical treatment of CTS, which gives better results in 6 and 12 months compared to the application of immobilisation, NSAIDs and local administration of corticosteroids. Qualitative and quantitative analysis (Klokkari, D., & Mamais, I. 2018) are consistent with the results that the surgical treatment leads to better results in CTS treatment after six months and a higher improvement of neurophysiological parameters (distal motor latency and the speed of conduction of sensory fibres) compared to the conservative treatment. However, the results are not significantly better compared to the conservative therapy after 3 and 12 months. Many patients with a mild and moderate degree of CTS react to the conservative treatment, which is generally recommended as the initial one (Calandruccio, J. H., & Thompson, N. B. 2018), although there are results that show that patients who initially received the conservative treatment method and postponed the surgery up to 6 months in average had worse results compared to those who were initially treated by surgery (Cha, S. M., et al 2016). Even though there are advantages of the surgical treatment method, it is necessary to take into consideration possible complications of those as well. Therefore, conservative treatment remains the first line for the treatment of mild and moderate CTS (Multanen, J., et al. 2021). These facts were motivating for us to examine the degree of the median nerve damage at the moment when our patients report for the first time in order to electrodiagnostically confirm suspicions of CTS and if it is still possible to have the conservative treatment. In cases where it was electrophysiologically proved the presence of bilateral CTS, the changes were of mild degree most often, but the right hand had more expressed changes than the left one, although it was not statistically significant. When observing the hand that had more expressed symptoms, regardless of unilateral or bilateral localisation, again most patients had a mild degree of nerve damage. However, there was no statistically significant difference in the grades of electrophysiological findings for the registered changes of median nerve in the carpal tunnel between the analysed age groups of female patients, who had the bilateral carpal tunnel. This means that the years of life did not represent a factor that influenced the severity of changes on the nerve and the consequential clinical picture.

CONCLUSION

The degree on median nerve damage in CTS, as well as the presence of bilateral symptoms are not connected with age. The patients most often report with moderate degree of nerve damage, when there is still a possibility of the conservative treatment.

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THE EFFECT OF USING DEDUCTIVE AND INDUCTIVE METHODS ON THE VERBAL INTERACTION OF PHYSICAL EDUCATION AND SPORT PROFESSORS

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Abstract: This study investigates the effect of using the deductive and inductive teaching methods on verbal interaction of physical education and sport professors. The study uses the descriptive approach by tackling two samples of two different professors from the same secondary school (Houari Boumediene, state of El-Bayadh). Then it applies "Hamdan Tool" to observe and analyze the overall verbal interaction over 8 lectures. This research shows that there is less verbal interaction with the professor when he uses the inductive method comparing to the use of the deductive one. To sum up, the study recommends that the use of different methods where the professor's verbal interaction is less than the student's one. Moreover, a further research about this study is extremely needed.

Key words: Deductive and inductive teaching methods, verbal interaction, physical education and sport professor.

INTRODUCTION

A number of fundamental factors influence the educational and pedagogical process's success, including: the abilities of the teacher, and as a result, the willingness of contemporary education to cultivate learners' reflective, investigation, and research/creativity skills. In addition, this emphasizes the importance of utilizing all current teaching strategies to achieve balance between the requirements of students and teachers' professional abilities. Teaching techniques are one of these skills, and they are useful tools for the pedagogical process of learning in general and the treatment of scientific subjects in particular. Because of their effectiveness in providing quality instruction, teaching methods play a significant role in the educational process. A good teacher is one who can bring back a dead curriculum using a good teaching method; because the teacher's means of achieving the educational process's goals, including all of its educational and behavioural components, is the teaching method (Kalza, 1987).

The nature of the subject, the teaching objectives, and the level of study of the students, in addition to the scientific experience of the professor that will assist him in succeeding in a classroom setting, must serve as important foundations and criteria for the professor's selection of teaching methods. As a result, in order for the instructor to impart the desired knowledge to his or her students, he or she has to assume a number of appropriate classroom roles when implementing the chosen teaching strategies. In this regard, Mohsen Attia says in his book *Al-Kafi in teaching methods*: the educational philosophy on which the program is based, the educational objectives to be achieved, the material program and its type (Mohsen Attia Ali, 2006). As was mentioned earlier, the teacher's role has evolved into a mentor's one. Therefore, in order to guide the students toward the objective, professor must adopt a strategy that enables him to effectively communicate and explain the subject. It's also important to remember that methods and subjects cannot be separated. Methods and matters should be connected in a cohesive way. In addition, it is essential to select methods that takes advantage of the students' abilities and encourages them to examine and evaluate the results while also taking into account their cultural level; the logical order in which the issue was communicated. A correct teaching method saves the teacher and the learner's time and effort, in addition to evolving in an organized environment (Salem AbuZeid Attia, 2013). In the classroom, either combined or separated inductive and deductive methods are utilized. And also, they form the foundation of numerous instructional strategies aimed at encouraging student thought and participation. They are necessary for teaching sports and physical education in particular, as well as for education in general. Teaching techniques are unquestionably an essential component of general education. As

a teaching method, sports physical education does not depart from this educational conceptual framework. Additionally, we must conduct an objective measurement of this behavior during the interaction between the teacher and the student in order to attain mastery in teaching sports and physical education. We will be able to evaluate this behavior with the help of this measure, confirming it.

Scientific progress records in education are behind the emergence of many measurement methods, including the observation and analysis of classroom interaction, aiming at scientific evaluation of the teaching process. Classroom observation is one of the most important supervisory activities and tasks. Observation plays a major role in so-called young sciences, as well as in research dealing with new problems. In the field of educational sciences, for example, many studies are still at the stage of orderly observation, but they are essential (Dreij, 2000) (Jordan & Henderson, 1995). And if they are done correctly, they can have a significant and effective impact on the promotion of the teacher as well as the activation of his role of supervisor. There are a variety of interactions that take place in the classroom. One of them is interaction over the phone. It is further broken down into two kinds of interactions: both the teacher's and the students' speeches. We are aware of the significance of verbal interaction in the educational process, which is why we are interested in the topic. Something that can be seen in the study of Adel Ahmed Dahan AlAqbi(Aqbi, 2017), it intends to know the reality of the level of teaching of physical education and sports in the Republic of Yemen, through the collection of opinion of mentors, teachers and students of the sector. The results show that the teaching of physical education and sports in Yemen is not successful and effective. The research by Abdel Hafid Kadri study (Kadri, 2019) shows a field knowledge of the pedagogical behaviors that occur in physical education and sports classes. The instructions and directives given to intermediate and secondary school students, where the patterns of verbal interaction differ from one teacher to another; with differences in the ratios compared to the Hamdan standards (Hamdan M. Z., 2010), in some categories of experienced teachers. Through the field follow-up of the researchers, Hamdan notes that the teaching methods of professors, differ from one professor to another, and are not of the same effectiveness. Regardless their working experience.

After looking at the benefits of teaching methods for the educational process as a whole, the significance of physical and sports education, and the role that scientific observation plays in evaluating the teaching process; The following issue manifests itself: How does the physical education and sports professor's verbal interaction change as a result of teaching methods (deductive and inductive)?

MATERIALS AND METHOD

Participants

The researcher uses the semi-experimental approach to study the effect of using deductive and inductive methods on the verbal interaction of a professor of physical education and sports.

The study population consists of teachers of ElBayad Algeria, secondary schools (working place).

Table 1. Teachers as exploratory experience number in secondary schools

Secondary schools	Mohamed Belkheir	Cheikh Bouamrane	ElhassenIbn Elhaythem	Mahboubi Hadj Aneur
Number of teachers	02	01	02	01

- Two teachers from Houari Boumediene secondary school for the main experience (two teachers because there are only two teachers, from the secondary school because I work there and I can take videos for analysis)

Materials

- Filming is done for the exploratory experience in the El Bayadh secondary schools from 02/09/2020 to 02/20/2020.
- The basic experiment is conducted from 03/01/2020 to 09/13/2020.

Data collection tools

- Arab and foreign sources and references
- Cameras to film classes
- Hamdan’s tool for comprehensive verbal interaction

Study design

The filming is done for 8 teaching classes for two teachers. One using the deductive method and the other the inductive method. Then, half an hour is taken from each class (90minuts) and divided into units of five (05) seconds, where the verbal interaction of the professor is monitored. The analysis of the recorded videos, and the number of repetitions of terms related to the terms of the professor’s direct and indirect talk are recorded: (acceptance of pupils’ feelings, praise, encouragement and reward of pupils, teacher lecture or information, to the cell of the type and nature of pupils).

Hamdan’s standardise tool for comprehensive verbal interaction

The comprehensive verbal interaction tool contains sixteen behavioural groups. One additional (category 10) to show the type of pupils interacting with from the teacher. The tool describes two types of conversation or classroom interaction: teacher talk, talk and pupil reactions. While the teacher’s talk is divided into two main types: indirect and direct talk. Pupils’ reactions or classroom talk also consist of two types: talk, constructive and modern reactions, or non-constructive negative reactions.

The exploratory study

The researcher selects an exploratory sample of physical and sports education professors for El Bayadh secondary schools, consisting of 05 professors without the original study sample and fully similar to the original sample to ascertain the validity of the measurement tool.

Table 2. Results of the Pearson correlation coefficient to calculate the validity and reliability of the measuring instrument

Behaviors(teacher’s and pupils talk)	Sample volume	Computed correlation	Honesty Lab coefficient
The teacher indirect talk	06	0.90	0.94
The teacher direct talk		0.92	0.95
Constructive student talk		0.94	0.96
Unconstructive student talk		0.91	0.95
The tabular value of (R) is at the significance level 0.05 and below the sine degree 05 = 0.87			

Through table 2, the stability factor for the measurement tool categories (Hamdan’s tool) for comprehensive verbal interaction analysis is the lowest correlation coefficient (0.90) and the highest value (0.94), which shows that the tool is highly stable, and the researchers uses the self-honesty factor with the lowest value (0.94) and the highest value (0.96), which shows that the tool is characterized by a high degree of honesty.

Statistical analysis

Statistical analysis was performed using the SPSS software (version 25) and significance levels were set at $p \leq 0.05$.

RESULTS

Table 3. The value of the arithmetic average and standard deviation and (T) student applied between the two professors using the deductive and the inductive methods, that is from unloading Hamdan's verbal interaction tool results.

Teacher's talk	Teaching method	Arithmetic average	Standard deviation	Percentages	Teaching classes	The computed value (T)	Statistical significance	
The teacher indirect talk	Accepting student's feelings	Inductive	6.62	2.58	1.39	08	3.06	Function
		Deductive	2.75	1.56	0.61			
	praise encouragement and rewards	Inductive	131.8	25.03	20.49		7.36	Function
		Deductive	56.50	10.30	9.47			
	the use of pupil's ideas	Inductive	8.75	9.29	1.95		0.50	Not function
		Deductive	11	7.08	2.44			
	Teacher's questions to students	Inductive	14.37	5.95	1.92		0.61	Not function
		Deductive	12.62	4.55	1.46			
	teacher's answer to pupils	Inductive	4.75	3.03	1.05		5.62	Function
		Deductive	12.12	1.69	2.69			
	The sum of the teacher's indirect talk	Inductive	166	27.82	25.80		5.91	Function
		Deductive	95	15.28	15.93			
The teacher direct talk	Teacher's lecture or recitation	Inductive	46.37	13.71	7.20	08	3.23	Function
		Deductive	68.37	11.66	11.46			
	directions and orders	Inductive	160.2	13.71	20.18		4.57	Function
		Deductive	188.2	8.62	26.16			
	Criticism and justification of authority	Inductive	54.37	10.40	12.13		3.19	Function
		Deductive	72	10.22	16.01			
	The teacher's hostile behavior	Inductive	5.12	3.88	1.14		0.61	Not function
		Deductive	6.62	5.14	1.47			
	The type or nature of pupils	Inductive	3.5	3.04	0.78		0.65	Not function
		Deductive	4.75	3.99	1.05			
	The sum of the teacher's direct talk	Inductive	269.6	41.87	41.90		3.51	Function
		Deductive	340	32.45	57.02			

The tabular value of (T) is at the significance level 0.05 and degree of freedom 07 = 1.89 in the total of the professor's speech with the ratio: Inductive = 67.70% - Deductive = 32.30%

DISCUSSION

Through table 3, The teacher's indirect speech: the calculated value of (T) is greater than the tabular value of (T) 1.89 in the categories of acceptance of feelings of the students, praise and encouragement from the students, and the teacher's response, successively: (5.62, 7.36 and 3.06). It is in favor of the greatest arithmetic average. That is in favor of the teacher using the inductive method in the overall conversation. The researcher attributes these ratios in the areas of indirect verbal interaction to the ease and simplicity of the inductive method for adolescent students over the deductive method. This is why most educators insist on the need to choose the right teaching method to be used in the classroom, by the teacher, so as to take into account the age levels of his students, their abilities, and their requirements (Mohammed.F., 2005). Something that makes the exercises for the students to do easy, accepts the students' feelings, and praises and encourages the students for doing well on the exercises the teacher gave them; students' lack of curiosity, self-reliance, and investment in these benefits; Consequently, the teacher is not required to respond directly to students' inquiries. This holds true for the entirety of the professor's indirect speech. In addition, it is evident that the professor's inductive-method conversation contains more indirect speech than the professor's deductive-method conversation. That is to say more democratic, which is in agreement with the study. By Allali Taleb

on the second generation program: helps in still a spirit of autonomy. Learn to achieve forms, induction, deduction, conciseness, generalization, discussion, group work (Taleb, 2018) and therefore, self-control. In this regard, Hull et al (Hull & Virnelli, S., 1987) say it is the tendency to feel and act as if the individual is a factor influencing life events and not a helpless and weak person. With more detail, it can be said that the rate of the total speech of the professor applying the inductive method during the semester, is about 67.70%, which is closer to the average speech of the professor, in ordinary cases 65% (Hamdan M. Z., 2010). As for the teacher's total speech applying the deductive method in the same period, it is about 72.95%, which is higher than the teacher's average speech (Hamdan M. Z., 2010). So, the inductive method is better than the deductive method in teaching physical and sports education. Besides, the professor intervenes less in the inductive method, than in the deductive method, and thus, leaves more space to the students.

A quick look at the total of the teacher's direct speech (41.90 %) and indirect speech (25.80 %) reveals a style and influence that are direct to the students. It is evident from the teacher's total direct speech (57.02 %) and indirect speech (15.93 %) that he has a method and a direct influence on the students. This is due to the nature of the physical education and sports course, which requires giving orders directly to the students so that they carry them out. However, as was previously mentioned, the inductive method and the student's age give the student more room to work. The teacher who used the inductive method in the enrolled section congratulated and encouraged the students 132 times across all classes, for 20.49 %. This is higher than the global verbal interaction tool's overall percentage of teachers and students' behavior, which is 2% of the lesson's total 30 minutes time (Hamdan M. Z., 2010). The professor who used the deductive method had a rate of 9.47 %, and this was due to the nature of the class and the need for encouragement from the professor for girls in particular in the physical education and sports class; to complete the tasks that have been assigned to them, knowing that certain teaching methods can inspire students to learn this subject (Sayma, 1995).

The percentage of questions answered by the teacher using the inductive approach is 2.97 %. This is lower than the teacher's use of cell number 4,5 (his questions to the students and his responses to them) in typical verbal interactions using the global tool Hamdan uses. Up to 15% of the time allotted to the observed class can be represented by this. On the other hand, the percentage that applies to the teacher who used the deductive method is 4.15 %. The researcher attributes these outcomes to the fact that the session does not ask many questions and requires more motor activity than mental activity to perform exercises. As an educational system, physical education and sports are primarily based on a child's fundamental sports potential and the models that are commonly used to execute these movements and skills in the general education stage. Ensures the achievement of the stage-specific behavioural, motor, cognitive, and emotional goals through the management of the educational process (Abu Abdo, 2002). In terms of the difference between the two methods, exercises favour the inductive method and are simplified, so; Due to the exercises' simplicity, the teacher gets fewer questions about how to carry them out and fewer questions from students.

The calculated value of (T) 3.23 of the teacher's direct speech from table n° (03) is higher than the value of (T) tabular in cell 06 (lecture and presentation of information), where the rate of use by the teacher of cell 06 (lecture and presentation of information) is about 35 to 40 % of the total time allotted to the class under normal conditions. In general, the teacher's adoption of this behaviour can range from as little as 20% to as much as 50%. It has been noticed that 11.46 % of the teacher's speech during the session uses the deductive method, while 7.20 % of the teacher's speech uses the inductive method. Since physical education and sports classes require motor rather than mental activity, it was discovered that the teacher who uses the deductive method is closer to lecture and presentation of information than the teacher who uses the inductive method. Because it is closer to the inductive method has a higher statistical significance than the deductive method.

The rate of the calculated (T) in cells represents the following: (directives and orders), (criticism and justification of authority), and (teacher hostile behavior): 4.57, 3.19, and 0.61), which is greater than the number (T) in table 1.89, with the exception of the teacher's hostile behavior, which is not significant. 33.45% of the time, the professor who uses the inductive method gives orders, instructions, and criticism. Additionally, he rejects and belittles students. 43.64% for the professor who used the deductive method, which is a lot higher than the Hamdan tool's average rate at its highest limit, which is 2% of the total time spent in the observed session. This is because the physical education and sports class begins with instructions and tips for a successful warm-up, as well as criticism, which students of the class enjoy more than necessary and unnecessary conversation to make their classmates laugh. In accordance with "Nour's" statement in his book "The adolescent's desire to rebel against parental, social and religious authority, because he wants to build his own specific values and principles. Does not accept the dictates of others, and tends

to criticize his parents and his teachers, in search of error ... etc” (Nour, 2004). However, a teacher who employs the deductive method frequently intervenes due to the students’ inability to comprehend many of the exercises that are not simplified and the teacher’s tendency to issue more directives and criticism. This is in contrast to the idea that the student is the focus of education (Marwan, 2016).

Under normal usage of the Hamdan tool, approximately 50% of the total time allotted to the session is spent by the teacher using cells 4,5,6 (questions, answers, and lectures). This use can, on average, reach between 28% and 65%, which is higher than the calculated rate of 10.17 % for the teacher using the inductive method. Additionally, the nature of the session, which requires more physical than intellectual activity, resulted in the teacher employing the deductive method at a rate of 15.61 %.

In the previous cells, the inductive method had a conversation rate of 30.32 % and the deductive method had a conversation rate of 24.49 %. This indicates that the inductive method provides students with more space to talk and participate in lessons. Ben kasmi Yaguoub, Abdel Hafid Kadri, and others all came to the same conclusion from their research: When compared to the results obtained by Flanders, the ratios of the various teachers’ models of verbal interaction differ. The following behaviors frequently identify an experienced teacher: Acceptance of students’ ideas, praise and encouragement, instruction and instruction, and explanation and indoctrination

CONCLUSION

When explaining sports skills to teenagers, the inductive method is easier and simpler than the deductive method. First of all, in contrast to the deductive method, the ratio of the sum of the professor’s speeches using the inductive method is closer to the rate of the professor’s speech in typical situations as measured by the Hamdan tool. When teaching physical education and sports lessons, the inductive method is superior to the deductive method because it is consistent with teaching with skills. Because the teacher is less talkative in the inductive method than in the deductive method, there are more opportunities for students to participate in the teaching process. Hence, inductive and deductive methods are effective in categories of hostile behaviour of teachers, as well as in type and nature of students, as there are no statistically significant differences in the percentages of the analysis of Hamdan tool for a full analysis of verbal interactions for these groups, which is closer than normal cases to the Hamdan tool.

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THE EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING AND GAME-BASED TRAINING ON JUNIOR HIGH SCHOOL SOCCER PLAYER

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Abstract: There was a lack of empirical comparison of the concurrent strength effects of High-Intensity Interval Training and Game-Based Training in the context of youth soccer players. **Objective:** The main purpose of this study was to examine the effects of those two types of training within six week-period of cardio activities performance characteristics of male junior high school soccer players in Kediri, East Java. **Methods:** By applying a quantitative approach and experimental research design, this study took 20 male junior high school soccer players with a mean age of 14.5-year-old to fulfill the requirement that the samples were in the youth stage and were accustomed to a training workload and involved in soccer training and matches for at least two years to meet the minimum criteria. The research instruments were the pre-test and post-test to measure the O_2 max of the research subjects. **Results:** For 6 weeks, the subjects performed HIIT at close to ~85% of maximal heart rate while the GBT intensity was set at 70-75% of maximal heart rate. The findings implied that students with HIIT were more likely to have a greater heart rate during the study and training to get into the local tournament. Also, sprinting performance increased significantly in both groups from pretest to post-test without any changes in running performance. **Conclusion:** These findings may become the reference to conduct further research on different characteristics of subjects or other areas of study.

Keywords: cardio, game-based training, heart rate, high-intensity interval training, oxygen uptake, soccer player.

INTRODUCTION

Being a skillful soccer player needs a lot of sacrifices and a big commitment in the process of training. Various cardio activities are required in soccer, such as jumping, kicking, tackling, turning, sprinting, and changing pace (Wang & Zhang, 2016). Improvement of these explosive performances has been reported after muscular strength training that increased the available force of muscular contraction inappropriate muscle groups (Maffiuletti et al., 2016). For soccer players, training aims to develop skills in technical, tactical, psychological, and physical qualities. The training emphasizes physical fitness improvements during the preseason, whereas during the in-season period the emphasis is mainly on making tactical and technical improvements while maintaining physical fitness (Miloski et al., 2016). Indeed, as competition matches require a high energy expenditure, the training load is not increased to avoid excessive fatigue or the beginning of an over-training syndrome (Halson, 2014).

The intensity and running periods can alternate at any time according to the demands of the match. In addition, goals or decisive actions are often preceded by accelerations, sprints, bursts, jumps, and shots (Faude et al., 2012). One of the aims of the training is to improve the ability to perform maximal and high-intensity exercise. Other references found that Danish first division players performed more high-speed, and sprint runs than Danish second division players, indicating that the number of sprints and high-speed running depends on the level of the competition (Andrzejewski et al., 2015).

Cardio activities and aerobic endurance are important for soccer performance, it is of practical interest for coaches to simultaneously improve these capacities in their players when the match has started (Dellal et al., 2012). In this context, previous studies of concurrent muscle strength and aerobic and cardio endurance training have produced contradictory results; some studies have reported complementary effects (Wong et al., 2010), whereas others showed interference effects (Cadore et al., 2011). Specifically, there is a contrast result from another finding that

stated strength training has been reported to cause muscle hypertrophy, increased contractile protein, and contractile force (Marston, 2011), which has the potential negative effect of reducing mitochondrial density and decreasing the activity of oxidative enzymes, thus inhibiting the improvement of aerobic endurance (Larsen et al., 2016). Unlike strength training, aerobic endurance training does not induce muscle hypertrophy but increases the mitochondrial content and oxidative capacity and converts muscle fiber characteristics from fast to slow twitch, which negatively affects explosive performances (Hoppeler et al., 2011).

High-intensity interval training (HIIT) is a high-intensity exercise in a short time. Some well-known methods include Crossfit and Tabata (Williams & Kraemer, 2015). Videos about the sport are circulating on Youtube, in almost the same way that is combining high-intensity sports with mild intensity and done in less than an hour. High-intensity sports can also be done for other types of sports as an effort to exercise cardio for soccer, basketball, and softball sports (Luti et al., 2020).

The tabata method, for example, combines push-ups, jump squats, chin-ups, or other movements into one unified exercise (Viana et al., 2019). HIIT is a cardio exercise that uses a combination of high-intensity exercise with moderate or low intensity within a certain time interval. An example is to run a sprint for about 20-30 seconds followed by overnight or jogging for 60-90 seconds depending on the fitness conditions of each (Fragala-Pinkham et al., 2014). Regarding the benefit of HIIT implementation, previous research on HIIT-styled training indicates improvements in markers of cardiovascular health, and metabolic capacity, and often superior compared to the more traditional continuous moderate-intensity exercise (Kilpatrick et al., 2014).

Game-based training (GBT) transforms training content into a game, and employees learn as they play. Learning becomes active, and game mechanics challenges users to engage frequently to master the content and “level up.” This approach not only increases engagement with training but helps improve retention. The game-based approaches (GBAs) have been advocated as a pedagogy to improve decision-making, skill execution, and physical fitness in physical education teaching and sports coaching (Kinnerk et al., 2018). For high school football players, adopting GBT as a form of practice before the actual game on the field is a very good to do. This exercise can make young players feel the real euphoria of cardio exercises and train their minds to carry out activities in real football games such as running fast, running mid-range, sprinting, jumping, kicking, and dribbling (Vagheti et al., 2018). Soccer games for teenagers in junior high school need training that is adjusted to their energy, calorie, and breathing capacity, so that they will not experience overpowering due to fatigue or too heavy training (Kunz et al., 2019). Furthermore, previous research reported that the implementation of game-based training showed significant improvements in various aspects of decision-making and tactical awareness (Miller et al., 2017).

However, it is highly recommended that the application of HIIT should follow the safety guideline to minimize any injury risk. HIIT may be potent for health and generally well tolerated, participation in this exercise requires practitioners to consider established guidelines related to risk (Campbell et al., 2019). In addition, this form of training fits somewhat loosely within the range of vigorous exercise. Therefore, is only appropriate for low-risk individuals, moderate-risk individuals who have been cleared for vigorous intensities by a medical professional, and high-risk individuals who are under direct medical supervision during exercise training (Goodman et al., 2011). Previous studies on Game-Based training suggest that the type of exercise may not always meet the high-intensity, repeated-sprint demands of competition (Delextrat et al., 2018). Even though the reference on GBT implementation in a competitive context was still only a few, reviews of the literature on GBAs have discovered the emergence of studies investigating game-based approach in competitive training settings (Misurell et al., 2011). There are concerns from previous studies that high volumes of training may increase the risk of early specialization in youth athletes (Jayanthi et al., 2013) and can potentially have many negative consequences, such as an increased risk of injury (Fischer et al., 2011), overtraining and early dropout (Myer et al., 2015), reducing the individual's all-around motor skill development (Girard et al., 2013), and reduced performance later in their athletic career (Franchini et al., 2012). Therefore, this study intended to fill the gap between the two types of training to find out the best alternative to train young soccer players.

To the best of our knowledge, there is no previous study examining the effects of concurrent muscular strength due to HIIT and GBT and the difference between them in youth soccer players with ages ranging from 14 to 16-year-old. The present study aimed to compare the effects of high-intensity interval training (HIIT) and game-based training (GBT) on the cardio activity's performance characteristics of male junior high school soccer players in Kediri, East Java, Indonesia. As the tight control of exercise training intensity using individualized high-intensity interval training

is known to be a successful stimulus for enhancing aerobic performance, and because high-intensity interval training will also stress anaerobic pathways, we hypothesized that it would be more efficient than game-based handball training at improving indices of (supra) maximal cardio power. Thus, the researcher determined the research objective as discovering the effects of both high-intensity interval training and game-based training on a junior high school soccer player.

METHOD

Research Approach and Design

This study applied a quantitative approach and experimental design. To measure the effects of the two types of training, quantitative data were needed to present an accurate measurement of the indicators. This research consisted of 1 pretest and 1 post-test diagnostic phase and 1 training period with 2 intervention groups to test whether HIIT has a greater effect on maximal oxygen uptake, 1,000-m running time, sprint, and jumping abilities compared to GBT. In both diagnostic phases, all participants completed an $\dot{V}O_{2\max}$ test on a treadmill, a sprint and jump test, and a 1,000-m run. During the intervention, the participants exercised either according to the HIIT or GBT program. During this period, the energy expenditure of all junior high school students was recorded via lightweight multisensory devices.

The participants were followed over a 6-week period that was divided into two groups of treatment which are HIIT in the 6 weeks as the experiment group and GBT in the 6 weeks as a control group. Before beginning the protocol, anthropometric measurements (height, mass, and percentage of body fat) were made, and a maximal graded test was performed. Field tests (maximal graded field test and 40-m sprint field test) and anthropometric measurements were carried out before the control period, after the control period (which corresponded to the beginning of the HIIT and GBT period), and at the end of the training period. Both groups have been measured by the cardio parameter.

Subjects

A total of 20 children took part in this study (mean \pm SD: 14.5 \pm 0.5-year-old, weight: 48.4 \pm 9.1 kilograms, height: 158.1 \pm 8.0 cm). The subjects of this study were in the age range of youth and met the criteria to get exposure to intensive training. All junior high school students were accustomed to a training workload of >6 training units per week and have been involved in soccer training and matches for at least 2 years. All junior high school students were members of a team (<14 years) in the local junior high school club. Five players were members of a federal junior all-star team. The sampling technique used was simple random sampling because the population was homogeneous. The junior high school students were divided into a training group that mainly performed high-intensity intervals (HIIT, $n = 7$, $\dot{V}O_{2\max}$: 50.1 \pm 4.3 ml \cdot min $^{-1}\cdot$ kg $^{-1}$) and one training group with continuous loads of endurance training (GBT, $n = 13$, $\dot{V}O_{2\max}$: 49.3 \pm 6.5 ml \cdot min $^{-1}\cdot$ kg $^{-1}$) according to their maximal oxygen uptake.

Procedure

The research instruments were the pre-test and post-test to measure the $\dot{V}O_{2\max}$ of the research subjects. The treatment of both groups focused merely on the endurance cardio part of the training session. The training session for both HIIT and GBT was administered as an extension of the regular soccer-specific training. The study period was conducted directly before the beginning of the second half of the junior soccer season in the first semester of a junior high school class in Kediri. Usually, the tournament is held between January to March at the beginning of the year. As the tournament began, this study was conducted with 3-4 sessions per week over the 6-week winter tournament preparation period. The training week consisted of 4 times 1-1.5 hours of practice and 1 game. During the study, all training sessions were designed in the same manner for both HIIT and GBT.

The training sessions started with a warm-up phase of 5-10 minutes, containing flexibility exercises, short sub-maximum sprints, and integrating game-specific actions. Thereafter, a phase of soccer-specific drills followed. Within the soccer-specific drills, either single skill practice or team tactics in small-sided games took place. Further, the focus in this phase was set on agility (twists, turns, and jumps) and on core strength training (sit-ups and push-ups). No additional apparatus-based strength training or weightlifting was performed. Because of this training design, soccer-specific training was equal for both groups. After the soccer-specific part, endurance training followed. Heart rate and energy expenditure were monitored during the entire session.

The high-intensity interval intervention consisted of various types of interval training without a soccer ball and did not exceed a total exercise time of 30 minutes, including rest. During HIIT, all junior high school should achieve or maintain 90-95% of their maximal heart rate, separated by periods of 1-3 minutes jogging at approximately 60-70% of maximal heart rate according to the training program Arterial lactate concentration and ratings of perceived exertion were obtained from every player in each session of this study.

Statistical Analysis

All results are documented as mean ± SD. A Student’s test was performed to analyze the differences in heart rate and lactate concentration between HIIT and HVT during the intervention. The significance of within and between-condition mean differences were assessed by analysis of variance, with repeated measures followed by post hoc analyses using the Least Significant Difference test. An alpha level of $p \leq 0.05$ was considered statistically significant and marked as $*p \leq 0.05$. Standardized difference (d) was calculated to standardize comparisons between the pre- and post-measurements. This effect size was considered small when $d < 0.2$, moderate when $d < 0.4$ and high when $d = 0.6$ or greater. Analysis in this study was done using SPSS and software package for Windows which is statistical analysis in Excel.

RESULTS

Intervention, Pre-Test, and Post-Test Diagnostic

The junior high school student soccer players completed the session of training in both experiment classes using HIIT and control class using GBT of all training sessions were completed in both groups. Table 2 and Figure 1 show the percentage amount of training performed at different heart rate intervals. The HIIT showed a significantly greater amount of time spent at intensities of 80-100% of maximal heart rate compared to HVT ($p < 0.05$). HVT, on the other hand, revealed a higher percentage in the lower heart rate zones (60-80% of maximal heart rate) compared to HIIT ($p < 0.05$). Relative oxygen uptake increased significantly by 8.2% from pretest to post-test in HIIT but not in GBT (+1.9%). Running time over 1,000 m decreased significantly in HIIT but not in GBT. The mean decrease in HIIT was 10 vs. 5 seconds in GBT. Sprint performance increased significantly in both groups from pretest to post-test without any change in jump performance of each student. Table 1 shows the results of training for the pretest statistically while Table 2 shows the results of training for the post-test statistically.

Table 1. The result of training for pretest

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	337.573	1	337.573	5.311	.024
Within Groups	4894.231	77	63.561		
Total	5231.804	78			

Table 1 shows the results of the t-test analysis to compare the pretest mean of two class groups namely the experiment class and the control class to measure cardio parameter and heart rate. The significance value obtained is 0.024, which means lower than the alpha value of 0.05. While the F value obtained is 5.311. It means that there is a difference between students who were trained using HIIT and students who were trained using GBT in the pretest.

Table 2. The result of training for post-test

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5333.865	1	5333.865	165.135	.000
Within Groups	2487.100	77	32.300		
Total	7820.965	78			

Table 2 shows the results of the t-test analysis to compare the post-test mean of two class groups namely the experiment class and the control class to measure cardio parameter and heart rate. The significance value obtained is 0.000, which means lower than the alpha value of 0.05. While the F value obtained is 165.135. It means that there is a difference between students who were trained using HIIT and students who were trained using GBT post-test.

DISCUSSION

the purpose of this study was to compare the effects of a specific training protocol based on sprint repetitions and high-intensity intermittent runs in comparison with a control period. The present study is the first to investigate, using specific field tests and a controlled study design, a comparison of the effectiveness of HIIT and GBT to junior high school soccer players on the physical performance capacities in Kediri before the tournament. This is significant to select the best type of training as soccer players need to recover fast even after a mild injury during their training or match. The players can perform high-intensity activities such as running and sprinting and still can recover in time for the next action (Carling et al., 2012). Due to the different responses inherent with specific HIIT and GBT, we hypothesized that HIIT as the experiment group would obtain greater improvements in indices of (supra)maximal cardio power than the GBT group, yet GBT would be more efficient at enhancing repeated sprint ability and intermittent endurance than HIIT. Despite the effectiveness of high-intensity training such as HIIT and GBT, there was a lack of empirical research to provide accurate and valid evidence, especially on soccer players.

Findings on the results showed that both in the pretest and post-test the results between groups were different. The experiment group performed HIIT at close to ~85% of maximal heart rate. It showed that students who had done exercising with HIIT would have a greater heart rate. This is in line with the findings from previous research (Currie et al., 2013), it was showed that high-intensity training affects heart rate during rest and exercise. Furthermore, HIIT is an alternative exercise with time efficiency that is as effective as moderate-intensity continuous training with increased capacity in young individuals (Wewege et al., 2017). Meanwhile, in the GBT, heart rate intensity was set at 70-75% of the maximal amount of measurement. It showed that GBT had not reached the same results as HIIT. Students with HIIT were more likely to have greater heart rates during the study and training to get into the local tournament. The somewhat greater efficiency of our treatment or intervention may be because of the longer intervention phase of 7-10 weeks compared to 6 weeks in this study for students to take.

Other findings also show that the O_2 max increased significantly from pretest to post-test. The value of increment between pretest and post-test was 8.2%. It happened from pretest to post-test in HIIT but not after GBT. Meanwhile, T_{1000} decreased significantly after HIIT. The T_{1000} in HIIT decreased ~-10 while T_{1000} in GBT decreased ~-5 seconds. It shows that from a practical point of view, to avoid cost-worthy and complex laboratory procedures, the simple assessment of T1000m reflects a feasible and uncomplicated method to detect improvements in endurance performance. Further, the frequent measurement of 1,000-m time provoked a positive competition mentality among the players wanting to beat their personal best and their teammates' times. In this study, sprinting performance increased significantly in both groups from pretest to post-test without any changes in running performance.

During the preseason period of this study, strength and conditioning specialists can use muscular strength training and high-intensity interval running when dribbling balls conducted as cardio exercise. Stakeholders from various fields have called for new concepts for attractive and effective training alternatives to reduce entry barriers and help to maintain training adherence for a wide range of people over several years (Moynihan et al., 2015). Junior high school students who were soccer players intended to join this study until the end. The practical application can be seen in the soccer player's stamina and health when practicing after the study has ended. They stated that this study affects so much on their performance during match exercises. Specifically, to minimize the interference effect of the concurrent training modes, high load, and less repetition (6RM for 4 sets, with 3 minutes of rest between sets) are recommended in muscular strength training to stress the neural adaptation and to avoid muscle hypertrophy for soccer players who already have sufficient muscle mass. Both HIIT and GBT can be properly implemented to become alternatives to train junior high school soccer players and improve their performance effectively.

CONCLUSION

based on the findings, in 6 weeks, 20 male junior high school soccer players with a mean (SD) age of 14.5 ± 0.5 years performed HIIT at close to ~85% of maximal heart rate. The GBT intensity was set at 70-75% of maximal

heart rate. The O_2 max increased significantly (8.2%) from pretest to post-test in HIIT but not after GBT. The T_{1000} decreased significantly after HIIT (~-10 vs. ~-5 seconds in GBT). Sprinting performance increased significantly in both groups from pretest to post-test without any changes in running performance. Therefore, it can be concluded that there was a slight difference in the heart rate performance between HIIT and GBT implementation. HIIT was slightly better in maximizing the heart rate performance. In addition, the oxygen uptake in the implementation of HIIT increased quite a lot from the pre-test session to the post-test. Meanwhile, such improvement did not show when GBA was implemented. Thus, the findings of this research were significant in the selection of appropriate training for youth soccer players. As the HIIT showed slightly better performance, it could be prioritized to be implemented as the training alternative. Since GBA also prove that it was also beneficial in cardio training, it can be the next alternative to vary the types of training.

RESEARCH LIMITATION AND RECOMMENDATION

this research was conducted to measure the effects of two types of training; they were High-Intensity Interval Training and Game-Based Training on youth soccer players. To enrich the empirical findings, the further researcher may take other types of training to make comparisons. Also, since this study only focused on the performance of young soccer players, future researchers may try to highlight the performance of younger players or adult players. Moreover, other research should also challenge finding other elements to measure as indicators other than heart rate and oxygen intake that have been discussed in this study.

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THE RELATIONSHIP OF GOAL ORIENTATION, SELF-ESTEEM, SITUATIONAL MOTIVATION AND SATISFACTION FROM SPORTS AMONG YOUNG KARATE ATHLETES

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Abstract: The main problem of the research was to determine the relationship between goal orientation, satisfaction, self-esteem, and situational motivation among young karate athletes from Republic of North Macedonia. The research was carried out on a sample of 100 respondents who are engaged in karate sport between the ages of 11 and 14 from Republic of North Macedonia. The sample is divided into two subsamples according to gender, namely 54 male respondents and 45 female respondents. The sample was drawn from several karate clubs in Republic of North Macedonia. In order to realize the goals of the research, several scales were applied to assess goal orientation, satisfaction, self-esteem and situational motivation. The obtained data were processed with appropriate parametric statistical methods. Based on the obtained results, it can be concluded that a larger number of respondents (young karate athletes) from our sample are more focused on developing and improving their competence, and less on achieving results and relying on their abilities. Interrelationships among the four subscales assessing the level of self-determination to be physically active, as expected the more proximal along the continuum are more positively correlated with task orientation than those more distal along the continuum. The research results confirm that task orientation is more positively related to more self-determined types of situational motivation (the internal motivational regulator -intrinsic motivation and the identification motivational regulator -identified regulation) and negatively related to less self-determined types of situational motivation (external motivational regulator- external regulation and guilt regulator - introjected regulation). Based on all that has been stated, it can be concluded that among young karate athletes aged 11 to 14, internal motives (i. e. fun, personal challenge, etc.) or so-called essential motives for playing sports should be promoted.

Key words: goal orientation, satisfaction, self-esteem, situational motivation, karate athletes.

INTRODUCTION

Karate is a martial sport that is experiencing a great expansion today and is trained by millions of people today. The reasons for this expansion can be found in the very original characteristics of karate, which is the main reason why karate is transformed into a dynamic sports discipline, which enjoys great popularity in our country. Practicing karate is an ideal prerequisite for developing positive psychophysical qualities among young people. Contrary to the prejudices that martial sports are violent, karate primarily offers practitioners discipline, respect, and self-control as a basic assumption for engaging in this sport. A number of authors consider that karate is an ideal sport, which basic elements can be applied in the physical and health education of young people (Sližnik and Bartik, 2004). What is it that “drives” athletes on a daily basis - day after day, week after week, year after year - regardless of the weather conditions, regardless of the current mood, regardless of how hard the training is and regardless of whether they win or not, to go on the field or in the gym and train hard? Why is the desire for success, commitment, discipline and perseverance in some athletes more pronounced than in others? What is it that ignites the embers and the fire in the view of some sportsman? The answer to this question is motivation!

When taking into account the large volume of training and competition activities, it is not surprising that achievement motivation is the key determinant of movement and direction of sports activity. Two basic components of sport are training and competition, so in the nature of sport one of the ultimate goals is to achieve the best competitive

result. However, athletes differ among themselves in the reasons and ways in which they approach the activity, the meaning they give to it, and the quality assessment measures. So for example, one athlete may engage in a certain activity in order to improve his competence, another athlete may perform that same activity to show and prove his competence to others.

One of the leading theoretical frameworks for studying achievement motivation is the social-cognitive approach and within it the theory of goals - Achievement Goal Theory - AGT4 (Duda & Ntoumanis, 2005; Roberts, Treasure, & Sogpou, 2007). The core of the theoretical construct of this theory is goal orientation, which is considered a cognitive pattern that arises through specific experience during sports socialization and is relatively stable over time (Roberts, 2001). Goal orientation maintains a person's belief about an activity about how success can be achieved and failure avoided, as well as about the criteria for evaluating performance (Duda, 2001). There is a difference between the orientation of learning and improvement - task orientation and the orientation of achieving results - ego orientation (Duda & Hall, 2001; Duda & Nicholls, 1992; Roberts et al., 2007). For athletes who are dominated by the orientation of learning and improvement (task orientation), a striving towards personal advancement and improvement of competence is characteristic. They believe that by making an effort they can improve their competence, they immerse themselves in the activity, they try to find a strategy that will successfully respond to the demands of the activity.

For them, the basic criterion of success is the subjective feeling of improvement and performance, and essentially they use self-referential criteria for assessing performance. For athletes who are dominated by the goal of achieving results (ego orientation), progressing and performing skills in it is not enough to feel successful.

They believe that the basis of success is high abilities. They experience success on the basis of comparison with others "Being successful" for them means "Being better than the other". They use normative performance assessment criteria. When they achieve success without effort, then they highlight the significance of their abilities. They attribute failure to insufficient effort and thus avoid the demonstration of incompetence. To avoid failure, they often choose goals that are significantly below their real capabilities.

Children at different ages compare their abilities differently. At the age of two to six years, children usually observe the abilities in relation to the success of the performed task during the last rehearsal. If they notice an improvement in performance from one trial to the next, they assume that ability has increased. The amount of effort invested is considered by the child as evidence of high ability. In this period, it can be seen that the child is focused on the tasks. With further development and at the age of six and seven, the child observes his abilities in relation to others. It's no longer just about performing the task, it's about doing the task performed better than others. High ability is only implied if they are better than other children. This is the period when the child is primarily focused on the goal. After 11-12 years, the child can show ego or task orientation, which mostly depends on environmental factors. Environmental factors aimed at social comparison orientation produce ego orientation, while guiding through mastering the tasks thereby produces task orientation. A greater benefit of task orientation has been found for the development of positive self-concept (Cox, 2005).

As already mentioned, social factors play a major role in forming the orientation of children. Ego-oriented environments can be quite detrimental to low-ability children, while high-ability children thrive in both types of environments. Of course, it is necessary to create an environment of improvement that can change the negative influence of the ego-oriented environment, which acts on the child with low abilities who is afraid of competitive situations (Guda et al., 1995, according to Cox, 2005). This climate of improvement creates greater independence, self-esteem and identity in children and should be aimed at (Cox, 2005).

The problem of this research is to determine the relationship between goal orientation, satisfaction, self-esteem and situational motivation among young karate athletes from the Republic of North Macedonia.

MATERIALS AND METHODS

Sample of respondents

The research was carried out on a sample of 100 respondents who are engaged in karate sport between the ages of 11 and 14 from Republic of North Macedonia. The sample is divided into two subsamples according to gender, namely 54 male respondents and 45 female respondents. The sample was drawn from several karate clubs in Republic of North Macedonia.

Methods of data collection

The data were collected using the method of a structured survey questionnaire. The survey questionnaire consists of three separate units that enable the formation of variables.

Task-and-Ego-Orientation Assessment Questionnaire (Task-and-Ego-Orientation)

The most commonly used instrument for assessing goal orientation among youth in sports (Biddle, Wang, Kavassanu, & Zrgau, 2003; White, 2007) is the TEOSQ (Task-and-Ego-Orientation). Respondents answer by circling one of the offered answers on a Likert-type scale (from 1- "do not agree at all" to 5- "completely agree"). The questionnaire contains two subscales: goal orientation of the improvement and goal orientation of the result. Each item begins with "I feel most successful in sports when...". Reliability coefficients in previous research on samples of athletes range from .70-.86 for the achievement orientation scale, .77-.89 for the result orientation scale (Bortoli, Bertollo, Comani, & Robazza, 2011; Givvin, 2001; Hom Duda, & Miller, 1993; Sit & Lindner, 2005; Treasure et al., 1994; Vesković & Milanović, 2011; White, 1996; White, et al., 1998).

A scale for assessing satisfaction with sports

The ASQ scale will be used to assess satisfaction. The scale was constructed by Raimrer and Chelladurai (Raimrer, & Chelladurai, 1998 according to Veskovic, 2012). It consists of 8 particle-items and is of graphic type, 7 degrees, ranging from 1 (I am not at all satisfied) to 7 (I am very satisfied). The result is obtained as an average value of the responses from all particles. A higher score indicates that the respondent has a higher degree of satisfaction.

Sample variables for assessing motives for physical activity

Situational motives for physical activity will be assessed with the scale: Behavior Regulation Exercise Questionnaire (BREQ) constructed by Mullan, Markland, and Ingledew (Mullan, Markland, and Ingledew, 1997). Respondents answer by circling one of the offered answers on a Likert-type scale (from 1- "do not agree at all" to 5- "completely agree"). It consists of 15 items, and is divided into several subscales: external regulation (example. I exercise because other people say I should), guilt regulator - introjected regulation (example. I feel guilty when I don't exercise), identified regulation (example. I exercise because I have health, aesthetic benefits from exercise), internal regulator - intrinsic motivation (example I exercise because it's fun). From the four subscales, an autonomous index of the strength of self-regulation of motivation towards physical activity is obtained, which is calculated according to the formula: $(-2) (EXT) + IJ + ID + 2(IM)$. Four factors were determined by conformational factor analysis, Cronbach alpha coefficient was also quite high for the four factors (external = 0.79, introjected = 0.76, identified = 0.78, intrinsic = 0.90).

Rosenberg Self-Esteem Scale

The self-esteem scale consists of 10 items and was constructed by Rosenberg (Rosenberg Self-Esteem Scale, RSE; Rosenberg, 1965). It is a 4-point scale, ranked from 1 (completely disagree) to 4 (completely agree). The result is obtained from the average value of the responses of all 10 particles. Based on the answers received, the respondents are categorized into three categories: low, medium and high self-esteem. The interconsistency of the scale in previous research ranges from .80 to .60.

Data processing methods

For all quantitative variables, the basic descriptive statistical parameters were calculated, namely: arithmetic mean (X), standard deviation (SD). Differences in variables for assessing goal orientation, satisfaction with sport, were determined by univariate analysis of variance. The relationship between the variables for assessing satisfaction with sports, goal orientation, self-esteem and situational motivation (the level of self-determination), between sports tradition in the family and the variables for assessing goal orientation, satisfaction with sports, self-esteem and situational motivation was determined by the bivariate Pearson correlation.

The data were processed with the statistical packages SPSS for Windows Version 22.0 and STATISTICA for Windows Version 12.0.

RESULTS

In order to determine the relationship between the variables for assessing satisfaction with sports, goal orientation, self-esteem and situational motivation (the level of self-determination), Pearson's bivariate correlation was calculated for the sample as a whole and individually for the male and female subsamples. These values are shown in Tables 1, 2 and 3.

Table 1. Correlation analysis between the variables for assessing satisfaction with sport, goal orientation, self-esteem and situational motivation among the entire sample of respondents

	1	2	3	4	5	6	7	8
ASQ	1.00							
Self Esteem	.17	1.00						
Ego Orientation	.49	.26	1.00					
Task Orientation	.32	-.06	.06	1.00				
External Regulation	.02	-.29	-.02	-.19	1.00			
Introjected Regulation	.35	-.12	.35	.04	.29	1.00		
Identified Regulation	.01	-.16	.06		.20	.14	1.00	
Intrinsic Motivation	-.29	-.16	-.33	.14	.43	-.23	.53	1.00

From the review of table 1, it can be seen that a positive average correlation was established between the scale for assessing satisfaction with sports and orientation towards achieving results ($r=.49$), orientation towards perfecting goals ($r=.32$) and regulator of guilt - introjected regulation ($r=.35$). A low negative correlation was established between the variable for assessing satisfaction from sports and the internal motivational regulator - intrinsic motivation ($r= -.29$). Self-esteem has a low positive correlation with the variable focus on achieving results ($r=.26$) and a low negative correlation with the variable external motivational regulator - external regulation ($r=-.29$). Variable focus on achieving results (ego orientation) has a low positive correlation with guilt regulator - introjected regulation ($r=.35$) and a low negative correlation with the internal motivational regulator - intrinsic motivation ($r=-.33$). The variable directed towards the improvement of goals has an average positive correlation with the identified motivational regulator - identified regulation ($r=.52$).

From the overview of table 2, which shows the cross-correlation coefficients among the respondents (young karate athletes) from the male gender, it can be seen that a positive average correlation was established between the variable for assessing satisfaction from sports and the orientation towards achieving results - ego orientation ($r=.47$), the focus on improving goals ($r=.41$) and a low correlation with self-esteem ($r=.29$). Self-esteem has an average negative correlation with the external motivational regulator - external regulation ($r=-.39$), guilt regulator - introjected regulation ($r=-.44$) and identified motivational regulator - identified regulation ($r=-.32$). Variable focus on achieving results (ego orientation) has a low positive correlation with guilt regulator - introjected regulation ($r=.25$). The variable directed towards the improvement of goals has an average positive correlation with the identification motivational regulator - identified regulation ($r=.58$) and the internal motivational regulator - intrinsic motivation ($r=.51$).

Table 2. Correlation analysis between the variables for assessing satisfaction with sports, goal orientation, self-esteem and situational motivation among male respondents

	1	2	3	4	5	6	7	8
ASQ	1.00							
Self Esteem	.29	1.00						
Ego Orientation	.47	.14	1.00					
Task Orientation	.41	-.03	.17	1.00				

External Regulation	-.10	-.39	.08	-.24	1.00			
Introjected Regulation	.17	-.44	.25	-.18	.39	1.00		
Identified Regulation	.12	-.32	.08	.58	.14	-.04	1.00	
Intrinsic Motivation	-.05	-.12	-.18	.51	.10	-.25	.59	1.00

From the overview of table 3, which shows the cross-correlation coefficients among the respondents (young karate athletes) from the female gender, it can be seen that a positive average correlation was established between the variable for assessing the satisfaction from the sport and the focus on achieving results - ego orientation ($r=.50$), guilt regulator - introjected regulation ($r=.62$) and a low positive correlation with the orientation towards perfecting goals ($r=.23$).

Table 3. Correlation analysis between the variables for assessing satisfaction with sport, goal orientation, self-esteem and situational motivation among female respondents

	1	2	3	4	5	6	7	8
ASQ	1.00							
Self Esteem	-.03	1.00						
Ego Orientation	.50	.43	1.00					
Task Orientation	.23	-.11	-.09	1.00				
External Regulation	.14	-.20	-.11	-.16	1.00			
Introjected Regulation	.62	.43	.56	.32	.20	1.00		
Identified Regulation	-.07	.01	.06	.48	.25	.35	1.00	
Intrinsic Motivation	-.49	-.23	-.54	-.10	.60	-.24	.50	1.00

Self-esteem has an average positive correlation with focus on achieving results - ego orientation ($r=.43$) and guilt regulator - introjected regulation ($r=.43$). A low negative correlation was determined between self-esteem and the external motivational regulator - external regulation ($r=-.20$) and the internal motivational regulator - intrinsic motivation ($r=-.23$). The variable focus on achieving results (ego orientation) has an average positive correlation with the guilt regulator - introjected regulation ($r=.56$) and an average negative correlation with the internal motivational regulator - intrinsic motivation ($r=-.54$). The variable directed towards the improvement of goals has an average positive correlation with the identification motivational regulator - identified regulation ($r=.48$) and guilt regulator - introjected regulation ($r=.32$).

The obtained results showed that no significant bivariate correlation was established, i.e. an orthogonal relationship was established between the variables task orientation and ego goal orientation (orientation towards achieving results), and the same was confirmed in several previous studies (Duda, Fox, Biddle, & Armstrong, 1992; Fox et al., 1994; Roberts et al., 1996). In order to obtain additional information about the relationships between the constructs of situational motivation and goal orientation, four target groups were formed based on the extreme values of the medians of the two variables for assessing goal orientation (orientation towards achieving results, Median = 3.25; orientation towards tasks Median = 4.00). Table 4 shows the basic descriptive statistical parameters and the level of statistical significance for each of the four extreme groups. In order to determine whether the respondents belonging to the different groups differ in the constructs of situational motivation, satisfaction with sport and self-esteem, a one-factor analysis of variance (ANOVA) was applied.

From the review of table 4, it can be seen that statistically significant univariate between-group differences between the respondents (young karate athletes) who belong to different extreme groups are determined in the variables of satisfaction with sports ($F= 21.83$, $p=.000$), guilt regulator - introjected regulation ($F= 6.04$, $p=0.00$), identification motivation regulator - identified regulation ($F= 9.22$, $p=0.00$), internal motivation regulator - intrinsic motivation ($F= 4.98$, $p=0.00$) and autonomous index of the strength of self-regulation of motivation ($F= 3.71$, $p=0.01$).

Table 4. Intergroup differences between four target groups based on the extreme values of the medians of the two variables for assessing goal orientation

	High Task /High Ego		High Task /Low Ego		Low Task /High Ego		Low Task /Low Ego		F	Sig.
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
ASQ MEAN	5.54	0.80	4.25	0.57	4.73	0.60	4.32	0.55	21.83	0.00
External Regulation	3.44	1.17	3.25	0.63	3.72	0.45	3.53	0.42	1.76	0.16
Introjected Regulation	3.54	1.08	2.81	0.29	3.49	0.69	3.35	0.53	6.04	0.00
Identified Regulation	4.17	0.50	4.14	0.43	3.72	0.71	3.42	0.69	9.22	0.00
Intrinsic Motivation	3.87	0.98	4.45	0.37	3.86	0.62	4.16	0.38	4.98	0.00
Self Esteem	2.55	0.47	2.44	0.17	2.66	0.37	2.60	0.49	1.51	0.22
Avtonomen indeks	12.14	1.05	12.15	0.89	11.35	1.35	11.39	1.32	3.71	0.01

DISCUSSIONS

Consistent with previous research (Guay et al., 2000; Standage et al., 2000; Treasure et al., 1994), the results of this study provide additional empirical support for the model and the relationships among the subscales for assessing the level of self-determination, being physically active, satisfaction from sports, self-esteem and goal orientation. Based on the obtained results, it can be concluded that a larger number of respondents (young karate athletes) from the sample of respondents are more focused on developing and improving their competence, and less on achieving results and relying on their abilities. They put effort into the activity, trying to find a strategy with which they will successfully solve the set tasks. They feel successful when they improve their performance, and the dominant criterion for assessing performance is personal progress in performance (improvement of technique, tactics, motor skills, etc.). For these karate athletes, compared to others, the feeling of success is not a priority criterion (to win at any cost, to prove oneself in front of others, to be better than others, etc.). The research results are in accordance with the results of a larger number of previous studies carried out on samples of athletes who train in different sports disciplines (Balaguer, et al., 2002; Duda & Hom, 1993; Gano-Overwaya, et al” 2005; Gershgoren, et al “ 2011; Givvin, 2001; King, & Williams, 1997; Waldron & Krane, 2005; White, et al” 1998). According to TGO theorists (the theory of goal orientation), the dominance of goal orientation toward improvement over orientation toward achieving results is considered a significant factor for achieving adaptive motivational patterns (Duda, & Hall, 2001).

The interrelationships between the four subscales assessing the level of self-determination to be physically active, as expected the more proximal on the continuum are more positively correlated with task orientation than those more distal on the continuum (Ryan & Connell, 1989). This pattern of significant correlations indicates that SIMS underlies multidimensional motivation consistent with the theoretical principles proposed by Deci and Ryan (Deci & Ryan 1985, 1991).

The research results confirm that task orientation is more positively related to more self-determined types of situational motivation (intrinsic motivation and identified regulation) and negatively related to less self-determined types of situational motivation (external motivational regulator and guilt regulator - introjected regulation). The results are consistent with the meta-analysis conducted by Ntoumanis & Biddle (1999) which found a moderate to strong relationship between task orientation and increasing intrinsic interest in physical activity. Contrary to this, it was determined that ego orientation (orientation towards result) is less related to autonomous types of situational motivation. This finding is of particular importance, as a lower self-determined type of motivation relates to lower positive outcomes than a higher self-determined type of motivation (Ryan & Deci, 2000; Vallerand, 1997). For athletes who are dominated by the goal of achieving results (ego orientation), progressing and performing skills in it is not enough to feel successful.

Although the results of the correlation analysis provided some insight into the relationships between goal orientation and situational motivation, taking into account the results of previous research, and confirmed by the results of this research, which indicates that ego orientation and task orientation are orthogonal (not correlated). In that direction, the results of the analysis of the formed extreme groups provide a more complete (more precise) insight into

the relationships between goal orientation and situational motivation. Situational motivation of the individual differs depending on which group he belongs to. Namely, the results of the research indicate that respondents who belong to the High Task/Low Ego and High Task/High Ego groups have a higher identification motivation and autonomous index of the strength of self-regulation of motivation in relation to the groups defined as Low Task/High Ego and Low Task/Low Ego. On the other hand, respondents from the group defined as High Task/Low Ego have a much higher internal motivation compared to all three other groups. In accordance with previous research and the results of our research, they indicate that in general the group dominated by both goal orientations is also adaptive, as Duda (1997) claims, "What can High Task/High Ego motivated individuals do over a longer period of time? is the fact that their strong task orientation can set them back even when their sense of normative dependence is in danger." According to Duda's research (Duda, 1997), task orientation in this research is a decisive construct for increasing motivation. Furthermore, it can be stated that the dominance of ego orientation somewhat weakens task orientation (Roberts et al., 1996). On the other hand, the results indicate that the groups defined as Low Task/High Ego and Low Task/Low Ego has a higher level of external regulation in relation to the groups defined as High Task/Low Ego and High Task/High Ego. In addition to the lack of internal criteria of success, given the controlled nature of external regulation, it seems that for these individuals and their perception of abilities is normatively stated and influenced mostly by external factors (example rewards, threats, etc.). With this in mind we agree with Brunel (1996), who states that it is important to remind athletes that they engage in sport to learn (improve skills) and not to outperform their peers at all costs. If the emphasis is on being better than one's peers at all costs, then such a situation is difficult for the karateka (Nicholls, 1989).

It is interesting that the results indicate that the group defined as Low Task/High Ego has higher values of the external motivation regulator - external regulation and guilt regulator - introjected regulation compared to the group defined as Low Task/Low Ego. These findings are consistent with the findings of Roberts et al. (1996) who determined that the group defined as Low Task/High Ego was the least autonomously motivated group. These results indicate that the low level of autonomous motivation is more pronounced in athletes who have a lack of task orientation accompanied by a high disposition of ego orientation. A certain number of researches are not in agreement with these findings, that is, it has been determined that the most risky group with the lowest level of autonomous motivation is Task/Low Ego (Pensgaard & Roberts, 2002). Of course, additional research is needed to confirm which target group has the greatest risk from a motivational perspective.

The coach is a key factor in encouraging the motivation of young karate athletes and promoting and dictating a certain climate in training and competitions. Coaches with their attitude towards young athletes can influence their internal (autonomous) motivation. There are two basic styles in interacting with athletes, and they are controlling or maintaining the athletes' autonomy (Vallerand & Losier, 1999). In the first case, the coaches control the athlete's behavior by strictly determining what, how and when he will work in training, while in the other case, the athlete is left room to make some decisions independently or make a choice. Research indicates that coaches who support autonomy in their interaction with young athletes stimulate intrinsic motivation in athletes to a greater extent than coaches who are characterized by a style of strict control (Goudas et al., 1994). An athlete's perception that a coach is autonomy supportive is a positive predictor of autonomy, competence, and relatedness (Standage & Gillison, 2007). Athletes who were included in training programs with an emphasis on supporting their autonomy showed a greater desire to exercise and were more often physically active in their free time compared to athletes who were not included in this program (Chatzisarantis & Hagger, 2009).

Based on all that has been stated, it can be concluded that among young karate athletes aged 11 to 14, internal motives (ie fun, personal challenge, etc.) or so-called essential motives for playing sports should be promoted. There are a number of scientific studies that indicate the way in which intrinsic motivation (essential motives) influence an increase in sports activity (Ryan, 2000; Frederick & Ryan, 1993),

Although extrinsic motivations such as appearance or fitness can be significant in motivating young people to start participating in sports (Wankel, 1993; Frederick & Ryan, 1993), they are not sufficient to maintain the same activity. longer time. On the other hand, if the initial motives and process variables are related to intrinsic motivation, and especially those like enjoyment/interest, the activity is maintained for a much longer time. Encouraging intrinsic motivation in young karate athletes through promotion and messaging can contribute to increasing sports activity and the health benefits associated with it.

CONCLUSION

The research results confirm that task orientation is more positively related to more self-determined types of situational motivation (intrinsic motivation and identified regulation) and negatively related to less self-determined types of situational motivation (external motivational regulator and guilt regulator - introjected regulation). Namely, the results of the research indicate that respondents who belong to the High Task/Low Ego and High Task/High Ego groups have a higher identification motivation and autonomous index of the strength of self-regulation of motivation in relation to the groups defined as Low Task/High Ego and Low Task/Low Ego. On the other hand, respondents from the group defined as High Task/Low Ego have a much higher internal motivation compared to all three other groups. On the other hand, the results indicate that the groups defined as Low Task/High Ego and Low Task/Low Ego has a higher level of external regulation in relation to the groups defined as High Task/Low Ego and High Task/High Ego. Based on all that has been stated, it can be concluded that among young karate athletes aged 11 to 14, internal motives (i. e. fun, personal challenge, etc.) or so-called essential motives for playing sports should be promoted.

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THE ROLE OF PARENTS IN ENCOURAGING CHILDREN TO EXTRACURRICULAR KINESIOLOGICAL ACTIVITIES

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Abstract: Extracurricular kinesiological activities, in addition to providing the opportunity for actively spend leisure time, significantly contribute to the improvement of children's health and the development of their abilities, knowledge and achievements, so it is desirable to encourage and direct them. The aim of the study was to assess parents' attitudes about physical activity and about encouraging children to extracurricular kinesiological activities in their leisure time. Also the aim was to determine the differences in parental attitudes about encouraging activities with respect to the child's involvement in organized extracurricular kinesiological activities. The research was conducted on a sample of 191 parents of third and fourth grade primary school students. An anonymous questionnaire assessed parents' attitudes about physical activity and about encouraging children to extracurricular kinesiological activities. Frequencies of answers were calculated, and the significance of the differences was determined by Man-Whitney U test. 79,58% of children were involved in organized extracurricular kinesiological activities, while 20,42% weren't. Man-Whitney U test indicates the existence of statistically significant differences in parental attitudes related to activity encouragement. Parents whose children attend organized extracurricular kinesiology activities are more likely to encourage children to engage in physical activity. In directing children to extracurricular kinesiological activity and encouraging an active lifestyle, the role of parents will be significant only if parents have positive attitudes about physical activity.

Key words: children, extracurricular kinesiological activities, parent's attitudes, the level of physical activity.

INTRODUCTION

The period of younger school age is accompanied by a series of changes in anthropological characteristics that are noticeable in children, and which create the basis for the development of certain abilities. If certain abilities are not developed adequately by the appropriate age, they will later be difficult to develop to a satisfactory level. Systematic participation in various forms of physical activity certainly contributes to the development of children and young people, but in modern society, which is characterized by advances in technology in terms of increasing application of digitalization, physical activity is increasingly declining. Previous research indicates that high use of technology is significantly associated with low levels of physical activity in children and youth (Alotaibi, Almuhan, Alhasan, Alqadhib, Mortada, & Alwhaibi, 2020; Kenney & Gortmaker, 2017), as well as lower motor skills (Martin & Staiano, 2019). In addition to the regular physical education class at school, extracurricular kinesiological activities also provide an organized form of active leisure time outside the school, which is carried out according to the preferences of students. Organized extracurricular activities can be encouraged by peers, teachers or family, but of all educational settings, families and parents are the ones who should have the greatest influence because they know their children and their interests best and know how to guide and motivate them for an activity. Although the World Health Organization (WHO, 2017) points out that a child needs a minimum of 60 minutes of moderate to vigorous physical activity per day, numerous studies suggest a steady trend of declining physical activity (Krivokapić and Bjelica (2014) according to Iveković, 2020). An analysis of physical activity based on 1.6 million children and adolescents in 146 countries shows that most adolescents do not meet the guidelines for physical activity, thus endangering their current and future health (Guthold, Stevens, Riley & Bull 2020). Organized physical activity that is carried out for children and young people in school 2 to 3 times per week in the form of a physical education class does not meet the daily requirement for physical activity. A systematic review of previous research of the level of physical activity

during physical education class (PA class) in children and adolescents in the period 1987 to 2019 suggests that the level of physical activity during PA class is insufficient, and that less than a quarter of children and adolescents reach 30 minutes of moderate physical activity during PA class (Grao-Cruces, Velásquez-Romero & Rodríguez-Rodríguez, 2020). Children most often see role models in their parents, and numerous studies indicate that parents' lifestyle and habits are closely related to children's habits (Trajkovski & et al., 2014), ie that physical activity of both parents is significantly associated with frequent participation of children in multiple sports (Rodrigues, Padez & Machado-Rodrigues, 2018). The role of parents in encouraging children to engage in extracurricular kinesiological activities can be stimulating or limiting, and depends on a number of factors. For example Brown et al. (2011) according to Iveković (2020) in their research point out that parents encourage more male children to sports activities, while female children are primarily directed to sedentary activities based on fine motor skills. In addition, the results of the Pew Research Center (2015) indicate a greater involvement of fathers in encouraging children to play sports (37% of fathers said they encourage children to train and 27% of mothers). Furthermore, parental influence on targeting sports activity decreases by the age of children. According to a study by the Pew Research Center (2015), 38% of parents of young school-age children indicated that they participate in encouraging their children to take part in sports activities, while 26% of parents do the same in a sample of adolescents. In general, the current literature shows that the age of children in relation to gender has a much greater impact on participation in organized sports activities (Iveković, 2020). According to the research Vidaković Samaržija & Alić (2019), children in lower grades of primary school participate more in kinesiological activities in their leisure time than students in higher grades of primary school, which also indicates a negative trend of declining kinesiological activity with age.

The aim of this study was to assess parental attitudes about physical activity and encouraging children to extracurricular kinesiological activity in their leisure time. The secondary goal was to determine the persistence of differences in parental attitudes towards encouraging activities with regard to the child's involvement in organized extracurricular kinesiological activities.

METHODS

Study participants

The research was conducted on a sample of 191 parents of 3th and 4th grade students of primary schools in Cavtat, Gruda and Župa Dubrovačka, Croatia. The research was approved in advance by the Faculty Council of the Department of Teacher and Preschool Teacher Education of the University of Zadar, Croatia. The research was voluntary and anonymous.

Variables

A survey questionnaire consisting of 24 questions was used. The first part of the questionnaire was aimed at collecting socio-demographic data on age, gender, and involvement in extracurricular physical activity. The second part of the questionnaire was focused on parents' attitudes about physical activity and encouraging children to attend organized extracurricular kinesiology activities. The degree of agreement with a particular statement was assessed on a Likert-type scale (1- disagree at all, 2- disagree, 3- do not know, 4- agree, 5- strongly agree).

Statistical analysis

The collected data were processed by the program Statistica 7.0. Basic descriptive indicators were calculated: arithmetic mean, standard deviation and response frequencies of individual particles. The normality of the distribution was tested by the Kolmogorov-Smirnov test. Since the distributions of the tested variables deviated significantly from the normality, the Man-Whitney U test was applied for testing significant differences in attitudes about physical activity. For this purpose, the median and quartile rank, z-values and significance level (p) were calculated.

RESULTS

The study involved 191 parents of the 3th and 4th grade students of primary schools. Descriptive indicators (arithmetic means and standard deviations) and the response frequencies of parental attitudes were calculated and shown in Table 1. The values of arithmetic means in most items are extremely high and indicate positive attitudes of

parents about physical activity. The values of standard deviations indicate a small variance in the results of all variables except the variable *I take children to sports events*, which indicates that the range of responses is varied. This is evident from the frequencies of answers to the question (53.84% of respondents do not take children to sports events, and 41.03% of them are not sure).

Table 1. Descriptive parameters and response frequencies of parental attitudes about physical activity and encouragement to attend organized extracurricular kinesiological activities

	M±SD	I don't agree at all	I disagree	I do not know	I agree	I agree completely	Max D	K-S
I talk to the children about the importance of playing sports	4.02±0.78	0	10.26	33.33	51.28	5.12	0.26	p < .01
I spend my leisure time with children on walks outdoors	3.95±0.86	0	12.82	20.51	53.85	12.82	0.25	p < .01
I take children to sporting events (matches)	3.25±1.30	15.38	38.46	41.03	2.56	2.56	0.16	p < .01
I encourage children to be more physically active. it is important for their overall development	4.57±0.61	0	5.13	7.69	48.72	38.46	0.38	p < .01
I encourage children to spend more leisure time outdoors than in front of screens	4.80±0.47	0	2.56	5.13	20.51	71.79	0.49	p < .01
Playing sports contributes to the improvement of health	4.89±0.32	0	0	0	15.38	84.62	0.53	p < .01
Playing sports contributes to the development of responsibility	4.80±0.44	0	0	2.56	25.64	71.79	0.49	p < .01
Children should be encouraged to engage in sports activities from an early age	4.75±0.47	0	0	2.56	20.51	76.92	0.47	p < .01
Both girls and boys can play any sport	4.53±0.79	5.13	0	7.69	38.46	48.72	0.39	p < .01
In sports self-satisfaction is more important than success	4.81±0.44	0	0	0	12.82	87.18	0.50	p < .01

All respondents (parents) believe that playing sports contributes to improving health (100%), and contributes to the development of responsibility (97.43%). Extremely high response rates indicate positive attitudes about the benefits of physical activity. Of the total number of respondents, 79.58% of parents answered that their children are involved in organized extracurricular kinesiology activities (a total of 152 students, of which 86 boys and 66 girls), while 20.42% answered that their child does not participate in such a form of activity (a total of 39 students, of which 18 students and 21 students).

The Man-Whitney U test was applied to determine the significance of differences in parents attitudes toward physical activity with respect to children's involvement (N = 152) and non-involvement (N = 39 in extracurricular kinesiological activity). In most of the items, the values of the arithmetic means of the parents of students involved in organized extracurricular kinesiological activities were higher, but only in some items differences were large enough to be significant (Table 2).

Table 2. Determining the persistence of differences in parental attitudes related to the encouragement of activities with regard to the child's attendance and non-attendance of extracurricular kinesiological activities

	MED/QR N=152	MED/QR N=39	Rank Sum Group 1	Rank Sum Group 2	U	Z	p-level
I talk to the children about the importance of playing sports	4.00/1.00	4.00/1.00	15825.00	2511.00	1731.00	4.00	0.00*
I spend my leisure time with children on walks outdoors	4.00/2.00	4.00/1.00	15218.00	3118.00	2338.00	2.03	0.04*
I take children to sporting events (matches)	4.00/3.00	2.00/1.00	16013.50	2322.50	1542.50	4.62	0.00*
I encourage children to be more physically active. it is important for their overall development	5.00/1.00	4.00/1.00	15550.00	2786.00	2006.00	3.11	0.00*
I encourage children to spend more leisure time outdoors than in front of screens	5.00/0.00	5.00/1.00	15027.00	3309.00	2529.00	1.41	0.16
Playing sports contributes to the improvement of health	5.00/0.00	5.00/0.00	14791.50	3544.50	2764.50	0.65	0.52
Playing sports contributes to the development of responsibility	5.00/0.00	5.00/1.00	14961.00	3375.00	2595.00	1.19	0.23
Children should be encouraged to engage in sports activities from an early age	5.00/0.00	5.00/0.00	14602.00	3734.00	2954.00	0.03	0.97
Both girls and boys can play any sport	5.00/1.00	4.00/1.00	15226.00	3110.00	2330.00	2.06	0.04*
In sports self-satisfaction is more important than success	5.00/0.00	5.00/0.00	14435.50	3900.50	2807.50	-0.51	0.61

MED- QR- median-quartile range; Z-z score; p*- statistical significance

Significant differences were obtained in the items related to the encouragement of physical activity, so parents of children involved in organized extracurricular kinesiology activities more significantly *talk with children about the importance of sports*, more significantly *spend leisure time with children walking outdoors*, more significantly *take children to sports events* and more significantly *encourage children to be physically active* because it is important for their overall development. In the items focused on attitudes about physical activity, it is evident that parents of both groups equally believe that sport contributes to health and the acquisition of work habits, and that children should be directed to sport from an early age. Significant differences were obtained in the items aimed at encouraging children to participate in sports activities, as well as in the items aimed at choosing sports. Parents of children who engage in extracurricular kinesiology activities have less stereotypical thinking and believe that children, regardless of gender, can engage in all kinds of sports.

DISCUSSION

Parents' attitudes about the importance of physical activity as well as its contribution to children's health can have a significant impact on guiding and involving children in organized extracurricular sports activities, and are therefore often the subject of numerous studies. In this paper, the aim was to assess the attitudes of parents about physical activity and encouragement of extracurricular sports activities in their leisure time. High values of the arithmetic means of the answers indicate predominantly positive attitudes about physical activity. Specifically, in this study 100% of parents believe that physical activity contributes to health, over 90% of parents believe that playing sports contributes to the acquisition of work habits and responsibilities and that children from an early age should be encouraged to engage in sports activities, while over 80% of parents encourage children to physical activity because they feel it is essential to their overall development. Such results coincide with the results of the Bešlić (2018) research, according to which more than 80% of parents fully agree with the claims about the positive impact of sports. The positive attitude of parents about extracurricular sports activities is defined by numerous studies (Yılmaz & Güven, 2019) in which the authors emphasize parental awareness of the positive impact of kinesiological activi-

ties on the child (Trajkovski et al. (2014); Vidić et al. (2018) according to Iveković, 2020) or as pointed out by Van der Eecken, Spruyt and Bradt (2019), parents seek to involve their children in leisure activities because they believe that this will enable them to acquire better skills. Positive attitudes of parents about the benefits of physical activity certainly contribute to the inclusion of children in kinesiological activities, especially if their positive attitudes are manifested by encouraging activity, discussing the importance of physical activity and joint participation in outdoor sports activities. In this study, the aim was to determine whether there are differences in parents' attitudes regarding the involvement of children in extracurricular kinesiological activity. A large proportion of parents pointed out that their children were involved in the activity (79.58%), which is similar to the results of some previous research (Prskalo, 2007), and significant differences in individual variables were obtained. Parents of children involved in extracurricular kinesiology activities talk much more with children about the importance of playing sports, spend significantly more leisure time with children outdoors in a sports activity, take more children to sports events and generally significantly more encourage children to be physically active. Parents' lifestyle and their habits are closely related to their children's habits (Sothorn (2004) according to Trajkovski et al., 2014), which was confirmed by the results of this research. More precisely, if the parents are physically active enough and if they often participate in physical activities with their children, then their children will also adopt the habit of daily physical activity. The participation of children and adolescents in extracurricular sports activities is related to their immediate environment (Romero-Blanco, Dorado-Suárez, Jiménez-Zazo, Castro-Lemus, & Aznar, 2020), so it is important to emphasize the importance of establishing physical activity habits from an early age in a family setting. Extracurricular physical activity of children and adolescents can contribute to achieving the recommendations of the World Health Organization (WHO) on the daily level of physical activity (Romero-Blanco, Dorado-Suárez, Jiménez-Zazo, Castro-Lemus, & Aznar, (2020) necessary for their overall development. A number of studies published in the last 20 years have concluded that a large proportion of children and young people are insufficiently physically active (Guthold, Stevens, Riley and Bull 2019; Steene-Johannessen et al. 2020). Insufficient levels of children's physical activity can be strongly influenced by time spent in front of screens and owning electrical appliances, so parental involvement is needed to shorten children's exposure to technological screens (Alotaibi, Almuhanha, Alhassan, Alqadhib, Mortada, & Alwhaibi, 2020). A significant number of parents believe that the use of technology has a negative impact on their child's physical activity and suggests that less access to technology would result in increased activity levels, but there are still large numbers of dissenting opinion (Beech, Philp, Pandyan, McCluskey, 2020). In addition to the fact that children's participation in extracurricular kinesiological activities can contribute to increasing the level of daily physical activity (Belton, Prior, Wickel, & Woods, 2017), regular participation can also contribute to increasing children's motor skills and knowledge (Skowroński et al. 2019; Reverdito et al. 2017), and improving their physical fitness (Ricci, Cleverger, Sellers, Davenport, & Pfeiffer 2020; Golle, 2014).

CONCLUSION

The study points to positive attitudes of parents about children's participation in this form of activity and emphasizes that the role of parents will be significant only if parents have positive attitudes about physical activity, especially if their positive attitudes are manifested by encouraging activity, discussing the importance of physical activity and joint participation in outdoor sports activities. Extracurricular kinesiological activities are mostly available to children, and systematic encouragement of their participation can significantly contribute to the overall level of physical activity and their overall development.

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TRADITIONAL SPORT-BASED PHYSICAL EDUCATION LEARNING MODEL IN CHARACTER IMPROVEMENT AND CRITICAL THINKING OF ELEMENTARY SCHOOL STUDENTS

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Abstract: The research aims to develop a physical education teaching model for lower grade elementary school students in order to develop and improve character and critical thinking. This learning model is expected to be used as a vehicle for student activities in instilling character values and critical thinking from an early age. This learning model is made in a circuit so that it can be played both individually and in groups and can be competed between groups in an interesting and fun way. **Method:** This development research applied the 4D development model by Thiagarajan, Semmel, and Semmel, with the following steps: (1) define, (2) design, (3) develop, and (4) disseminate. The product trials were carried out on 45 students of State Elementary School (SDN) 1 Clering, SDN 3 Clering, and SDN 2 Jugo. The data collection instruments used include: (1) observation guide for the teaching model, (2) value scale, (3) interview guide, and (4) paired sample T-test. The data analysis technique used is quantitative descriptive analysis and qualitative analysis. **Results:** The result of the study is in the form of a traditional sports-based physical education teaching model in the form of a guidebook for teaching the students. The teaching model consists of five game posts, namely: (1) letter S game, (2) letter A game, (3) letter N game, (4) letter T game, and (5) letter O game. It is packaged in the form of a series of game activities. **Conclusion:** At the end of the study, it can be concluded that the developed teaching model is very attractive, according to the characteristics of lower grade students, can be used as a way of teaching physical education, and is very effective for improving character and critical thinking.

Keywords: character, critical thinking, learning model, traditional sport.

INTRODUCTION

Learning physical education, sports and health at the elementary school level, these subjects are compulsory subjects. The learning process of sports and health physical education in elementary schools develops three aspects including cognitive, affective and psychomotor aspects. These three aspects, each of which plays a role in creating a complete human personality in accordance with the goals of national education. In the cognitive realm, learning physical education, sports and health, not only teaches knowledge, but also teaches students to think critically on every problem they face. Leigh Anderson (2017) argues that in character development, physical activity can be used as a means of instilling character values. Based on this, Benjamin (2008: 3-6) states that "physical education is able to develop nervous and kinesthetic system responses for emotional, intellectual, and social interaction development". Based on these opinions, it can be stated that the purpose of physical education in schools is not to make students into athletes or athletes but aims at developing self-potential through various physical activities.

Traditional games as a vehicle for playing are taught in physical education subjects, sports and health in elementary schools. According to Sujarno (2010: 148), traditional games are cultural products of great value for children in the context of fantasy, recreation, exercise and as a means to practice polite and skillful living in society. This game is a game activity filled with noble values, and teaches to always interact with other people. This traditional game has a lot of character values in it, including those values that have a very impact on physical, psychological and social aspects. According to Haerani Nur (2013), traditional games as children's games can be an alternative to creating the next generation with superior character. Traditional games are expected to be used as one of the right media in developing and developing character values, especially the values of cooperation, discipline, responsibility, confident and make a decision.

Character is a set of values that lead to a value system that underlies the thoughts, attitudes, and behaviors that a person displays. Character is a set of values that lead to a value system that underlies the thoughts, attitudes, and behaviors that a person displays (Kemdiknas 2010:11). According to Syamsu Yusuf et al (2013: 34-35), to carry out character education in schools are as follows: (a) Creating a conducive religious climate, (b) Organizing a socio-emotional climate, (c) Building academic culture, (d) Integrated with the learning process, (e) Integrated in extracurricular activities, (f) Cooperation with other parties. According to Lickona (1992) in order to internalize character education towards noble character in every student.

According to Ennis (2011) critical thinking is the ability to reflect and reason, focusing on what is believed or done. Critical thinking skills include the ability to clarify basic, basic decisions, draw conclusions, provide further explanation, estimate and integrate, and additional abilities. Meanwhile, Raharjo (2010) defines character education as a holistic educational process that connects the moral dimension with the social realm in the lives of students as the foundation for the formation of a quality generation that is able to live independently and has the principle of a truth that can be accounted for. According to (Richard Leptein 2006: 56) learning to think critically needs to be integrated in learning, so that students can understand and easily find a subject matter. To become a good critical thinker requires awareness and skills to maximize the work of the brain through good critical thinking steps, so that the frame of mind and way of thinking are structured in a good pattern.

The learning model is a learning activity that must be done by teachers and students so that learning objectives can be achieved effectively and efficiently. From the source of the model of teaching book written by Joyce, Bruce and Weil, Marsha, (1996), the learning model is a set of sequential procedures to carry out learning development. Meanwhile, according to (Husdarta and Yudha M.Saputra 2000:35) the learning model is a plan that is used to design a teaching. The learning model is developed in the form of letter games where the games are arranged in a post or circuit. The letter game is in the form of letters with a total of 5 (five) posts, each post aims to stimulate character values and critical thinking skills. The learning model is named the letter game and is packaged in a manual or guidebook. This game is made based on the selection of character values from 28 types of traditional Javanese games, where the character values developed include the character of discipline, self-confidence, responsibility, decision making and cooperation. In addition, this learning model is combined from 18 character values from the Ministry of National Education and from the Physical Education curriculum. With the development of this learning model, it is hoped that it can help students understand, practice and improve the character values contained in the series of post games, as well as improve critical thinking skills in everyday life. The following is an explanation of the series of activities for each game post in table 1.

Table 1. Series of game posts

Pos	Game Form	Character Aspect	Aspects of Critical Thinking
1.(Letter S)	Players, perform an ankle movement with one leg alternately, on a triangular-shaped medium, and perform a jumping motion with both feet on a square-shaped medium.	This game aims to increase the value of disciplined characters.	Set a strategy so that in doing the movement of lifting the legs alternately, to maintain the balance of the body is maintained. In addition, players recognize form and space.
2.(Letter A)	The player, performs a running movement on a line in the shape of the letter "A", by jumping over the obstacles that have been provided.	This game aims to increase the attitude of self-confidence.	Analyze how much strength, needed to be able to jump over each obstacle and recognize letters.
3.(Letter N)	Players, run back and forth on a track in the shape of the letter "N", while bringing pieces of letters to be arranged into a sentence.	This game aims to increase the value of the character of responsibility.	Analyze the position of the letters that will be arranged into a sentence.
4(Letter T)	The player throws a plastic ball into the box or basket that has been provided with a distance of 2 meters on a line that is in the shape of the letter "T",	This game aims to improve decision-making attitudes	Strategy and accuracy in entering the plastic ball according to its color, and analyzing the correct hand position so that when throwing it is right and entered.
5(Letter O)	Players, together perform a step-by-step movement, with the help of a square pedestal to the point of stopping.	This game aims to increase the value of the cooperative character.	Carry out a strategy in setting foot steps so that there is no distance between other supports.

Based on the explanation above, the researcher wants to conduct development research, which aims to develop a traditional sports-based physical education and health-based learning model in improving character and critical thinking in elementary school students.

METHODS

The method used in this research is research and development. In this research and development method, there are several types of models. The model used is the development of a 4-D model. The 4-D development model (Four D) is a learning device development model. This model was developed by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel (1974: 5). The 4D development model consists of 4 main stages, namely: Define, Design, Develop and Disseminate. This method and model was chosen because it aims to produce a product in the form of a traditional sports-based physical education learning model in improving the character and critical thinking of elementary school students. The product developed is then tested for feasibility with validity and product testing to determine the extent to which character improvement (discipline, self-confidence, decision making, responsibility and cooperation) and critical thinking skills after learning using traditional sports-based learning models on physical and physical education material is carried out by testing the effectiveness.

RESULTS

At this stage of development to produce products that have been revised based on input and suggestions from experts. This development stage includes expert validation and development trials. It is known from the results of expert validation and trials, then revisions are made until the product is feasible and can be used as learning material. Assessment or validation by experts can be determined by the eligibility criteria obtained from the average score of the respondents. The mean score of the respondents that has been obtained is then converted according to the feasibility conversion table to determine the level of feasibility of the learning model according to the respondents. Aspects of assessment by material experts include aspects of the suitability of basic competencies, aspects of learning and aspects of material presentation. The assessment scores that have been obtained through a questionnaire are then averaged into an assessment score with a range of 1-4. The results of the average score that have been obtained are then categorized according to the level of feasibility according to the table. The data on the results of the assessment by material experts are in Table 2.

Table 2. Data on the results of the Material Expert assessment

Aspects of assessment	Expert Score	Average	Category	
Basic competence suitability	6	8	3.50	Very good
Learning	43	46	3.70	Very good
Material presentation	12	16	3.50	Very good
Rerata Total			3.57	Very good

In the aspect of conformity with basic competencies, an average score of 3.50 is obtained which means it is included in the “very good” category. In the learning aspect, the average score was 3.70, which means it is in the “very good” category. Meanwhile, in the aspect of presenting the material, it gets a score of 3.50 which means it is in the “very good” category. Based on the table of eligibility categories for learning material experts in table 2, the traditional sports-based learning model is included in the “very good” or very feasible category.

Aspects of assessment by media experts include aspects of the accuracy of the basic basic materials, aspects of the accuracy of the layout of the game, aspects of the accuracy of the form of the game and aspects of the accuracy of the game media. The assessment scores that have been obtained through a questionnaire are then averaged into an assessment score with a range of 1-4. The results of the average score that have been obtained are then categorized according to the level of feasibility according to the table. The data on the results of the assessment by material experts are in Table 3.

Table 3. Data on the results of the media expert's assessment

Aspects of assessment	Expert Score			Average	Category
Base material accuracy	8	8	3	3.17	Very good
Game layout accuracy	15	15	6	3.00	Very good
Game form accuracy	12	11	4	3.00	Very good
Game media accuracy	24	23	11	3.22	Very good
Rerata Total				3.10	Very good

The results of the assessment of each aspect get a different average score. In the aspect of the accuracy of the basic ingredients, the average score is 3.17, which means it is included in the “very good” category. In the aspect of the accuracy of the layout of the game, an average score of 3.00 was obtained which means it is in the “very good” category. The accuracy aspect of the game form obtained an average score of 3.00 which means it is in the “very good” category. Meanwhile, the accuracy aspect of the game media gets a score of 3.22 which means it is in the “very good” category. Based on the table of eligibility categories of learning model media experts in table 19, the based learning model is included in the “very good” or very feasible category.

After the model was validated by material experts and media experts and declared suitable for use as learning material, then the traditional sports-based physical education learning model was tested on students, to get a response as a user. The questionnaire used consisted of 20 assessment items with a score range of 1-4 points. Aspects of the development trial assessment include learning aspects, material aspects, and media aspects. The assessment scores that have been obtained through a questionnaire are then averaged into an assessment score with a range of 1-4. The results of the average scores that have been obtained are then categorized according to the feasibility level as contained in table 4.

Table 4. Data from the test results Development

Aspects of assessment	Total average	Category
Learning	3.64	Very good
Theory	3.43	Very good
Media	3.51	Very good
Total average	3.53	Very good

In the trial results of the development of the traditional sports-based physical education learning model that was developed, there were 3 aspects of the assessment carried out. The results of the average score of each aspect are different. The learning aspect got an average total score of 3.64 which means it falls into the “very good” category. The material aspect got an average score of 3.43 which means it falls into the “very good” category. Meanwhile, for the media aspect, the average score was 3.51 which was included in the “very decent” category. The results of the overall development trial got an average total score of 3.53 out of a maximum score of 4.00. Based on the table for the feasibility category of the learning model in table 4, the module is included in the “very good” or very feasible category.

This research was conducted to find out how influential the traditional sport-based physical education learning model is in improving character and critical thinking. The study used a quasi-experimental method and the research design consisted of a pre-test, a mid-test and ended with a final test. From the research results obtained data that are relevant to the objectives and hypotheses. The presentation of research results can be in the form of tables, graphs, pictures or charts arranged according to the stages of research implementation. The research data was obtained from the pretest with an assessment questionnaire test on character and a critical thinking assessment questionnaire test whose scores were taken, and the measurement results can be seen in Tables 5 and 6.

Table 5. Character Assessment Questionnaire Data

No	Respondents	Indicators	Pretest	Posttest	Different
1	45	Discipline	3.36	3.54	0.18
2	45	Confidence	3.31	3.41	0.10
3	45	Responsibility	3.37	3.52	0.15
4	45	Decision-making	3.38	3.45	0.07
5	45	Cooperation	3.32	3.46	0.14
		Amount	16.74	17.38	0.64
		Average	3.35	3.50	0.15
		Standard Deviation	0.146	0.47	0.324
		Variant	0.22	0.22	0
		Minimum Value	3.10	3.20	0.10
		Maximum Value	3.75	3.85	0.10
		Increase Amount			1.95

Based on the table above, it can be seen that the results of the observation of the character aspect have an average pre-test of 3.35 standard deviation of 0.146 with a variance of 0.00 and a minimum value of 3.10 and a maximum value of 3.275. Meanwhile, for the post-test, the average value was 3.50 with a standard deviation of 0.47 with a variance of 0.00 and a minimum value of 3.10 and a maximum value of 3.85. The average difference between the pre-test and post-test is 0.15, the standard deviation is 0.32 with a variance of 0.00 and the difference between the minimum pre-test and post-test values is 0.10 while the difference between the pre-test and post-test values is 0.10. the maximum value of pre-test and post-test is 0.10. From these results, it can be seen that the traditional sports-based physical education learning model on the character aspect between pre-test and post-test gives an increase of 1.95%.

Table 6. Questionnaire data for critical thinking assessment

No	Respondents	Indicators	Pretest	Posttest	Different
1	45	Analyze	3.28	3.45	0.17
2	45	Solve the problem	3.41	3.48	0.07
3	45	Able to strategize	3.30	3.42	0.12
4	45	Setting tactics	3.28	3.43	0.15
5	45	Evaluation skills	3.38	3.45	0.07
		Amount	16.65	17.23	0.58
		Average	3.33	3.44	0.11
		Standard Deviation	1.41	1.40	-0.01
		Variant	0.20	0.20	0
		Minimum Value	3.07	3.14	0.07
		Maximum Value	3.71	3.71	0
		Increase Amount			1.33

Based on the table above, it can be seen that the results of critical thinking observations have an average pre-test of 3.33 standard deviation of 1.41 with a variance of 0.20 and a minimum value of 3.07 and a maximum value of 3.71. Meanwhile, for the post-test, the average value was 3.44 with a standard deviation of 3.40 with a variance of 0.20 and a minimum value of 3.14 and a maximum value of 3.71. The mean difference value of pre-test and post-test is 0.11

standard deviation of -0.01 with a variance of 0.00 and the difference value between the minimum value of pre-test and post-test is 0.07, while the the difference between the maximum value of pre-test and post-test is 0.00. From these results, it can be seen that the traditional sports-based physical education learning model on critical thinking aspects between pre-test and post-test gave an increase of 1.33%.

After the data is normally distributed and the data is homogeneous, then proceed with the T test, this test is carried out to find out whether there are differences in the character value variables and critical thinking at the time of initial and final measurements. The results of the analysis stated that there was a difference if the significant value was less than 0.05 ($p < 0.05$). The following results of the t-test for the variable value of character and critical thinking can be seen in table 7 below.

Table 7. Test Results Paired Sample T-Test variable Character Value and Critical Thinking

Variabel	Mean	T test	Sig
Character	-3.06667	-9.630	0.000
Critical thinking	-1.60000	-6.478	0.000

The results of the paired sample T-test on character values and critical thinking variables give the results that: (1) the variance of the character values ($p = 0.000$), (2) critical thinking about the variance ($p = 0.000$). From the results of the paired sample T-test data on character values and critical thinking values, it can be concluded that there is a significant increase.

DISCUSSION

The feasibility of this traditional sports-based physical education learning model goes through several stages so that a learning model is declared feasible if it has gone through the following stages: (a) Material expert validation: Material expert validation carried out in the development of this traditional sports-based physical education learning model, involving two material experts , which consists of one material expert from a professor of fiction and one material expert from a senior teacher. Material experts were given questions through a material expert questionnaire, then asked to respond to some of the questions asked, and continued to provide suggestions and input and recommendations regarding the feasibility of traditional sports-based physical education learning model materials in improving students' character and critical thinking. After the expert questionnaire was collected, the researchers processed the data, after the data was processed, it could be concluded that the feasibility of the learning model material developed was in good category, and the model was feasible to be tested with revisions. (b) Validation of media experts, media expert validation carried out in the context of developing a traditional sports-based physical education and physical education learning model in improving students' character and critical thinking, involving three media experts, consisting of two material experts from a fictitious professor and one material expert from senior teacher. Media experts were given questions through a media expert questionnaire, then asked to respond to some of the questions asked, and continued to provide suggestions and input and recommendations regarding the feasibility of traditional sports-based physical education and physical education learning media in improving students' character and critical thinking. After the expert questionnaire was collected, the researchers processed the data, after the data was collected, it was continued by processing the data, so the results can be concluded that the feasibility of the learning model media developed in the good category, and the model deserves to be tested with revisions. (c) Product trial results. After going through a series of validations from material experts and media experts, then proceed with development trials aimed at getting user responses and input. This trial involved 45 students from 3 public elementary schools in the Donojo sub-district, Jepara. The results obtained from the trial were concluded to be categorized as very good.

Based on the results of the t-test analysis on the effect of the traditional sports-based physical education learning model in character building. The results of the analysis of the increase in character values, that with a significance level of $p = 0.000$ ($p < 0.05$), the statement that there is a difference in character level between the pretest and post-test is accepted. In other words, it can be stated that there is a significant difference between the pretest and posttest. Based on the results of the analysis, it turns out that the posttest character level is better than the pretest, this means the research hypothesis states that there is an increase in physical education and traditional sports-based sports in

character building. From the hypothesis test above, it can be concluded that physical education and sports learning based on traditional sports have increased character. Traditional games can develop character values, proving that traditional games are effectively used to build character. (Marlina, S.2016). According to Fadlillah, M. (2016) through games can instill various character values such as the character of discipline. This is also stated by Dubnewick, M. conducting research related to traditional games that traditional games can build self-confidence. (Dubnewick, M., et al, 2018). in addition to increasing character with sports exercises carried out with circuit models, it is quite effective to improve physical fitness, (Susanto, et al, 2021)

The highest increase in the character variable is the character of discipline, as seen in the increase of 0.18. An increase in the discipline variable occurred at the letter S game post, in this game students carried out activities including (1) when playing the game students obeyed the rules of the game by queuing, (2) students performed ankle movements or walked by lifting one leg in turn. on the shape plane. triangle and square. While the lowest is in the decision-making variable, this variable has increased by 0.07 which can be seen in table 21. The lack of improvement in the decision-making variable occurs in the letter T game post, in this post game students rush to throw the target ball in the form of a basket. and does not take into account the magnitude of the force required to throw. Through traditional games can improve children's social development such as cooperative characters (Y. T. Saleh, et al, 2017). In addition, doing regular physical movements can affect the working system of the lungs and other functions (Susanto et al, 2020).

Based on the results of the t test about the effect of the traditional sports-based physical education learning model in improving critical thinking. The results of the analysis on increasing the value of critical thinking, that with a significant level of $p = 0.000$ ($p < 0.05$) so the statement that there is a difference in critical thinking level between the pretest and posttest is accepted. In other words, it can be stated that there is a significant difference between the pretest and posttest. Based on the results of the analysis, it turns out that the posttest critical thinking level is better than the pretest, this means that the research hypothesis states that there is an increase in traditional sports-based physical education and sports learning in increasing critical thinking. From the hypothesis test above, it is concluded that traditional sports-based physical education and sports learning has an increase in critical thinking. The highest increase in this critical thinking variable is in the component of analyzing activities, an increase of 0.17. This increase occurs because every time students will do a series of games, students always pay attention to the examples of movements given by the teacher and always pay attention to their friends doing each game post, so students can easily practice each game. While the variable with the lowest increase occurred in the component of problem solving and evaluation skills, each of which increased by 0.07. Lack of problem solving at each game post, occurs due to students' lack of coordination between friends or their team, and lack of evaluation skills occurs because mistakes are always repeated in every repetition of the game. Students' critical thinking according to (Nuryanti, L. Et al (2018), is the ability of students to find learning information independently and actively create cognitive structures in students. Teaching students to think critically is one of the main goals of education (Kazempour, 2013; Kaleiloglu & Gulbahar, 2014; Zubaidah, 2010) Thinking skills are an indispensable ability in facing life's challenges.

CONCLUSION

The research product resulting from this development research is in the form of a traditional sports-based physical education learning model that is appropriate as a learning model, which is equipped with a guide book. The product of physical education learning research with the title "Development of Physical Education Learning Model in improving the character and critical thinking of elementary school students". This learning model can be used for enrichment of learning models in order to improve character and critical thinking. Based on the discussion from the previous chapter, the following conclusions can be drawn: (1) The traditional sports-based physical education learning model after going through a series of expert validations and trials that have been carried out is declared worthy of a physical education learning model that develops and improves the character and critical thinking of school students base. (2) The traditional sports-based physical education and physical education learning model can develop and improve the character of lower grade elementary school students. The characters developed are the character of discipline, the character of self-confidence, the character of responsibility, the character of decision-making and the character of cooperation. The characters developed greatly affect students' productivity in the learning process and other supporting activities. (3) The traditional sport-based physical education and physical education learning model can develop and improve the critical thinking of

elementary school students. Critical thinking developed includes: analysing activities, solving problems, formulating strategies, developing tactics and evaluating. Critical thinking activities are very well applied to students from as early as possible, this can support students in the learning process activities.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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THE INFLUENCE OF ORGANIZED PHYSICAL EXERCISE ON THE TIME SPENT IN MVPA OF ELEMENTARY SCHOOL STUDENTS

UTICAJ ORGANIZOVANOG FIZIČKOG VEŽBANJA NA VREME PROVEDENO U MVPA UČENIKA OSNOVNIH ŠKOLA

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Abstract: The World Health Organization recommends daily physical activity for at least 60 minutes for children, while for adults this recommendation amounts to at least 30 minutes a day. As part of daily physical activity, it is recommended to exercise at a moderate to high intensity for at least 10 minutes. Today, we are increasingly faced with the problem of sedentariness in both adults and children. It is considered that a school is a place where children could be expected to be more physically active because they spend a lot of time there. The subject of this research concerns the time spent in moderate to high-intensity physical activity (MVPA) during one day. A systematic review of two electronic databases (PubMed and Mlibrary) identified a small number of studies that analyzed MVPA between boys and girls. In the studies, organized physical exercise is cited as a way to make children more interested in exercise than usual. The research results of three selected studies indicate that students are not sufficiently physically active and that there are no significant differences in MVPA values between boys and girls (8 to 14 years of age). On the basis of highly qualified scientific studies, including only studies that measured MVPA with an accelerometer, it is observed that boys achieved higher values and are therefore somewhat more physically active compared to girls. **Keywords:** physical activity, physical education teaching, primary school, adolescents.

Apstrakt: Svetska zdravstvena organizacija preporučuje svakodnevnu fizičku aktivnost u trajanju od najmanje 60 minuta za decu, dok za odrasle ta preporuka iznosi najmanje 30 minuta dnevno. U okviru dnevne fizičke aktivnosti preporučuje se vežbanje umerenog do visokog intenziteta u trajanju od najmanje 10 minuta. Danas se sve više suočavamo se problemom sedentarnosti kako odraslih, tako i dece. Smatra se da je škola mesto gde bi se moglo očekivati da deca budu više fizički aktivna jer tu provode dosta vremena. Predmet ovog istraživanja tiče se vremena provedenog u umerenom do visokom intenzitetu fizičke aktivnosti (MVPA) tokom jednog dana. Sistematskim pregledom dve elektronske baze podataka (PubMed i Mlibrary) utvrđen je mali broj studija koje su analizirale MVPA između dečaka i devojčica. U studijama se navodi organizovano fizičko vežbanje kao način da se deca nešto više nego inače zainteresuju za vežbanje. Rezultati istraživanja tri odabrane studije navode da učenici nisu u dovoljnoj meri fizički aktivna, kao i da nema značajnijih razlika u vrednostima MVPA između dečaka i devojčica (8–14 godina). Na osnovu visokokvalifikovanih naučnih studija, uključujući isključivo studije koje su vršile merenje MVPA akcelometrom uočava se da su dečaci postigli veće vrednosti pa su time i nešto fizički aktivniji u odnosu na devojčice.

Ključne reči: fizička aktivnost, nastava fizičkog vaspitanja, osnovna škola, adolescenti.

INTRODUCTION

Previous research points out that school-aged children are insufficiently physically active. It is assumed that one of the possible factors can be attributed to the insufficient motivation of students to participate in physical activity, both in an organized form within classes and in free activity after the time spent at school. Physical activity as a significant risk factor for growth and development in chil-

UVOD

Dosadašnja istraživanja ističu da su deca školskog uzrasta nedovoljno fizički aktivna. Pretpostavlja se da se jedan od mogućih faktora može pripisati nedovoljnoj motivisanosti učenika za učešćem u fizičkoj aktivnosti, kako u organizovanom obliku u okviru nastave, tako i slobodnoj aktivnosti nakon vremena provedenog u školi. Fizička aktivnost kao značajan riziko faktor rasta i ra-

dren is associated with an increased rate of obesity. On the other hand, increased time spent in moderate to vigorous physical activity (“MVPA” - Moderate to Vigorous Physical Activity) is significantly related to a lower rate of obesity in children and youth (Strong et al., 2005). The World Health Organization emphasizes the overall importance of regular physical exercise for both adults and children (WHO, 2019). However, study data indicate that school-aged children are not sufficiently physically active and that they do not meet the recommended minimum regarding exercise intensity (Troiano et al., 2008). School-aged children should exercise daily for at least 60 minutes, while they should spend at least 10 minutes in MVPA during the day (WHO, 2019; Ekelund et al., 2012). Considering that children spend a lot of time at school during working days, it is considered that children should do half of the recommended daily exercise (at least 30 minutes) in the school environment (Kriemler et al., 2011).

Recently, the subject of research is the intensity of physical exercise, which is defined by the parameter of the time interval spent in moderate to high-intensity physical activity (MVPA). Different authors measured this outcome in different ways (accelerometers, pedometers, surveys). Even though the benefits of regular physical exercise are known, the intensity-related effect (MVPA) remains under-researched. It is considered that an increase in MVPA of 10 minutes during one day could be compared with an increase in MVPA of about 50 minutes during a working week, that is, on a weekly basis, with an increase in overall physical activity by about 30% (Jago et al., 2012). Therefore, on the basis of previous research that focuses on the intensity of physical exercise of school-aged children, and not meeting the recommended minimum for exercise dictated by the World Health Organization, this study aims to consider and qualitatively present the time spent in MVPA within the framework of physical education classes. and organized school activities in the field of physical exercise.

METHOD

In this study, a bibliographic speculative method was applied, and the research was based on the analysis of already existing bibliographic sources, which for the subject set the time interval as the intensity of physical activity in MVPA. With a systematic review of two electronic databases (PubMed and Mlibrary), without a time limit, a review of scientific studies was carried out based on clearly defined keywords: physical activity, physical education teaching, primary school, and adolescent. Filters were included to select English-language stud-

zvoja kod dece dovodi se u vezu sa povećanom stopom gojaznosti. Sa druge strane povećano vreme provedeno u umerenoj do visoko intenzivnoj fizičkoj aktivnosti (“MVPA” – Moderate to Vigorous Physical Activity) značajno je u vezi sa nižom stopom gojaznosti kod dece i mladih (Strong et al., 2005). Svetska zdravstvena organizacija ističe sveukupnu važnost primene redovnog fizičkog vežbanja, kako za odrasle, tako i za decu (WHO, 2019). Ipak, podaci studija ukazuju na to da deca školskog uzrasta nisu u dovoljnoj meri fizički aktivna, kao i da ne zadovoljavaju preporučeni minimum koji se tiče intenziteta vežbanja (Troiano et al., 2008). Deca školskog uzrasta trebalo bi da vežbaju svakodnevno i to najmanje 60 minuta, dok u MVPA treba da provedu najmanje 10 minuta u toku dana (WHO, 2019; Ekelund et al., 2012). Obzirom, da deca dosta vremena provode u školi tokom radnih dana smatra se da bi pola preporučenog dnevnog vežbanja (najmanje 30 minuta) deca trebalo da realizuju u školskom okruženju (Kriemler et al., 2011).

U poslednje vreme predmet istraživanja je intenzitet fizičkog vežbanja koji se definiše parametrom vremenskog intervala provedenog u umerenom do visokom intenzitetu fizičke aktivnosti (MVPA). Različiti autori su na različite načine vršili merenje tog ishoda (akcelerometri, pedometri, ankete). Iako su poznati benefiti redovnog fizičkog vežbanja i dalje ostaje nedovoljno istražen efekat koji se tiče intenziteta (MVPA). Smatra se da bi povećanje MVPA od 10 minuta u toku jednog dana moglo da se poredi sa povećanjem MVPA sa oko 50 minuta u toku jedne radne nedelje, odnosno, na nedeljnom nivou povećanjem celokupne fizičke aktivnosti za oko 30% (Jago et al., 2012). Dakle, na osnovu dosadašnjih istraživanja koja u fokus postavljaju intenzitet fizikog vežbanja dece školskog uzrasta, te ne zadovoljavanje preporučenog minimum za vežbanjem koji diktira Svetska zdravstvena organizacija upućuje na to da ova studija za cilj razmotri i kvalitativno prikaže vreme provedeno u MVPA u okviru nastave fizičkog vaspitanja i organizovanih školskih aktivnosti na polju fizičkog vežbanja.

METOD RADA

U ovoj studiji primenjen je bibliografsko spekulativni metod, a istraživanje je bazirano na analizi već postojećih bibliografskih izvora koja za predmet postavljaju vremenski interval kao intenzitet fizičke aktivnosti u MVPA. Sistematskim pregledom dve elektronske baze podataka (PubMed i Mlibrary), bez vremenskog ograničenja, izvršen je pregled naučnih studija na osnovu jasno definisanih ključnih reči: fizička aktivnost, nastava fizičkog vaspitanja, osnovna škola i adolescent. Uklju-

ies as well as highly qualified randomized clinical trials (RCTs). From a total of 346 scientific studies, after removing duplicate studies, and studies with inappropriate designs and criteria, the studies that were obtained were reviewed in their entirety. When reviewing the studies, it was noticed that the methodological criteria for assessing MVPA are not uniform, so the selection of studies included in the analysis of this paper was based on the criteria for the selection of the instrument. Studies in which the time interval as a criterion for MVPA was identified based on the accelerometer were selected.

Studies that stated the use of a pedometer instead of an accelerometer, exercising under the guidance of a teacher (time interval followed by a stopwatch) as a criterion for MVPA, as well as studies that did not use appropriate statistics were rejected. Potentially selected papers were reviewed by two independent authors (R.R. and D.G.). Out of a total of 15 studies that met the set criteria, only 3 studies (Corder, 2020; Resalanda, 2018; Telford, 2016) showed results that highlight differences between male and female students in the values of time (interval) spent in MVPA. Due to the inconsistency of the methods and applied statistics, the obtained data are presented exclusively qualitatively.

Primary outcome

Papers that mention a physical activity that was performed during the time spent at school or after school were selected. The program of organized physical exercise referred to all physical activities that have a stimulating effect on elementary school students (dance, ball games, sports team games, various competitions). The intensity of physical activity, which is defined as moderate to high (MVPA), is significant for its positive impact on the child's organism. In studies, MVPA was defined as >2296 per minute (Evenson et al., 2008). All studies that report the use of accelerometers exclusively in the analysis of MVPA were included in the reviewed paper.

Respondents

A systematic review selected studies that highlight differences in MVPA between school-aged boys and girls (8 to 14 years of age). In all studies, parental consent was requested for the research, as well as permission to wear the accelerometer. The students were divided into two groups. The experimental group practiced with a teacher (and an instructor) during their time at school or outside of school hours. The control group exercised according to the regular curriculum within physical education classes. Because of the known gender differences and the impact they have

čeni su filteri za odabir studija na engleskom jeziku, kao i visokokvalifikovanih randomizovanih kliničkih studija (RKT). Od ukupno 346 naučnih studija, nakon odbacivanja dupliranih studija, studija neodgovarajućeg dizajna i kriterijuma, dobijene su studije koje su pregledane u celosti. Pri pregledu studija uočeno je da metodski kriterijumi za procenu MVPA nisu ujednačeni, te se izbor studija koji je uvršten u analizu ovog rada bazirao na kriterijumu za izbor instrumenta. Izdvojene su studije u kojima je interval vremena kao kriterijum za MVPA bio identifikovan na osnovu akcelometra.

Odbačene su studije koje kao kriterijum MVPA navode upotrebu pedometra umesto akcelometra, vežbanje pod vođenjem nastavnika (vremenski interval praćen štopericom), kao i studije koje nisu imale primenjenu odgovarajuću statistiku. Potencijalni izdvojeni radovi pregledani su od strane dva nezavisna autora (R.R. i D.G.). Od ukupno 15 studija koje su zadovoljile postavljene kriterijume, samo 3 studije (Corder, 2020; Resalanda, 2018; Telford, 2016) pokazale su rezultate koje ističu razlike između učenika i učenica u vrednostima vremena (interval) provedenog u MVPA. Zbog neusaglašenosti metoda i primenjene statistike dobijeni podaci prikazani su isključivo kvalitativno.

Primarni ishod

Odabirani su radovi koji navode fizičku aktivnost koja se izvodila tokom boravka u školi ili nakon škole. Program organizovanog fizičkog vežbanja odnosio se na sve fizičke aktivnosti koje deluju podsticajno na učenike osnovnih škola (ples, igre sa loptom, sportske ekipne igre, različita takmičenja). Intenzitet fizičke aktivnosti koji je definisan kao umeren do visok (MVPA) značajan je radi pozitivnog uticaja na dečiji organizam. U studijama MVPA je bio definisan kao broj >2296 u minuti (Evenson et al., 2008). U pregledni rad su ušle sve studije koje navode korišćenje isključivo akcelometra u analizi MVPA.

Ispitanici

Sistematskim pregledom odabrane su studije koje ističu razlike u MVPA između dečaka i devojčica školskog uzrasta (8–14 godina). U svim studijama tražena je saglasnost roditelja za istraživanje, kao i dozvola za nošenje akcelometra. Učenici su bili podeljeni u dve grupe. Eksperimentalna grupa je vežbala sa nastavnikom (i instruktorom) za vreme boravka u školi ili u vannastavno vreme. Kontrolna grupa je vežbala po redovnom nastavnom planu i programu u okviru nastave fizičkog vaspitanja. Zbog poznatih polnih razlika i uticaja koje

on the realization of physical activity, studies in which the research differences and the stated time of MVPA for male and female students were shown were selected.

Measurement

Selected studies reported that physical activity was measured with an accelerometer worn on the right hip or right arm. The minimum time of physical activity measurement lasted between 3 and 5 days (over a period of 9 to 12 weeks). Also, the studies stated that the minimum time for wearing the accelerometer was at least 3 hours per day.

RESULTS

Based on the set criteria, only three RCT studies were selected that state the use of accelerometers when measuring MVPA during time at school or after school. The review included the results of studies from a total of 94 primary schools with organized physical exercise programs: “GoActive”, “ASK” and “SOFIT”. The values of MVPA were highlighted specifically for male and female students (8 to 14 years of age).

In the first study (Cordera et al., 2020), which assessed which components (competition, rewards, points, leadership, self-esteem, friendship quality) are associated with changes in MVPA, a total of 671 students (13 to 14 years of age) were analyzed, from 8 schools. Students wore accelerometers on their non-dominant wrists for 7 days continuously (24 hours/day). The time spent in MVPA was measured only at the end of the realized program of organized physical exercise and the obtained results indicate higher values measured in boys compared to girls ($n=360$, -1.98 (23.40); $n=311$, -1.55 (17.04)). Values are presented as percentages or as mean and standard deviation. The impact of competition and scoring was found to be more beneficial among female students, while teacher support was found to be more beneficial among male students. The implemented program aimed to promote FA through a different way of competition and collecting points between students. In order to motivate weaker students to participate in the mentioned program, the collected points were kept secret. Activities were divided into individual and group activities (more detailed description in the study). It was found that this type of physical exercise can have a positive effect on increasing socialization among students, self-esteem, and well-being, but not the time spent in MVPA. The obtained research results can only be relevant to high-income schools in Great Britain. The same time period for measuring the results and not recording the results in

ono ima na realizaciju fizičke aktivnosti odabrane su studije u kojima su prikazane razlike istraživanja i navedeno vreme MVPA za učenike i učenice.

Merenje

U odabranim studijama se navodi da je fizička aktivnost merena akcelerometrom koji je nošen na desnom kuku ili na desnoj ruci. Minimalno vreme merenja fizičke aktivnosti trajalo je između 3 i 5 dana (tokom perioda od 9 do 12 nedelja). Takođe, u studijama se navodi da je minimalno vreme nošenja akcelerometra iznosilo najmanje 3 sata dnevno.

REZULTATI

Na osnovu postavljenih kriterijuma odabrane su samo tri RKT studije koje navode korišćenje akcelerometra prilikom merenja MVPA u toku boravka u školi ili nakon škole. Pregledni rad obuhvatio je rezultate studija od ukupno 94 osnovne škole sa programima organizovanog fizičkog vežbanja: “GoActive”, “ASK” i “SOFIT”. Vrednosti MVPA istaknute su posebno za učenike i učenice (8 – 14 godina).

U prvoj studiji (Cordera et al., 2020), koja je procenjivala koje su to komponente (takmičenje, nagrade, bodovi, vođstvo, samopoštovanje, kvalitet prijateljstva) povezane sa promenama u MVPA, izvršena je analiza ukupno 671 učenika (13-14 godina) iz 8 škola. Učenici su nosili akcelerometre na nedominantnom ručnom zglobu 7 dana neprekidno (24 sata/dan). Vreme provedeno u MVPA mereno je samo na kraju realizovanog programa organizovanog fizičkog vežbanja i dobijeni rezultati ukazuju na veće vrednosti izmerene kod dečaka u odnosu na devojčice ($n=360$, -1.98 (23.40); $n=311$, -1.55 (17.04)). Vrednosti su predstavljene u procentima ili srednjim vrednostima i standardnoj devijaciji. Uticaj takmičenja i bodovanja pokazalo se korisnijim među učenicama, dok se podrška nastavnika pokazala korisnijim među učenicima. Primenjeni program imao je za cilj promociju FA kroz neki drugačiji način takmičenja i sakupljanja bodova između učenika. Kako bi se slabiji učenici motivisali za učešće u pomenutom programu sakupljeni bodovi su držani u tajnosti. Aktivnosti su bile podeljene na individualne i grupne (detaljniji opis u studiji). Utvrđeno je da ovakav način fizičkog vežbanja može imati pozitivnog uticaja na povećanje socijalizacije među učenicima, samopoštovanja i blagostanja, ali ne i vremena provedenog u MVPA. Dobijeni rezultati istraživanja mogu biti relevantni samo za škole sa visokim primanjima na području Velike Britanije. Kao mana istraživanja navodi se isti vremenski period

the sedentary group of subjects is mentioned as a drawback of the research.

In the second study (Resalanda et al., 2018), the impact of “active learning” through organized physical exercise “ASK” and the impact it can have on the school performance of students (N=1129 students, age 10 years, 57 Norwegian primary schools) was researched. The seven-month program “ASK” tried to influence the increase of weekly physical activity above the regular curriculum (165 min/week). The program consisted of three components: 1-educational classes of physical activities (3 × 30 min every week); classes held on the school playground (basic subjects); 2-Physical activity during the break between classes performed in the classroom (5 min × 5 days each week) and 3-Physical activity in the form of homework (10 min per day; 5×10 min/week). All students, in addition to the mentioned program, attended regular physical education classes. The “ASK” program is designed to make the activities interesting and enjoyable for children (more detailed description in the study). Physical activity and sitting time were measured with accelerometers (at the beginning of the study and after seven months) worn on the right hip for 7 consecutive days at all times (except during sleep and bathing). The minimum wearing time during one week was 4 days (480 min/day) and 3 days during 5 working days (180 min/day, between 09:00 and 14:00). The results of the study indicate higher values of MVPA (mean, SD or %) during the whole day measured in boys of the experimental group compared to girls (EG n=282, 84(31); n=260, 71(22)). Also, higher outcome values were recorded in the control group of boys (KG n=240, 80(25); n=224, 67(20)). The values measured during the school day also indicate higher values of MVPA measured in boys in both groups compared to girls (EG n=284, 33(11); n=268, 26(8); KG n=248, 32 (10); n=232, 25(9)). The study does not show a difference in results at the beginning and end of the research period. The results of the study show that there are no significant differences between boys and girls in MVPA values. This research is considered important in assessing the impact of increased physical activity and the impact it may have on long-term important aspects, such as children’s school performance. However, the weakness of the research can be considered the lack of investigation of other factors that may have an impact on the school success of students.

The third selected study (Telford et. al., 2016), whose aim was to examine the impact of the “LOOK” program on increasing the physical activity of school-aged (8 to 12 years of age) children (EG=457; KG=396), from 29 primary schools through the implementation of

merenja ishoda i nebeleženje ishoda u sedentarnoj grupi ispitanika.

U drugoj studiji (Resalanda et al., 2018), istraživan je uticaj “aktivnog učenja” kroz organizovano fizičko vežbanje “ASK” i uticaj koje ono može da ima na školski uspeh učenika (N=1129 učenika, uzrast 10 godina, 57 norveških osnovnih škola). Sedmomesečnim programom “ASK” pokušalo se uticati na povećanje nedeljne fizičke aktivnosti iznad redovnog nastavnog plana i programa (165 min/nedeljno). Program se sastojao iz tri komponente: 1-edukativni časovi fizičkih aktivnosti (3 × 30 min svake nedelje); nastava koja se izvodi na školskom igralištu (osnovni predmeti); 2-Fizička aktivnost tokom pauze između časova koja se izvodi u učionici (5 min × 5 dana svake nedelje) i 3-Fizička aktivnost u vidu domaćeg zadatka (10 min dnevno; 5×10 min/nedeljno). Svi učenici, pored navedenog programa, pohađali su redovnu nastavu fizičkog vaspitanja. Program “ASK” osmišljen je tako da aktivnosti deci budu interesantne i prijatne (detajniji opis u studiji). Fizička aktivnost i vreme sedenja mereni su akcelerometrima (na početku istraživanja i nakon sedam meseci) koji su nošeni na desnom kuku 7 uzastopnih dana u svakom trenutku (osim tokom spavanja i kupanja). Minimalno vreme nošenja tokom jedne nedelje bilo je 4 dana (480 min/dan) i 3 dana u toku 5 radnih dana (180 min/dan, između 09:00 i 14:00 h). Rezultati studije ukazuju na veće vrednosti MVPA (mean, SD ili %) u toku celog dana izmerene kod dečaka eksperimentalne grupe u odnosu na devojčice (EG n=282, 84(31); n=260, 71(22)). Takođe, veće su zabeležene vrednosti ishoda i u kontrolnoj grupi dečaka (KG n=240, 80(25); n=224, 67(20)). Mrene vrednosti u toku školskog dana, takođe, ukazuju na veće vrednosti MVPA izmerene kod dečaka u obe grupe u odnosu na devojčice (EG n=284, 33(11); n=268, 26(8); KG n=248, 32(10); n=232, 25(9)). Studija ne prikazuje razliku rezultata na početku i na kraju perioda istraživanja. Rezultati studije ističu da nema značajnih razlika između dečaka i devojčica u vrednostima MVPA. Ovo istraživanje smatra se važnim u procenjivanju uticaja povećane fizičke aktivnosti i uticaja koje ono može da ima na duge važne aspekte, kao što je školski uspeh dece. Međutim, mana istraživanja može se smatrati neistraženost ostalih faktora koji mogu imati uticaja na školski uspeh učenika.

Treća odabrana studija (Telford et. al., 2016), čiji je cilj bio da se ispita uticaj “LOOK” programa na povećanje fizičke aktivnosti dece (EG=457; KG=396) školskog uzrasta (8-12 godina) iz 29 osnovnih škola kroz primenu izvođenja nastave fizičkog vaspitanja sa novijim i interesantnijim sadržajima. Eksperimentalna grupa učeni-

physical education classes with newer and more interesting content. The experimental group of students received instructions for organized exercise by trained instructors (2 × 45 min physical education lessons per week), while students from the control group only exercised according to the usual plan and program. Students have been wearing pedometers for a long period (7 days each year) and accelerometers for the last 2 years to assess the value of MVPA and sedentary activity of students. Organized exercising was based on creating a pleasant environment for performing physical activity, and the tasks were related to encouraging students to discover different physical movements, and game strategies through experimentation and self-discovery. The comparison of experimental and control physical education classes was made according to the fitness teaching observation system ("SOFIT" - activities classified for the assessment of MVPA during physical education classes). The results of the study state that no significant difference was observed between the students. Pedometers recorded a higher number of steps in boys (in both groups of subjects) compared to girls. The "SOFIT" program, which measured MVPA (means; 95 % CI) with an accelerometer, recorded higher values in the experimental group in boys and girls (boys 11 years - 53.3 (49.1,57.4); 12 years - 49.9 (45.8,53.8) ; girls 11 years - 36.0 (31.8,40.1); 12 years - 34.0 (30.1,37.9). The following values were recorded in the control group: boys 11 years old - 44.9 (40.2,49.7) and 12 years old - 48.7 (44.1,53.3); girls 11 years - 41.6 (37.4,45.9) and 12 years - 35.6 (31.8,39.5). However, the authors believe that well-designed physical education by encouraging students to experiment and self-discovery through play contributes to increasing physical activity.

The importance of the four-year "LOOK" study, which was conducted in Australia, is reflected in summarizing the impact of various factors (organized physical exercise, proper nutrition, family influence, health, school success) on increasing MVPA in students. The disadvantage of the study is that accelerometers were not included from the beginning of the research due to the available budget and a large number of respondents.

DISCUSSION

A systematic review of the available literature found a small number of studies that evaluate the effect of physical activity on the time spent in MVPA of elementary school students. Only three RCT studies that report the use of accelerometers in their research were included in the research. In all three studies, students in the experimental group had slightly higher MVPA values measured.

ka dobijala je instrukcije za organizovano vežbanje od strane obučениh instruktora (2 × 45 min časa fizičkog vaspitanja nedeljno), dok su učenici iz kontrolne grupe vežbali samo po uobičajnom planu i programu. Učenici su tokom dužeg perioda nosili pedometre (7 dana svake godine) i akcelerometre poslednje 2 godine da bi se procenila vrednost MVPA i sedentarna aktivnost učenika. Organizovano vežbanje se zasnivalo na stvaranju prijatne sredine za izvođenje fizičke aktivnosti, a zadaci su se odnosili na podsticanje učenika da otkrivaju različita fizička kretanja, strategije igre kroz eksperimentisanje i samootkrivanje. Poređenje časova eksperimentalnog i kontrolnog fizičkog vaspitanja izrađen je po sistemu posmatranja kondicione nastave ("SOFIT"- aktivnosti klasifikovane za procenu MVPA tokom časova fizičkog vaspitanja). Rezultati studije navode da nije uočena značajna razlika između učenika. Pedometri su zabeležili veći broj koraka kod dečaka (u obe grupe ispitanika) u odnosu na devojčice. "SOFIT" program, koji je merio MVPA (means; 95 % CI) akcelerometrom, zabeležio je veće vrednosti u eksperimentalnoj grupi kod dečaka i devojčica (dečaci 11 godina - 53.3 (49.1,57.4); 12 godina - 49.9 (45.8,53.8); devojčice 11 godina - 36.0 (31.8,40.1); 12 godina - 34.0 (30.1,37.9). U kontrolnoj grupi zabeležene su sledeće vrednosti: dečaci 11 godina - 44.9 (40.2,49.7) i 12 godina - 48.7 (44.1,53.3); devojčice 11 godina - 41.6 (37.4,45.9) i 12 godina - 35.6 (31.8,39.5). Autori ipak smatraju da dobro osmišljeno fizičko vaspitanje kroz podsticanje učenika na eksperimentisanje i samootkrivanje kroz igru doprinosi povećanju fizičke aktivnosti. Značaj četvorogodišnje studije "LOOK", koja je sprovedena u Australiji, ogleda se u sumiranju uticaja različitih faktora (organizovano fizičko vežbanje, pravilna ishrana, uticaj porodice, zdravlje, školski uspeh) i koje ono može da ima na povećanje MVPA kod učenika. Mana studije je što akcelerometri nisu bili uključeni od samog početka u istraživanje zbog raspoloživog budžeta i velikog broja ispitanika.

DISKUSIJA

Sistematskim pregledom dostupne literature pronađen je mali broj studija koje procenjuju efekat fizičke aktivnosti na vreme provedeno u MVPA učenika osnovnih škola. U istraživanje su uključene samo tri RKT studije koje navode korišćenje akcelerometra prilikom svojih istraživanja. U sve tri studije učenici eksperimentalne grupe su imali izmerene nešto veće vrednosti MVPA. Postavlja se pitanje, koji su razlozi merenja MVPA između učenika i učenica kada se očekuje da postoje razlike između polova, kao i koje benefite

The question arises, what are the reasons for measuring MVPA between male and female students when it is expected that there are differences between the sexes, as well as what benefits we can expect from observing the investigated differences? It is assumed that the obtained results could contribute to the development of the curriculum, as well as to the increase of the required minimum time regarding the intensity of physical exercise during the day. Given the small number of studies, these results should be interpreted with caution, and further research is warranted.

Authors who conducted research on the impact of physical activity on time spent in MVPA had common characteristics on the basis of which the studies were selected for this review. However, the non-uniformity makes it difficult to analyze the extracted results. The authors did not clearly specify the measurement periods in order to clearly determine the impact of organized physical exercise. Likewise, the authors state several months of follow-up of students and a certain minimum time are required for the results of wearing the accelerometer to be valid. However, it should be kept in mind that the students were probably more motivated to participate in organized physical exercise due to wearing the accelerometer and the challenge provided by the schoolwork. Also, in the investigated differences between the sexes, other factors that can have an impact, both on the development of motor skills and on acquired attitudes about the importance of daily physical activity should be included. Interesting research was conducted in the schools of Vojvodina in 2009. The author monitored the state of nutrition of lower-grade elementary school students in relation to their level of physical activity. Also, the connection between the realization of physical activity by both parents and children was monitored. The results of this pilot study showed that most children are never or only sometimes physically active, while less than 1/3 of children do frequent and daily physical activity (Lepeš, 2011). When looking at the length of the research period, it is assumed that more accurate data is provided by the physical exercise that is organized for a smaller number of students and lasts a shorter period of time. Although female students are more inclined to dance, it is believed that dance tasks could have a positive effect on engagement. However, if no changes occur after a certain time, reduced interest in physical exercise can be expected (Jago et al., 201; O'Donovan, & Kay, 2005). From the above, we can conclude that the measurement of time spent in MVPA certainly depends on the type of physical activity that is carried out by boys and girls in primary

možemo da očekujemo uočavanjem istraženih razlika. Pretpostavlja se da bi dobijeni rezultati mogli doprineti razvoju nastavnog plana i programa, kao i povećanju potrebnog minimalnog vremena koje se tiče intenziteta fizičkog vežbanja u toku dana. Obzirom na mali broj studija ove rezultate treba tumačiti sa oprezom, a dalja istraživanja su opravdana.

Autori koji su vršili istraživanja uticaja fizičke aktivnosti na vreme provedeno u MVPA imali su zajedničke karakteristike na osnovu kojih su studije odabrane za ovaj pregled. Međutim, ono što nije ujednačeno otežava analizu ekstrahovanih rezultata. Autori nisu jasno naveli periode merenja kako bi se jasnije mogao odrediti uticaj organizovanog fizičkog vežbanja. Takođe, autori navode višemesečno praćenje učenika i određeno minimalno vreme koje je potrebno kako bi rezultati nošenja akcelerometra bili validni. Međutim, treba imati u vidu da su učenici verovatno bili više motivisani za učešćem u organizovanom fizičkom vežbanju zbog nošenja akcelerometra i izazova koji im pruža školski zadatak. Takođe, u istražene razlike između polova treba uvrstiti i ostale faktore koji mogu imati uticaja, kako na razvoj motoričkih sposobnosti, tako i na stečene stavove o važnosti svakodnevne fizičke aktivnosti. Interesantno istraživanje sprovedeno je u školama Vojvodine 2009. godine. Autor je pratio stanje uhranjenosti učenika nižih razreda osnovnih škola u odnosu na stepen njihove fizičke aktivnosti. Takođe, pratila se povezanost između realizacije fizičke aktivnosti kako roditelja i dece. Rezultati pilot istraživanja su pokazali da je većina dece nikada ili samo ponekad fizički aktivna, dok čestu i svakodnevnu fizičku aktivnost realizuje manje od 1/3 dece (Lepeš, 2011). Kada se posmatra dužina trajanja perioda istraživanja pretpostavlja se da preciznije podatke pruža ono fizičko vežbanje koje je organizovano na manjem broju učenika i traje kraći vremenski period. Iako su učenice više sklonije plesu, smatra se da bi plesni zadaci mogli imati pozitivnog uticaja na angažovanost. Međutim, ukoliko ne dođe do promena nakon izvesnog vremena može se očekivati smanjena zainteresovanost za fizičko vežbanje (Jago et al., 201; O'Donovan, & Kay, 2005). Iz navedenog možemo zaključiti da merenje vremena provedenog u MVPA zasigurno zavisi i od vrste fizičke aktivnosti koja se realizuje sa dečacima i devojkama u osnovnim školama.

U studiji domaćih autora, u kojoj je cilj istraživanja bio da se utvrde stavovi nastavnika/profesora o nadarenosti učenika koji prelaze iz razredne u predmetnu nastavu, ističe se značaj i važnost angažovanosti učenika u nastavi. Istraživanje je sprovedeno na 102 ispitanika

schools.

In a study by local authors, in which the goal of the research was to determine the views of teachers/professors on the giftedness of students who are transitioning from the classroom to subject teaching, the significance and importance of student engagement in teaching are emphasized. The research was conducted on 102 respondents (BiH). The results showed that teachers have similar attitudes when it comes to the perception of the interpretation of sports gifted students. As a subject of future research, the question arises as to how it is necessary to implement the methodology of identifying gifted children, and not to neglect the way of animating average students. Also, the authors state the need to create better conditions for working in classes as a possible incentive for greater engagement in physical education classes and extracurricular physical activities (Bajrić et al., 2019). From the above example, it can be inferred that the values of the time spent in MVPA could depend on the degree of student's interest in exercise, but also on motivation, which certainly depends on many factors that need to be investigated. The selected studies in this reviewed paper out that there were no significant changes in the time spent in MVPA after a longer period of organized physical exercise, but there was a change in the form of increased self-confidence and interest of students to be more physically active (Telford et al., 2021).

Longitudinal studies are considered useful and can show significant data on MVPA values. However, it is assumed that the length of the research period can have an impact on the precision of measurements and the realization of various tasks. Authors Telford et al. (2016) point out that due to budgetary and practical restraints, they were limited to making measurements with an accelerometer for the entire period of four years, but they were included in later years when the costs of the devices and the number of participants were lower. If one wants to give an answer to the question of to what extent male and female students are physically active, that is, what is the minimum amount of moderate to high physical activity during the day, it is probably the most representative data that is based on the longest possible measurement period. However, how feasible this is, is stated in this paper by the authors who dealt with the problem posed.

For the promotion of physical education and physical activity, future research could take into account the time spent during school recess, as well as the way in which students use that free time. As children spend a lot of time in the school environment, different tasks during recess could contribute to the amount of movement, and prob-

(BIH). Rezultati su pokazali da nastavnici imaju slične stavove kada je u pitanju percepcija tumačenja sportski nadarenih učenika. Kao predmet budućih istraživanja nameće se pitanje na koji način je potrebno sprovesti metodologiju identifikacije nadarene dece, a ne zapostaviti način animiranja prosečnih učenika. Takođe, autori navode potrebu za stvaranje boljih uslova za rad u nastavi kao mogući podsticaj za veću angažovanost u nastavi fizičkog vaspitanja i vannastavnim fizičkim aktivnostima (Bajrić i drugi, 2019). Iz navedenog primera može se naslutiti da bi vrednosti vremena provedenog u MVPA mogle da zavise od stepena interesovanja učenika za vežbanjem, ali i motivacije koja svakako da zavisi od mnogih faktora koje je potrebno istražiti. Odabrane studije u ovom preglednom radu ističu da nije došlo do značajnih promena u vremenu provedenog u MVPA nakon dužeg vremena organizovanog fizičkog vežbanja, ali je došlo do promene u vidu povećanja samopouzdanja i zainteresovanosti učenika da budu fizički aktivniji (Telford et al., 2021).

Longitudinalna istraživanja smatraju se korisnim i mogu pokazati značajne podatke o vrednostima MVPA. Međutim, pretpostavlja se da dužina perioda istraživanja može imati uticaja na preciznost merenja i realizacije različitih zadataka. Autori Telford i sar. (2016) ističu kako su zbog budžetskih i praktičnih ograničenja bili limitirani da ceo period od četiri godine rade merenja sa akcelerometrom, već su oni uključeni u kasnijim godinama kada su troškovi uređaja i broj učesnika bili manji. Ukoliko se želi dati odgovor na pitanje u kojoj meri su učenici i učenice fizički aktivni, odnosno, koliko iznosi minimum umerene do visoke fizičke aktivnosti u toku dana verovatno da je reprezentativniji podatak koji se zasniva na što dužem periodu merenja. Međutim, koliko je to izvodljivo navode autori koji su se bavili postavljenim problemom u ovom radu.

Za promociju fizičkog vaspitanja i fizičke aktivnosti buduća istraživanja bi mogla da uzmu u obzir i vreme provedeno u okviru školskog odmora, kao i način na koji učenici koriste to slobodno vreme. Kako deca dosta vremena provode u školskom okruženju, različiti zadaci tokom odmora mogli bi doprineti količini kretanja, a verovatno i dovesti do povećanja intenziteta vežbanja u toku dana. Školski odmor ne može da zameni nastavu fizičkog vaspitanja, niti bilo koju vannastavnu aktivnost, ali može da doprinese dodatnoj motivaciji za vežbanjem i promociji fizičke aktivnosti (Kermeci., & Đorđić, 2018).

Smatra se da zainteresovanost za fizičku aktivnost u mnogome zavisi od: pola, uzrasta, stečenih stavova, načina života, kao i uticaja okoline. Kroz primere se isti-

ably lead to an increase in the intensity of exercise during the day. School vacation cannot replace physical education classes or any extracurricular activity, but it can contribute to additional motivation for exercise and the promotion of physical activity (Kermeci., & Đorđić, 2018). It is considered that the interest in physical activity is largely dependent on sex, age, acquired attitudes, lifestyle, as well as the influence of the environment. Through examples, it is pointed out that motivation for physical exercise decreases with age (Lukić et al., 2019). The insufficient motivation of students certainly has an impact on the intensity of physical exercise itself. Future research should find the reasons why older students are less and less interested in different physical activity programs, as well as discover a more successful way of organized physical exercise, which can have an impact on increasing the time spent in MVPA.

CONCLUSION

From the selected studies, it can be concluded that organized physical exercise programs were perhaps more interesting for male students, but the results between boys and girls did not differ much in terms of the value of time spent in MVPA. The general conclusion from the above-selected studies indicates the need to constantly train and educate professional staff for conducting physical education classes through the design of various programs of organized physical exercise in order to influence the increase of daily physical activity and the value spent in MVPA. Authors who researched the mentioned problem mostly cite data related to students' anthropological status, level of physical activity, academic performance, and well-being. Future research that would include the analysis of family habits, parents' habits, marital status, social status, education, and the level of physical activity of parents (on a weekly basis), would contribute to the understanding of possible differences between male and female students when observing engagement in classes, different programs of organized physical exercise, as well as attitudes about the importance of daily physical activity. Since there are no studies in our speaking area that dealt with the time spent in MVPA of elementary school students, it is necessary to investigate the mentioned problem. Likewise, research by domestic authors who dealt with the issue of student and parent awareness of the importance of physical activity, as well as the need for participation and greater involvement of students in various forms of organized physical exercise, would be of great importance.

će da sa uzrastom dolazi do pada motivacije za fizičkim vežbanjem (Lukić i drugi, 2019). Nedovoljna motivisanost učenika svakako da ima uticaja i na sam intenzitet fizičkog vežbanja. Buduća istraživanja trebala bi da pronađu razloge zbog kojih su stariji učenici sve manje zainteresovani za različite programe fizičke aktivnosti, kao i otkrivanjem uspješnijeg načina organizovanog fizičkog vežbanja, a koje može da ima uticaja na povećanje vremena provedenog u MVPA.

ZAKLJUČAK

Iz odabranih studija može se zaključiti da su programi organizovanog fizičkog vežbanja bili možda interesantniji učenicima, ali se rezultati između dečaka i devojčica nisu mnogo razlikovali po vrednosti vremena provedenog u MVPA. Opšti zaključak iz navedenih odabranih studija ukazuje na potrebu da se konstantno vrši obučavanje i osposobljavanje stručnog kadra za vođenje nastave fizičkog vaspitanja kroz osmišljavanje različitih programa organizovanog fizičkog vežbanja kako bi se uticalo na povećanje dnevne fizičke aktivnosti i vrednosti provedene u MVPA. Autori koji su istraživali navedeni problem uglavnom navode podatke vezane za: antropološki status učenika, nivo fizičke aktivnosti, akademski učinak i blagostanje. Buduća istraživanja koja bi obuhvatala analizu: porodičnih navika, navika roditelja, bračni status, socijalni status, obrazovanje i nivo fizičke aktivnosti roditelja (na nedeljnom nivou), doprinela bi shvatanju mogućih razlika između učenika i učenica kada se posmatra angažovanost u nastavi, različitim programima organizovanog fizičkog vežbanja, kao i stavova o značaju svakodnevne fizičke aktivnosti. Kako na našem govornom području ne postoje istraživanja koja su se bavila vremenom provedenog u MVPA učenika osnovnih škola, neophodno je istražiti navedeni problem. Takođe, od velikog značaja u zaključivanju doprinela bi istraživanja domaćih autora koji su se bavili pitanjem svesti o učenika i roditelja o značaju fizičke aktivnosti, kao i potrebe za učešćem i većoj angažovanosti učenika u različitim oblicima organizovanog fizičkog vežbanja.

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ANALYSIS OF ANTHROPOMETRY, PHYSICAL CONDITIONS, AND ARCHERING SKILLS AS THE BASIC FOR IDENTIFICATION OF TALENT IN THE SPORT OF ARROW

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Abstract: This research aimed to show children talent in archery by using the base of anthropometric, physical condition, and archery skill. This is descriptive research, and the data was collected by survey. Populations of this research are elementary school students in Yogyakarta and Central Java. Samples are chosen using purposive sampling technique with some criteria, such as: (1) Students of states and private school, (2) Students are the member of Archery Club and actively practice, (3) Samples are 31 persons, (4) Students are filling terms and condition sheet for joining this research. Data are collected by test and measurement in any aspects, such as (1) Height and Weight, (2) Arm Span, (3) Kinesthetic Perception Test, (4) Sit and Reach, (5) Standing Balance, (6) Wall Sit, (7) Side Learning Test, (8) Hand Dynamometer, (9) Endurance, and (10) Archery Skills. The data analysis uses descriptive statistics (tabulation frequency). The result of this research shows that students' talent in archery is for: Very Talented (12), Talented (5), Quite Talented (8), and Not Talented (6).

Keywords: Talent identification, elementary school students, archery.

INTRODUCTION

In the daily life of society, many people like to do physical activity. They carry out physical activities with various goals, such as improving fitness, recreation, and achieving achievement (Dwyer et. al., 2019). Achievement sports are one of the four sports listed in the Great Design of National Sports (DBON) article 4 paragraph 1. In the DBON it is explained that sports based on their objectives can be divided into 4 namely educational sports, achievement sports, recreational sports, and industrial sports. Therefore, sport is included in the type of physical activity that is often done by most people today. Furthermore, regarding physical activity, activities that involve physical movement have their own criteria or characteristics. There are various kinds of physical activity variations that can be done by the community, one of which is games and target matches where in these activities not only train physical strength but can also train one's concentration and accuracy (Clemente et. al., 2016). Some of the target sports that have developed in Indonesian society include shooting and archery. Archery is growing rapidly and is liked by various groups both in terms of economic level, age, and so on (Yachsie et al., 2021). Archery is a type of sport that has existed in ancient times (World Archery, 2020). Even this sport is also believed to be a Sunnah sport (recommended by the Prophet Muhammad) for people who are Muslim. In fact, in the biggest sporting event in Southeast Asia, the SEA Games which was held in Malaysia in 2017, Indonesian archery athletes managed to bring home gold medals in the individual compound classes for men and women. This shows that the development of the sport of archery in Indonesia itself is growing rapidly, so there is a need for talent scouting.

Talent scouting and sports breeding is an important stage in fostering sports achievement. Nowadays, coaching athletes from an early age is considered a demand. This program can be referred to as the foundation of building a system for building athletic athlete achievement to a higher level in the future. The recent slump in Indonesian sports achievements has encouraged practitioners and sports experts from both academics and athletes together with the government, namely KEMENPORA (Ministry of Youth and Sports), KONI (Indonesian National Sports Committee), and KOI (Indonesian Sports Committee) to evaluate the system. sports development in Indonesia. Based on the results of discussions and seminars conducted by these stakeholders, it can be concluded that there is something wrong with the sports coaching system in Indonesia. The talent scouting system in archery seems to still rely more on

the observation approach and the experience of the coach. This is because there is no specific standard regarding the pattern of talent scouting carried out in the sport of archery. One of the cases that occurs in archery is, for example, archery coaches and coaches in the region tend to foster athletes who are interested in the archery branch that he fosters without taking into account whether the athlete has talent or has the potential to improve his performance in this sport.

Basically, national sports achievements are influenced by the sports coaching system in each region. This is of course clear considering that the regional level is part of the national sports coaching system, so sports coaching carried out from an early age must be able to run optimally. Until now, the achievement of sports achievements, especially in the sport of archery, is still experiencing various obstacles which have resulted in not achieving optimal results in every match. One of the biggest obstacles that exist today is the difficulty of finding talented prospective athletes, although basically talent itself does not have an absolute effect on the success of an athlete, but this has a very large role in the achievement of an athlete's achievement. There are various ways that can be done to get talented prospective athletes, one of which is to do talent scouting from an early age. This talent guide can be carried out by conducting tests or instruments that have been prepared and tested. The instrument is a parameter that is made to predict or predict the quality of an athlete's achievement, taking into account the level of physical fitness, ability to learn motion, and physical development that is currently owned by the child.

Based on the problems above, that before stepping into achievement coaching, it is necessary to seek sports talent search steps first, because this is very important to get prospective athletes who are talented and have the potential to be fostered. If this stage can be carried out properly, it will make it easier to map out the right archery athlete candidates according to the characteristics of their talents. Because, one's talent can be said as the main capital to be able to achieve even higher achievements.

METHOD

Based on the problems studied, this type of research is descriptive research, where descriptive research has the aim of revealing something as it is. In an effort to maintain the consistency of research so that it is more focused, the determination of the population and sample as objects and subjects in conducting research must be determined. The population and sample selected by the researcher in conducting this study are described as follows: In this study, the population was elementary school students in the province of Central Java and the Special Region of Yogyakarta. The results of the review and information from the coach with the number of active athletes as many as 31 people. The data collection technique in this study was to test the ability of physical conditions, kinesthetic perception tests, and archery skills tests. This test was conducted on early childhood as the sample in this study. The various stages carried out in measuring the level of physical condition, kinesthetic perception, and archery skills include: (1) Height and Weight, (2) Arm span, (3) Kinesthetic Perception Test, (4) Sit and Reach, (5) Standing Balance, (6) wall sit, (7) Side Learning Test, (8) Hand Dynamometer, (9) Endurance, and (10) Archery Skills. After all the data results were obtained in this study, then the data was processed using descriptive statistics (frequency tabulation).

RESULTS AND DISCUSSION

This research is presented in descriptive form and the discussion of the research obtained is in accordance with the data that occurs in the field. This data aims to see the physical condition and kinesthetic perception tests, namely: (1) Height and Weight, (2) Arm Range, (3) Kinesthetic Perception Test, (4) Sit and Reach, (5) Standing Balance, (6) wall sits, (7) Side Learning Test, (8) Hand Dynamometer, (9) Endurance, and (10) Archery Skills which will be shown in stages. The research results will be displayed in the form of tables and diagrams below.

Table 1. Results of Archery Talent Identification

No	Norm	Category	Amount
1	81-100	Very talented	12
2	61-80	Talented	5
3	41-60	Talented Enough	8
4	21-40	Not Talented	6
5	0-20	Very Untalented	0

ARCHERY TALENT IDENTIFICATION TEST

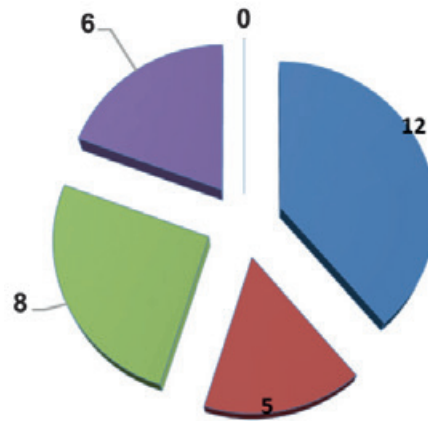


Figure 1. Graph of Archery Talent Identification Test

Based on the data above, it can be seen that there are various instruments used to assess physical condition and kinesthetic perception tests to assess whether the athlete has potential or talent in archery. The method of measuring the physical condition of a person who is said to have potential or talent in archery is by means of anthropometric calculations. Based on the explanation from Heymsfield et al., (2018) he said that anthropometry is one of the oldest measurement methods used to assess the size and shape of the human body. In addition, Norton (2018) also said that anthropometric measurements were carried out by measuring the dimensions of a person's body. With regard to the sport of archery, anthropometry will be very helpful to assess whether a person has the appropriate physique or at least has the potential to become an athlete. In this case, Lau (2020) said that archery is a type of sport that involves repeated aerobic and anaerobic activities. For example, when an archer is training or participating in a competition, they will walk the shooting distance back and forth to pick up the darted arrow and return to the shooting line over and over again. If an athlete is not used to it or does not have a strong body, of course this will be very tiring. Besides being required to have good endurance and aerobic capacity, an archery athlete must also have muscle strength in certain body parts such as arms, chest, shoulders, and back to perform repetitive movements when pulling the bowstring. In order to identify and select prospective athletes who are competent or have great potential, the assessment can be carried out using various instruments.

The first instrument used was height and weight. For people who are engaged in sports, an ideal body can be said as a foundation that can be maximized in achieving good sports skills. More fully, Weir (2019) explains that BMI is a statistical index that uses a person's height and weight to prove or show an estimate of body fat levels, for both men and women of all ages. Regarding the effectiveness of BMI which is used as a measuring tool to categorize a person's body, Adab (2018) explains that measuring the ideal level of a person's body using BMI is quite effective and easy to do and applied to all circles. Seeing and ascertaining the ideal level of a person's body can be used as an early indicator of whether a person has a suitable body as an athlete.

Archery talent identification assessment is seen from the arm span. The assessment of arm span related to archery has been described by Kim (2018), where he said that archery which has 6 (six) stages of movement will really need hand strength. The stages of the archery movement are bow hold or the position of holding the bow, drawing, which is the position when pulling the bowstring from the front of the face towards the chin or cheek, full draw or the position when the arm used to draw is at the perfect point where an archer gives a moment to pause to centering the shot, aiming is the position when the athlete has focused his aim and is sure to release the arrow, release or the position when an archer releases his pull so that the arrow shoots to hit the target, and the last is follow-through, namely the position of lowering the bow shortly after releasing the child arrow or release position.

The next instrument used to assess whether someone has talent in archery is to do a kinesthetic perception test. Based on the explanation from Artha (2019), kinesthetic perception is a function that has a correlation with movement or kinesthetic information. He further said that the information obtained from the movement of muscles and joints is a way that can be understood compared to the definition explained through reading or oral delivery. People who have kinesthetic abilities will be better able to understand information if they can do it, feel, compare, and iden-

tify directly an action or object. Based on this, he added that people who have more dominant kinesthetic abilities will more quickly understand the information that is exemplified or shown directly.

The relationship between kinesthetic ability and sports talent is based on the explanation from Elias (2021), namely that motor balance exercises and kinesthetic perception have the aim of preparing athletes in the sport they are involved in. Kinesthetic balance exercises use various development concepts to improve self-control or self-control in their kinetic performance, so that children who have talent as athletes will be better prepared to face sports that require them to have good kinesthetic balance and sensitivity. In the process of searching for prospective athletes who are talented in archery, of course, the kinesthetic ability of a child is also very taken into account. Although there are still many people who think that archery is an easy sport because the activities are not too heavy and the movements are carried out repeatedly, in reality archery can also be said to be a sport that is quite energy-consuming both physically and mentally. Arifin (2022) said that archery is a type of sport that performs repetitive movements such as swimming, cycling, and others.

After performing a height and weight test, an arm span test, and a kinesthetic perception test, the next step or the next assessment instrument is to assess the sit and reach ability. The relationship between the sit and reach test and the sport of archery goes beyond just assessing the level of flexibility. Archery activities that require an athlete to lift and keep the bow steady by directing the arms forward for a while certainly require arm strength and flexibility in both the back of the shoulder and the waist. The position called drawing has the same concept of position as the position when doing sit and reach. If these young athletes have good scores in sit and reach assessments, then they already have a ready foundation to maximize their potential in archery. In addition, Nugroho (2022) said that a test like this is necessary and useful to find potential athletes, so that they can direct and train those with maximum potential. He also added that the process of identifying archery athletes' talents is a way that needs to be done during the process of preparing athletes in the long term, which is about 10 years into the future. Identification of archery talent is a process of screening gifted children using physical, psychological and ability assessments to identify potential in order to excel in the sport in question. Not only that, in his statement he argues that the purpose of talent identification is to identify and select children who have talents with potential achievements so that they can be trained and developed to the maximum.

The indicator or instrument used to identify a child's talent for archery is the standing balance test. The standing balance test is a test used to determine the level of balance in a person's body. Based on the explanation from Van (2019), standing balance is a dynamic posture of a person's body to prevent falling or how they are able to maintain good body balance. The assessment of this instrument can be carried out based on static or stationary conditions or dynamic conditions or when moving. In archery, balance will be seen when the archer is standing on the shooting line, so it needs to be maintained from the beginning of the competition session to the end of the archery competition.

The next instrument is the wall sit. Seo (2019) explained that the wall sit is a test method that can be used to assess muscle strength in the lower body, namely the legs. In addition, Markwell (2021) also said that in carrying out the wall sit test, participants only need to maintain isometric contractions as long as possible by bending their knees 90° with the back position fully against the wall as if sitting. The wall sit test is also useful to determine the level of a person's ability to control themselves. This was conveyed by Steel (2021) where he said that the wall sit will show how a person can hold himself to stay in the perfect position when in uncomfortable conditions. The level of difficulty in performing this movement can be assessed from various aspects, as described by Simmons (2021). He said that to find out whether someone finds it difficult to perform a sporting movement, a researcher or trainer can see from the facial expressions that are reflected on a person, the vibrations that occur in the body when doing the movement, and the duration of time they perform the requested movement. Wall sits are especially useful for increasing strength in the legs, abdomen, and increasing bone density and maintaining posture. This ability will certainly greatly affect the sports performance of an athlete or athlete, especially in archery, because archery also focuses on the correct posture, and the strength of the legs in supporting the body and its bow. If the legs and stomach are not strong, it will be difficult for an archer to remain stable for long periods of time.

Furthermore, the instrument used as a test or test to see if a child has talent in sports, especially archery, is to test side learning and hand dynamometers. The side learning test is one of the activities used to test the level of arm muscle endurance (Purnama, 2019; Prasetyo, 2020). Prinz (2021) says that the hand dynamometer can also be referred to as a hand grip test or an assessment of hand grip strength. The strength and endurance of the arm muscles

are very much needed by archery athletes such as: the strength of the bow pull in each athlete is different, and archery athletes in the forearm must be able to hold the bow well so that when releasing the forearm it can remain stable, not vibrate or shake. This also applies when the wind blows strongly, arm stability is needed.

The next talent identification test instrument is endurance. Wang (2021) said that cardiopulmonary endurance (heart and lungs) greatly affects a person's ability to perform physical activities. Everyone's ability in the heart and lung system can be reflected in how often he does physical exercise. Lung-heart endurance for an archery athlete reflects an indicator of the level of physical fitness, and will be seen in the regulation of breathing during archery. Good breathing settings will provide calm and focus when aiming at the target / target. The better the score that the participants get in this testing process, the better their talents will be to maximize their potential in archery.

The last assessment instrument is archery skills, using a distance of 15 meters in a total of 6 rambaran. In the archery skill test because it is still the basis, use a standard bow. In this archery skill, you will see the basic archery techniques performed by the athlete, the consistency, and the score obtained. Assessment of archery skills can be said as a determining instrument when someone is judged whether he is talented in archery or not. Decheline (2020) says that in archery, the better a person's physical condition, the greater the opportunity for achievement, and vice versa.

Based on the data that has been collected, from 31 children who took a series of tests, it can be concluded that 12 children have talent in archery and have the potential to become athletes if they are trained properly and maximized their opportunities. Meanwhile, 5 out of 31 children have satisfactory talents, but they still have to practice harder and maintain consistency and enthusiasm so as not to waste the opportunities they have. Furthermore, of the 31 children, there are 8 children who have good talent, but they still need time to maximize their potential in archery. While the remaining 6 children were judged to have no talent in archery, it was seen from the test results that did not meet the standards and still needed maximum improvement and training.

Every child certainly has their own abilities and talents, but it would be better if various parties such as teachers, coaches, and parents understand the interests and talents of children well so that they can provide direction from an early age and make children do positive activities and achieve achievements from their interests and talents. If a child is seen or judged as not talented in a certain area, it could be because he or she may not enjoy that field or just needs a little longer to learn something new, because in sports anything is possible. People with talent but don't practice or practice at will will still lose to people who are able to take advantage of opportunities and learn to be better.

CONCLUSION

Conclusions from the data obtained in the field with the aim of seeing physical conditions and kinesthetic perception tests by paying attention to several elements such as (1) Height and Weight, (2) Arm Range, (3) Kinesthetic Perception Test, (4) Sit and Reach, (5) Standing Balance, (6) wall sit, (7) Side Learning Test, (8) Hand Dynamometer, (9) Endurance, and (10) Archery Skills, it can be concluded that in order to achieve the target of scouting talent for archery athletes, optimally, it is necessary to carry out an intensive evaluation. This of course will greatly affect the achievement of athletes with a well-programmed and tiered approach to sports science or sport science.

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RELATIONS BETWEEN MOTOR ABILITIES AND BASKETBALL SKILLS OF 13-14 YEAR OLD STUDENTS

RELACIJE MOTORIČKIH SPOSOBNOSTI I KOŠARKAŠKIH VJEŠTINA UČENIKA STAROSTI 13-14 GODINA

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Abstract: The aim of the research is to determine the relations and influences of motor abilities on the performance of some elements of the basketball techniques in the 7th and 8th graders. The study included 85 respondents, students of 7th and 8th grade of elementary school "Prekounje" from Bihać. The motor status assessment system was represented by the 12 variables (three variables each to assess coordination, explosive strength, flexibility and speed), while 4 situational-motoric tests were used to assess the success of the performance of the elements of basketball techniques: 1. Throwing the ball with both hands against the wall and catching it for 30 seconds (BHLR30), 2. Dribbling the ball with the hand in a slalom (VLRS), 3. Throwing the ball into the basket for 30 seconds (ULK30), 4. Lay-ups for 30 seconds (PNK30). Basic central and dispersion parameters were calculated for all variables which confirmed the normality of the distribution, and the relations between spaces were determined by using the canonical correlation analysis. Values obtained by canonical correlation analysis indicate very high correlation between basic motor abilities and basketball skills.

Keywords: elementary school, motor abilities, basketball skills, basketball, students.

Sažetak: Cilj istraživanja je utvrđivanje relacija i uticaja motoričkih sposobnosti na uspješnost izvođenja nekih elemenata tehnike košarke učenika 7. i 8. razreda osnovne škole. Istraživanjem je obuhvaćeno 85 ispitanika, učenika 7. i 8. razreda OŠ "Prekounje" iz Bihaća. Sistem za procjenu motoričkog statusa predstavljalo je 12 varijabli (po tri varijable za procjenu koordinacije, eksplozivne snage, fleksibilnosti i brzine), dok je za procjenu uspješnosti izvođenja elemenata tehnike košarke korišteno 4 situaciono-motorička testa: 1. Bacanje lopte objema rukama o zid i hvatanje u trajanju 30 sekundi (BHLR30), 2. Vođenje lopte rukom u slalomu (VLRS), 3. Ubacivanje lopte u koš u trajanju 30 sekundi (ULK30), 4. Prodor na koš za 30 sekundi (PNK30). Za sve varijable izračunati su osnovni centralni i disperzioni parametri čime smo potvrdili normalnost distribucije, a relacije između prostora utvrđivane su primjenom kanoničke korelacione analize. Vrijednosti dobijene kanoničkom korelacionom analizom ukazuju na jako visoku povezanost između motoričkih sposobnosti i košarkaških vještina.

Gljučne riječi: osnovna škola, motoričke sposobnosti, košarkaške vještine, košarka, učenici.

INTRODUCTION

Basketball was created as a means of physical culture, so its role in physical culture is quite natural. It has proven to be a very good means of physical culture because it has multiple effects on the body of a child and a young person, and especially on personality development in the process of education. It can be played both on open fields and in halls and does not require special material investments. Basketball is extremely popular in primary and secondary schools and is certainly one of the most popular means of physical culture in general

Uvod

Košarka je nastala kao sredstvo fizičke kulture, pa je sasvim prirodna njena uloga u fizičkoj kulturi. Ona se pokazala kao veoma dobro sredstvo fizičke kulture jer ima višestruk uticaj na organizam djeteta i mladog čovjeka a posebno na razvoj ličnosti u procesu vaspitanja. Može da se igra i na otvorenim terenima i u salama, stoga ne zahtjeva posebna materijalna ulaganja kada su u pitanju početne faze obuke u školi. Košarka ima ogromnu popularnost u osnovnim i srednjim školama i sigurno je jedno od najzastupljenijih sredstava fizičke kulture uop-

(Karalejić & Jakovljević, 2001). The ability to solve simple and complex motor tasks, and especially movement structures from sports games, largely depends on different dimensions of anthropological status (Kamberi et al., 2008). When we talk about the factors important for the success of playing basketball, we must first look at the equation of the specification of success in basketball.

The hypothetical equation of success in the basketball game was given by Pavlović (1977):

$$Ru = a1A + a2M + a3KM + a4F + a5G + a6TM + a7C + a8S + a9O + a10P + a11Z + a12E...$$

In the hierarchical order, we notice that morphological characteristics and motor abilities are most important for success. Students who have a higher degree of motor abilities have greater opportunities and greater success in performing certain elements of basketball as well as in the game itself. Basketball is basically a game where coordination abilities, speed, precision, strength, balance and, to a lesser extent, other motor abilities prevail (Mikić et al., 2001). Due to all of the above, it is to be expected that basketball will affect the harmonious development of the child's entire body, that is, that it will have a quality effect on the entire spectrum of abilities and characteristics (Granić & Krstić, 2006). Although studies of relations were conducted almost between all analyzed segments of anthropological status, researches of motor abilities were conducted with other segments in the largest number of cases in sports anthropology (Kurelić et al., 1979). In the research of Aruković et al. (2011) it was determined that explosive power, speed, frequency of movement, repetitive power of upper limb muscles and balance have a dominant influence on success in basketball, and that the aforementioned latent motor structures form the basis for successful basketball practice. Karalejić et al. (2009) in their research found significant relations between variables of motor abilities (explosive power, speed and agility) and variables of basketball skills (dribbling, defensive movements and passing). Kamberi et al. (2009) state that the explosive power of the lower extremities and the speed of changing the direction of movement (agility) and the speed of locomotion have a significant impact on the success of performing situational-motor movement structures in basketball. In the research of Bukvić (2003), a high correlation was established between explosive power, speed and balance from the area of basic motor abilities, and ball control and shooting at the basket from the area of specific basketball motor abilities. Šeparović et al. (2003) found in their research that the greatest influence on the success of mastering the elements of basketball technique is the motor abilities of coordination (agility) and the explosive

šte (Karalejić & Jakovljević, 2001). Sposobnost za rješavanje jednostavnih i kompleksnih motoričkih zadataka, a naročito kretnih struktura iz sportskih igara u velikoj mjeri zavisi od različitih dimenzija antropološkog statusa (Kamberi et al., 2008). Kada govorimo o faktorima bitnim za uspješnost igranja košarke moramo prvo pogledati jednačinu specifikacije uspješnosti u košarci.

Hipotetsku jednačinu uspjeha u košarkaškoj igri dao je Pavlović (1977):

$$Ru = a1A + a2M + a3KM + a4F + a5G + a6TM + a7C + a8S + a9O + a10P + a11Z + a12E...$$

U hijerarhijskom poretku primjećujemo da najveći značaj za uspješnost imaju morfološke karakteristike i motoričke sposobnosti. Učenici koji imaju viši stepen motoričkih sposobnosti, imaju veće mogućnosti i veći uspjeh u izvođenju određenih elemenata košarke ali i u samoj igri. Košarka je u osnovi igra gdje prevladavaju koordinacione sposobnosti, brzina, preciznost, snaga, ravnoteža, a u manjoj mjeri i ostale motoričke sposobnosti (Mikić et al., 2001). Zbog svega prethodno navedenoga za očekivati je da će košarka djelovati na harmoničan razvoj cijelog tijela djeteta, odnosno da će kvalitetno djelovati na čitav spektar sposobnosti i osobina (Granić & Krstić, 2006). Iako su se istraživanja relacija sprovodila gotovo između svih analiziranih segmenata antropološkog statusa, u najvećem broju slučajeva u sportskoj antropologiji vršena su istraživanja motoričkih sposobnosti sa ostalim segmentima (Kurelić et al., 1979). U istraživanju Aruković et al. (2011) utvrđeno je da dominantan uticaj na uspjeh u košarci imaju eksplozivna snaga, brzina frekvencije pokreta, repetitivna snaga mišića gornjih ekstremiteta i ravnoteža, te da navedene latentne motoričke strukture čine bazu za uspješno bavljenje košarkom. Karalejić et al. (2009) u svom istraživanju su utvrdili značajne relacije između varijabli motoričkih sposobnosti (eksplozivna snaga, brzina i agilnost) i varijabli košarkaških vještina (dribbling, kretnje u odbrani i dodavanje). Kamberi et al. (2008) navode da na uspješnost izvođenja situaciono-motoričkih kretnih struktura iz košarke značajan uticaj imaju eksplozivna snaga donjih ekstremiteta te brzina promjene pravca kretanja (agilnost) i brzina lokomocije. U istraživanju Bukvića (2003) utvrđena je visoka povezanost eksplozivne snage, brzine i ravnoteže iz prostora bazične motorike, te kontrola lopte i šut na koš iz prostora specifične košarkaške motorike. Šeparović et al. (2003) u svom istraživanju su utvrdili da za uspješnost savladavanja elemenata tehnike košarke najveći uticaj imaju motoričke sposobnosti koordinacije (agilnosti) i eksplozivne snage nogu i ruku. U svom

power of the legs and arms. In his research, Mekić (2002) found a high influence of basic motor abilities on the accuracy of passing and putting the ball into the basket. The main goal of this research is to determine the relationship and possible connection between motor skills and basketball skills through a research method. The subject of this research are the 7th and 8th grade elementary school students and their motor abilities and basketball skills. Starting from the results of previous research, and based on the goal and subject of the research, the following hypothesis was put forward:

H – A significant relation of variables for the assessment of motor abilities and basketball skills is expected.

METHODS

The sample consisted of 85 students of the 7th and 8th grades of Elementary School “Prekounje” from Bihać. During the testing, the psychophysical condition of all students was at a satisfactory level.

3 variables were used each to assess coordination, explosive power, flexibility and speed to test the motor abilities of the respondents (Mikić, 1999): 1. Slalom with three medicine balls (MKOS3M), 2. Coordination with a stick (MKOKSP), 3. Steps to the side (MKOKUS), 4. Standing vertical jump (MESSVM), 5. Standing long jump (MESSDM), 6. Medicine ball lying chest throw (MESBML), 7. Deep forward bend on the bench (MFLPRK), 8. Wide-legged forward bend (MFLPRR), 9. Lunge from the lying on the chest (MFLZLP), 10. Hand tapping (MBRTR), 11. Foot tapping (MBRTN), 12. Wall foot tapping (MBRTNZ).

The following variables were used to test the respondents' basketball skills: 1. Throwing the ball with both hands against the wall and catching it for 30 seconds (BHLR30), 2. Dribbling the ball with the hand in a slalom (VLRS), 3. Throwing the ball into the basket for 30 seconds (ULK30), 4. Lay-ups for 30 seconds (PNK30).

Data processing in this research and application of statistical-mathematical procedures was done in SPSS 25. In order to test the hypothesis that the results obtained by measurement in this research are normally distributed, all manifest variables were processed with standard descriptive parameters. At the multivariate level, the connection between the spaces was determined by applying canonical correlation analysis. On the basis of these methods, information was obtained on the distribution of parameters, correlations, partial correlations and on the interrelations of variables.

istraživanju, Mekić (2002) je utvrdio visok uticaj bazičnih motoričkih sposobnosti na preciznost dodavanja i ubacivanja lopte u koš. Osnovni cilj ovog istraživanja je putem istraživačkog metoda utvrditi relacije i moguću povezanost motoričkih sposobnosti i košarkaških vještina. Predmet ovog istraživanja su učenici 7. i 8. razreda osnovne škole i njihove motoričke sposobnosti i košarkaške vještine. Polazeći od rezultata dosadašnjih istraživanja, a na osnovu cilja i predmeta istraživanja postavljena je sljedeća hipoteza:

H – Očekuje se značajna povezanost varijabli za procjenu motoričkih sposobnosti i košarkaških vještina.

METODE RADA

Uzorak ispitanika sačinjavalo je 85 učenika 7. i 8. razreda OŠ “Prekounje” iz Bihaća. U toku testiranja psihofizičko stanje svih ispitanika bilo je na zadovoljavajućem nivou.

Za testiranje motoričkih sposobnosti ispitanika korištene su po 3 varijable za procjenu koordinacije, eksplozivne snage, fleksibilnosti i brzine (Mikić, 1999): 1. Slalom sa tri medicine (MKOS3M), 2. Koordinacija s palicom (MKOKSP), 3. Koraci u stranu (MKOKUS), 4. Skok u vis s mjesta (MESSVM), 5. Skok u dalj s mjesta (MESSDM), 6. Bacanje medicine iz ležanja na leđima (MESBML), 7. Duboki pretklon na klupici (MFLPRK), 8. Pretklon raskoračno (MFLPRR), 9. Zanoženje iz ležanja na prsima (MFLZLP), 10. Taping rukom (MBRTR), 11. Taping nogom (MBRTN), 12. Taping nogama od zid (MBRTNZ).

Za testiranje košarkaških vještina ispitanika korištene su sljedeće varijable: 1. Bacanje lopte objema rukama o zid i hvatanje u trajanju 30 sekundi (BHLR30), 2. Vođenje lopte rukom u slalomu (VLRS), 3. Ubacivanje lopte u koš u trajanju 30 sekundi (ULK30), 4. Prodor na koš za 30 sekundi (PNK30).

Obrada podataka u ovom istraživanju i primjena statističko-matematičkih postupaka je urađena u programu SPSS 25. Sa ciljem testiranja hipoteze da su rezultati dobijeni mjerenjem u ovom istraživanju normalno distribuirani, sve manifestne varijable su obrađene standardnim deskriptivnim parametrima. Na multivarijantnom nivou povezanost između prostora utvrđivana je primjenom kanoničke korelacione analize. Na osnovu tih metoda dobijene su informacije o distribuciji parametara, korelacijama, parcijalnim korelacijama i o međusobnoj povezanosti varijabli.

RESULTS WITH DISCUSSION

Arithmetic mean, median, sum, minimum and maximum score, coefficient of variation, range, standard deviation, standard error, curvature coefficient and elongation coefficient were calculated for each measured variable. Taking into account the results we obtained, it can be noted that all variables have a relatively good distribution.

Table 1. Basic and central dispersion parameters of motor abilities

	Valid N	Mean	Standard Error	Median	Mode	Standard Deviation	Variance	Skewness	Kurtosis	Range	Minimum	Maximum
MKOS3M	85	39,76	0,93	40,20	37,40	8,60	74,00	0,38	-0,22	36,60	24,70	61,30
MKOKSP	85	11,31	0,28	11,00	8,30 ^a	2,60	6,76	0,65	-0,05	11,40	7,00	18,40
MKOKUS	85	10,99	0,12	10,90	10,50	1,11	1,23	0,23	-0,54	5,10	8,60	13,70
MESSVM	85	30,39	0,63	30,00	35,00	5,80	33,65	-0,18	-0,48	25,00	20,00	45,00
MESSDM	85	148,05	2,68	146,00	120,00	24,68	609,01	0,31	-0,54	110,00	100,00	45,00
MESBML	85	6,06	0,14	6,08	4,53 ^a	1,30	1,69	0,47	0,04	6,13	3,79	9,92
MFLPRK	85	-1,71	0,85	0,00	0,00	7,87	61,88	-0,52	-0,30	34,00	-22,00	12,00
MFLPRR	85	42,96	1,13	43,00	34,00 ^a	10,40	108,20	-0,39	0,98	57,00	10,00	67,00
MFLZLP	85	53,06	1,52	55,00	55,00	14,06	197,68	-0,19	-0,60	65,00	20,00	85,00
MBRTR	85	42,34	1,10	44,00	50,00	10,17	103,35	-0,28	-0,83	41,00	24,00	65,00
MBRTN	85	37,42	0,40	37,00	37,00	3,72	13,82	0,13	-0,33	17,00	29,00	46,00
MBRTNZ	85	19,22	0,26	19,00	18,00	2,35	5,53	0,80	0,65	12,00	15,00	27,00

a. Multiple modes exists. The smallest value is shown.

Table 1 shows the basic parameters, ranges and distributions of students' results in tests for assessing motor abilities. By looking at the parameters of the central tendency, we can conclude that the selected tests are fully adapted to the motor abilities of the respondents of this age. The values of the arithmetic mean in relation to the values of the mode indicate that the results are within the normal distribution, thus we have obtained the conditions for performing multivariate data processing.

Table 2. Basic and central dispersion parameters of basketball skills

	Valid N	Mean	Standard Error	Median	Mode	Standard Deviation	Variance	Skewness	Kurtosis	Range	Minimum	Maximum
BHLR30	85	17,59	0,60	19,00	20,00 ^a	5,54	30,70	-0,72	0,32	27,00	1,00	28,00
VLRS	85	12,18	0,30	11,60	11,10 ^a	2,72	7,40	1,02	1,20	14,00	7,40	21,40
ULK30	85	4,08	0,30	3,00	2,00	2,74	7,53	1,18	0,98	11,00	1,00	12,00
PNK30	85	1,55	0,15	1,00	1,00	1,37	1,87	0,86	0,11	5,00	0,00	5,00

a. Multiple modes exists. The smallest value is shown.

Table 2 shows the results of the descriptive statistics of the respondents in basketball skills. Skewness values indicate a slight asymmetry in both sides, but it is within normal limits. A slightly higher homogeneity

REZULTATI S DISKUSIJOM

Za svaku izmjerenu varijablu izračunata je aritmetička sredina, medijana, suma, minimalni i maksimalni rezultat, koeficijent varijacije, raspon, standardna devijacija, standardna greška, koeficijent zakrivljenosti i koeficijent izduženosti. Uzevši u obzir rezultate koje smo dobili može se primjetiti da sve varijable imaju relativno dobru distribuciju.

Tabela 1. Osnovni i centralni disperzioni parametri motoričkih sposobnosti

U tabeli 1. dati su osnovni parametri, rasponi i distribucije rezultata učenika u testovima za procjenu motoričkih sposobnosti. Uvidom u parametre centralne tendencije možemo zaključiti da su odabrani testovi u potpunosti prilagođeni motoričkim sposobnostima ispitanika ovog uzrasta. Vrijednosti aritmetičke sredine u odnosu na vrijednosti modusa govore da se rezultati nalaze u okviru normalne distribucije, čime smo stekli uslove za provođenje multivarijatne obrade podataka.

Tabela 2. Osnovni i centralni disperzioni parametri košarkaških vještina

U tabeli 2. prikazani su rezultati deskriptivne statistike ispitanika u situaciono-motoričkim sposobnostima. Vrijednosti skewnessa ukazuju na blagu asimetričnost u obje strane ali je ona u granicama normalne. Nešto veća

of results was observed in the VLRS test - dribbling the ball with the hand in a slalom, as indicated by the kurtosis values (1.20). Based on the obtained parameters, we can conclude that the tests for assessing basketball skills are appropriate for the age of the respondents and their situational-motor abilities.

As part of the intercorrelation matrices, the correlations of individual variables within motor abilities and basketball skills were analyzed.

Table 3. Matrix of motor abilities intercorrelations

	MKOS3M	MKOKSP	MKOKUS	MESSVM	MESSDM	MESBML	MFLPRK	MFLPRR	MFLZLP	MBRTR	MBRTN	MBRTN
MKOS3M	1	0,489	0,48	-0,424	-0,45	-0,426	0,17	0,009	-0,045	-0,425	-0,309	-0,334
MKOKSP	0,489	1	0,358	-0,368	-0,384	-0,31	-0,08	-0,164	-0,191	-0,295	-0,307	-0,355
MKOKUS	0,48	0,358	1	-0,584	-0,581	-0,387	0,252	0,111	-0,103	-0,278	-0,102	-0,396
MESSVM	-0,424	-0,368	-0,584	1	0,708	0,32	-0,205	-0,011	0,241	0,298	0,208	0,411
MESSDM	-0,45	-0,384	-0,581	0,708	1	0,383	-0,123	0,089	0,25	0,308	0,191	0,388
MESBML	-0,426	-0,31	-0,387	0,32	0,383	1	-0,277	-0,034	-0,076	0,493	0,195	0,35
MFLPRK	0,17	-0,08	0,252	-0,205	-0,123	-0,277	1	0,689	0,371	-0,024	0,127	0,222
MFLPRR	0,009	-0,164	0,111	-0,011	0,089	-0,034	0,689	1	0,477	0,131	0,216	0,271
MFLZLP	-0,045	-0,191	-0,103	0,241	0,25	-0,076	0,371	0,477	1	0,128	0,196	0,37
MBRTR	-0,425	-0,295	-0,278	0,298	0,308	0,493	-0,024	0,131	0,128	1	0,168	0,372
MBRTN	-0,309	-0,307	-0,102	0,208	0,191	0,195	0,127	0,216	0,196	0,168	1	0,328
MBRTN	-0,334	-0,355	-0,396	0,411	0,388	0,35	0,222	0,271	0,37	0,372	0,328	1

Crvena boja označava značajnost na nivou p = 0.01
Plava boja označava značajnost na nivou p = 0.05

Table 3 shows the correlation coefficients of the variables for assessing the motor abilities of the respondents, i.e. the intercorrelation between test results. By looking at the intercorrelation matrix of the motor variables, we can see that the intercorrelation relationships within the applied variables are mostly around moderate and low correlation, and some values where the connection is not statistically significant. There is a high correlation between the variables MESSDM - standing long jump and MESSVM - standing vertical jump .708, which is expected because the variables are representatives of the explosive power of the lower extremities. The correlation coefficient between the variables MFLPRR and MFLPRK is 0.689, which is understandable because the variables belong to the latent space of hip flexor flexibility. In general, we can state significant intercorrelations between the variables of the same latent space (explosive power of the lower extremities, flexibility, coordination and segmental speed).

homogenost rezultata primjećena je u testu VLRS – vođenje lopte rukom u slalomu na što nas upućuju vrijednosti kurtosisa (1.20). Na osnovu dobijenih parametara možemo zaključiti da su testovi za procjenu košarkaških vještina primjereni uzrastu ispitanika i njihovim situaciono-motoričkim sposobnostima.

U sklopu matrica interkorelacija analizirane su korelacije pojedinačnih varijabli unutar motoričkih sposobnosti i košarkaških vještina.

Tabela 3. Matrica interkorelacija motoričkih sposobnosti

U tabeli 3. prikazani su koeficijenti povezanosti varijabli za procjenu motoričkih sposobnosti ispitanika, odnosno interkorelacija između rezultata testova. Prvim uvidom u matricu interkorelacija motoričkih varijabli, možemo uočiti da se interkorelacione veze unutar primjenjenih varijabli uglavnom kreću oko umjerene i niske korelacije, te neke vrijednosti gdje povezanost nije statistički značajna. Visoka korelacija postoji između varijabli MESSDM – skok u dalj iz mjesta i MESSVM – skok u vis iz mjesta .708 što je očekivano jer su varijable predstavnici eksplozivne snage donjih ekstremiteta. Koeficijent korelacije između varijabli MFLPRR i MFLPRK iznosi 0,689 što je razumljivo jer varijable pripadaju latentnom prostoru fleksibilnosti pregibača kuka. Generalno posmatrano možemo konstatovati značajne interkorelacije između varijabli istog latentnog prostora (eksplozivne snage donjih ekstremiteta, fleksibilnosti, koordinacije i segmentarne brzine).

Table 4. Matrix of basketball skills intercorrelations

	BHLR30	VLRS	ULK30	PNK30
BHLR30	1	-0,488	-0,418	-0,343
VLRS	-0,488	1	-0,512	-0,425
ULK30	0,418	-0,512	1	0,534
PNK30	0,343	-0,425	0,534	1
Crvena boja označava značajnost na nivou p = 0.01				
Plava boja označava značajnost na nivou p = 0.05				

Tabela 4. Matrica interkorelacija košarkaških vještina

Table 4 shows the correlation coefficients of the variables for the assessment of specific basketball motor skills, that is, the intercorrelation between the results of the tests for the assessment of basketball skills. The coefficients of intercorrelations in the correlation matrix range from 0.343 to 0.534, all variables have a moderate correlation. Through the analysis of the intercorrelation matrix, the existence of statistical significance in the crossing of variables was determined, which undoubtedly tells us that the applied battery of tests covers well the area of specific basketball motor skills, i.e. basketball skills. The variables ULK30 - Throwing the ball into the basket for 30 seconds and PNK30 - Lay-ups for 30 seconds (.534) have the highest correlation, which is expected because the successful performance of these activities requires a well-developed kinesthetic sense.

U tabeli 4. nalaze se koeficijenti povezanosti varijabli za procjenu specifične košarkaške motorike, odnosno interkorelacije između rezultata testova za procjenu košarkaških vještina. Koeficijenti interkorelacija u korelacionoj matrici su u rasponu od 0,343 do 0,534, sve varijable imaju umjerenu korelaciju. Analizom matrice interkorelacija, utvrđeno je postojanje statističke značajnosti u ukrštanju varijabli, što nam nesumnjivo govori da primjenjena baterija testova dobro pokriva prostor specifične košarkaške motorike, tj. košarkaških vještina. Najveću povezanost imaju varijable ULK30 – ubacivanje lopte u koš za 30 sekundi i PNK30 – prodor na koš za 30 sekundi (.534) što je i očekivano jer je za uspješno izvođenje tih aktivnosti potreban je dobro razvijen kinestetički osjećaj.

Table 5. Canonical correlation coefficients of motor abilities and basketball skills

	Canonical R	R-sqr.	Chi-sqr.	df	p	Lambda
0	.829984	.688873	131.9593	48	.000000	.174156
1	.497648	.247654	43.8090	33	.099018	.559757
2	.465196	.216407	22.3248	20	.323228	.744016
3	.224738	.050507	3.9130	9	.917036	.949493

Tabela 5. Koeficijenti kanoničke korelacije motoričkih sposobnosti i košarkaških vještina

Table 6. Matrix of the structure of the isolated canonical factor in the space of motor abilities

	Root 1
MKOS3M	-.793310
MKOKSP	-.694729
MKOKUS	-.778663
MESSVM	.489294
MESSDM	.686271
MESBML	.584721
MFLPRK	-.154279
MFLPRR	-.109185
MFLZLP	.081381
MBRTR	.545224
MBRTN	.231947
MBRTNZ	.559878

Tabela 6. Matrica strukture izolovanog kanoničkog faktora u prostoru motoričkih sposobnosti

Table 7. Matrix of the structure of the isolated canonical factor in the space of basketball skills

	Root 1
BHLR30	.538724
VLRS	-.933915
ULK30	.733892
PNK30	.613725

Tabela 7. Matrica strukture izolovanog kanoničkog faktora u prostoru košarkaških vještina

Table 8. Cross-correlation matrix of motor abilities and basketball skills

	BHLR30	VLRS	ULK30	PNK30
MKOS3M	-.375170	.672588	-.444524	-.221761
MKOKSP	-.240719	.600757	-.314707	-.269014
MKOKUS	-.303940	.620179	-.455401	-.351445
MESSVM	.237864	-.378982	.365978	.125728
MESSDM	.359499	-.510225	.444519	.404591
MESBML	.413275	-.380012	.517868	.343661
MFLPRK	-.050438	.048280	-.264948	-.073882
MFLPRR	.089299	.047132	-.119923	-.103180
MFLZLP	.095144	-.107772	.016711	-.088285
MBRTR	.327307	-.392117	.381291	.333861
MBRTN	.124898	-.230291	.071016	.027236
MBRTNZ	.311709	-.432488	.360079	.264949

Tabela 8. Matrica kroskorelacija motoričkih sposobnosti i košarkaških vještina

A canonical correlation analysis of motor abilities and basketball skills isolated one statistically significant pair of canonical factors, and the results are shown in Table 5. The correlation of the first and only statistically significant pair of canonical factors is extremely high and amounts to 0.83 ($R = .829984$), and the amount of common information or the variance amounts to 69% ($R_{sq} = .688873$), while significance is based on the stricter criterion of $p = 0.01$. From the presented correlation coefficients and significance levels, we conclude that there is a high correlation between motor skills and basketball skills, which confirms the research hypothesis H - A significant correlation between the variables for assessing motor skills and basketball skills is expected. Analyzing the matrix of the structure of the first isolated canonical factor in the area of motor abilities (Table 6), we notice that the highest projection on the first canonical factor is in the variables for assessing coordination, explosive power and speed. From the latent space of coordination, the variables MKOS3M - slalom with three medicine balls (-.79), MKOKUS - steps to the side (-.78) and MKOKSP - coordination with a stick (-.69) have a high correlation with the first canonical factor. From the area of explo-

Kanoničkom korelacionom analizom motoričkih sposobnosti i košarkaških vještina izolovan je jedan statistički značajan par kanoničkih faktora a rezultati su prikazani u tabeli broj 5. Povezanost prvog i jedinog statistički značajnog para kanoničkih faktora je iznimno visoka i iznosi 0.83 ($R = .829984$) a količina zajedničkih informacija ili varijansa iznosi 69% ($R_{sq} = .688873$), dok je značajnost na strožijem kriteriju od $p = 0.01$. Iz prezentiranih koeficijenta korelacije i nivoa značajnosti zaključujemo da postoji visoka povezanost motoričkih sposobnosti i košarkaških vještina, što potvrđuje hipotezu istraživanja H - Očekuje se značajna povezanost varijabli za procjenu motoričkih sposobnosti i košarkaških vještina. Analizom matrice strukture prvog izolovanog kanoničkog faktora u prostoru motoričkih sposobnosti (Tabela 6.) primjećujemo da najveću projekciju na prvi kanonički faktor imaju varijable za procjenu koordinacije, eksplozivne snage i brzine. Iz latentnog prostora koordinacije visoku povezanost sa prvim kanoničkim faktorom imaju varijable MKOS3M – slalom s tri medicine (-.79), MKOKUS – koraci u stranu (-.78) i MKOKSP – koordinacija s palicom (-.69). Iz prostora eksplozivne snage visoku povezanost sa prvim kanoničkim faktorom

sive power, the variable MESSDM - standing long jump (.69) has a high correlation with the first canonical factor, while the variable MESBML - throwing a medicine ball from a lying position (.58) and MESSVM - standing vertical jump (.49) have a medium correlation. From the latent space of speed, the variables MBRTNZ - wall feet tapping (.56) and MBRTR - hand tapping (.56) have a medium-high projection on the first canonical factor. Analyzing the matrix of the structure of the first isolated canonical factor in the area of basketball skills (Table 7), we see that the variable VLRS - dribbling the ball with the hand in a slalom (-.93) has an extremely high projection on the first canonical factor. The variables ULK30 - throwing the ball into the basket for 30 seconds (.73) and PNK30 - lay-ups for 30 seconds (.61) have a slightly lower, but still high projection on the first canonical factor. The variable BHLR30 - throwing and catching the ball by hand for 30 seconds has a medium-high projection on the first canonical factor (.54). By looking at the cross-correlation matrix of motor abilities and basketball skills (Table 8), we notice that the variables for assessing coordination, explosive power and speed have the highest correlation with variables from the area of basketball skills. The high correlation of the variable VLRS - dribbling the ball with the hand in a slalom with the variables for assessing coordination from the area of basic motor abilities is highlighted. VLRS - dribbling the ball with the hand in a slalom, MKOS3M - slalom with three medicine balls (.67). VLRS - dribbling the ball with the hand in slalom, MKOKUS - steps to the side (.62). VLRS - dribbling the ball with the hand in a slalom, MKOKSP - coordination with a stick (.60). These results coincide with the research results of Halilović (2011), who found in his research the highest coefficient of positive influence of the MKOS3M test - slalom with three medicine balls on the criterion variable VLRS - dribbling the ball with the hand in a slalom.

CONCLUSION

The main goal of this research was to determine the relations between motor abilities and the success of performing elements of basketball technique. 12 variables from the set of tests for assessing motor abilities were used to assess motor abilities, and 4 variables from the set of tests for assessing basketball skills were used to assess the performance of elements of basketball technique. The sample of respondents in this research consisted of 85 students of the 7th and 8th grades of Elementary School "Prekounje" from Bihać. Basic central and dispersion parameters were calculated for all variables, and relations

ima varijabla MESSDM - skok u dalj iz mjesta (.69) a srednje visoku povezanost varijable MESBML - bacanje medicinke iz ležećeg položaja (.58) i MESSVM - skok u vis iz mjesta (.49). Iz latentnog prostora brzine, srednje visoku projekciju na prvi kanonički faktor imaju varijable MBRTNZ - taping nogama od zid (.56) i MBRTR - taping rukom (.56). Analizom matrice strukture prvog izolovanog kanoničkog faktora u prostoru košarkaških vještina (Tabela 7.) vidimo da iznimno visoku projekciju na prvi kanonički faktor ima varijabla VLRS - vođenje lopte rukom u slalomu (-.93). Nešto nižu, ali i dalje visoku projekciju na prvi kanonički faktor imaju varijable ULK30 - ubacivanje lopte u koš za 30 sekundi (.73) i PNK30 - prodor na koš za 30 sekundi (.61). Srednje visoku projekciju na prvi kanonički faktor ima varijabla BHLR30 - bacanje i hvatanje lopte rukom za 30 sekundi (.54). Uvidom u matricu kroskorelacije motoričkih sposobnosti i košarkaških vještina (Tabela 8.) primjećujemo da najveću povezanost sa varijablama iz prostora košarkaških vještina imaju varijable za procjenu koordinacije, eksplozivne snage i brzine. Ističe se visoka povezanost varijable VLRS - vođenje lopte rukom u slalomu sa varijablama za procjenu koordinacije iz prostora bazičnih motoričkih sposobnosti. VLRS - vođenje lopte rukom u slalomu, MKOS3M - slalom s tri medicinke (.67). VLRS - vođenje lopte rukom u slalomu, MKOKUS - koraci u stranu (.62). VLRS - vođenje lopte rukom u slalomu, MKOKSP - koordinacija s palicom (.60). Ovi rezultati se podudaraju sa rezultatima istraživanja Halilovića (2011) koji je u svom istraživanju utvrdio najveći koeficijent pozitivnog uticaja testa MKOS3M - slalom s tri medicinke na kriterijsku varijablu VLRS - vođenje lopte rukom u slalomu.

ZAKLJUČAK

Osnovni cilj u ovom istraživanju bio je utvrđivanje relacija motoričkih sposobnosti sa uspješnošću izvođenja elemenata tehnike košarke. Za procjenu motoričkih sposobnosti korišteno je 12 varijabli iz skupa testova za procjenu motoričkih sposobnosti a za procjenu uspješnosti izvođenja elemenata tehnike košarke 4 varijable iz skupa testova za procjenu košarkaških vještina. Uzorak ispitanika u ovom istraživanju sačinjavalo je 85 učenika 7. i 8. razreda OŠ "Prekounje" iz Bihaća. Za sve varijable izračunati su osnovni centralni i disperzioni parametri, a relacije između prostora utvrđivane su primjenom kanoničke korelacione analize. Utvrđena je jaka povezanost između bazičnih motoričkih sposobnosti i situaciono-motoričkih sposobnosti a dobijen je jedan značajan par kanoničkih faktora. Rezultati istraživanja potvrđuju

between spaces were determined using canonical correlation analysis. A strong connection between basic motor abilities and basketball skills was established, and one significant pair of canonical factors was obtained. The results of the research confirm the results of previous research on the relations between motor abilities and basketball skills in basketball, and thus research hypothesis H is confirmed - a significant relation of variables for the assessment of motor abilities and basketball skills is expected. In addition, they point to the importance of systematic monitoring of motor abilities in the teaching and training process. Determining anthropological characteristics as well as their connection with characteristics or abilities from other anthropological areas is essential for optimal guidance and programming of the teaching and training process, as well as the selection and monitoring of students or athletes. These results can help physical education pedagogues in the selection and frequency of operators for the most successful transformation of the anthropological status of their students.

rezultate prethodnih istraživanja relacija motoričkih sposobnosti i košarkaških vještina u košarci, i tim je potvrđena hipoteza istraživanja H – očekuje se značajna povezanost varijabli za procjenu motoričkih sposobnosti i košarkaških vještina. Osim toga, ukazuju na važnost sistematskog praćenja stanja motoričkih sposobnosti u nastavi i trenažnom procesu. Određivanje antropoloških karakteristika kao i njihova povezanost sa obilježjima ili sposobnostima iz drugih antropoloških prostora bitna je za optimalno usmjeravanje i programiranje nastave i trenažnog procesa, te selekciju i praćenje učenika ili sportaša. Pedagogu nastave fizičke kulture ovi rezultati mogu pomoći u odabiru i frekvenciji operatera za što uspješniju transformaciju antropološkog statusa svojih vaspitanika.

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PROCEDURA RECENZIJJE

Radovi poslani časopisu će najprije biti ocijenjeni od strane Uredništva imajući u vidu nekoliko kriterijuma: prikladnost teme i sadržaja časopisa; uređivanje (priprema rukopisa) i format; i “opšta” valjanost. Ako su ovi kriteriji ispunjeni, rad će biti poslat na dvostruku anonimnu recenziju od strane najmanje dva priznata i nezavisna recenzenta, a proces recenzije može trajati do 8 sedmica.

Samo radovi koji dobiju pozitivne recenzije će biti prihvaćeni. Jedan od presudnih razloga recenzije je navođenje citata i referenci relevantne literature. Urednički odbor ima pravo da komentariše formu rada prije nego što on bude prihvaćen za objavljivanje. Redakcija nije obavezna da objavljuje radove po hronološkom redosledu njihovog prijema ili po redosljedju po kom su prihvaćeni za objavljivanje. Nijedan značajan dio rada ne treba da bude objavljen negdje drugdje. Prikazivanje rezultata u izvodima, sažecima, kratkim pregledima, disertacijama i magistarskim tezama, recenzijama i radovima sa konferencija (do tri stranice, koje sadrže sažetke, grafičke prezentacije i literaturu) ne smatra se objavljivanjem. Ako rukopis sadrži rezultate koji su već objavljeni, autor(i) moraju dobiti pristanak prvog izdavača i jasno citirati izvor.

ETHICS

Publication ethics, disclosure policy and malpractice statement

Publication and authorship

- All submitted articles are subject to strict peer-review process by at least two reviewers that are experts in the area of the particular paper.
- The factors that are taken into account in review are relevance, soundness, significance, originality, readability and language.
- The paper acceptance is constrained by such legal requirements as shall then be in force regarding libel, copyright infringement and plagiarism.
- For published articles, information on relevant potential conflicts of interest will be made available to the public.

Authors' responsibilities

- Authors must certify that their manuscripts are their original work.
- Authors must certify that the manuscript has not previously been published elsewhere.
- In case a submitted manuscript is a result of a research project, or its previous version has been presented at a conference in the form of an oral presentation (under the same or similar title), detailed information about the project, the conference, etc. shall be provided navesti gde se navode. A paper that has already been published in another journal cannot be reprinted in this journal.
- Authors must certify that the manuscript is not currently being considered for publication elsewhere.
- Authors must identify all sources used in the creation of their manuscript.
- It is the responsibility of each author to ensure that papers submitted in this journal are written with ethical standards in mind.

Reviewers' responsibilities

- Reviews should be conducted objectively, with no personal criticism of the author.
- Reviewers are required to provide written, competent and unbiased feedback in a timely manner on the scholarly merits and the scientific value of the manuscript.
- Reviewers should keep all information regarding articles confidential and treat them as privileged information.
- Reviewers must not have conflict of interest with respect to the research, the authors and/or the funding sources for the research. If such conflicts exist, the reviewers must report them to the Editor without delay.
- Any selected referee who feels unqualified to review the research reported in a manuscript or knows that its prompt review will be impossible should notify the Editor without delay.

Editors' responsibilities

- Editors have complete responsibility and authority to reject/accept an article.
- Editors are responsible for the contents and overall quality of the publication.
- Editors should always consider the needs of the authors and the readers when attempting to improve the publication.
- Editors should preserve the anonymity of reviewers.
- Editors should act if they suspect misconduct, whether a paper is published or unpublished, and make all attempts to persist in obtaining a resolution to the problem.
- Editors should not reject articles based on suspicions.

ETIKA

Etika objavljivanja, pravila objavljivanja i zloupotreba podataka

Objavljivanje i autorska prava

- Svi pristigli članci podliježu strogoj recenziji od strane barem dva recenzenta koji su stručnjaci iz oblasti naučnog rada.
- Faktori koji se uzimaju u obzir prilikom recenzije su relevantnost, ispravnost, značaj, originalnost, čitljivost i jezik.
- Prihvatanje rukopisa je ograničeno takvim zakonskim uslovima koje će se primijeniti u slučaju klevete, zloupotrebe autorskih prava i plagijata.
- Kod objavljenih članka, informacije o relevantnim potencijalnim sukobima interesa biće dostupne javnosti.

Odgovornosti autora

- Autori moraju da potvrde da je njihov rukopis njihovo autorsko djelo.
- Autori moraju da potvrde da njihov rukopis nije prethodno objavljen na nekom drugom mjestu.
- U slučaju da je poslati rukopis rezultat naučnoistraživačkog projekta ili da je, u prethodnoj verziji, bio izložen na skupu u vidu usmenog saopštenja (pod istim ili sličnim naslovom), detaljniji podaci o projektu, konferenciji i slično, navode se u navesti gdje se navode. Rad koji je već objavljen u nekom časopisu ne može biti preštampan u ovom časopisu.
- Autori moraju da potvrde da se njihov rukopis trenutno ne razmatra za objavljivanje negdje drugdje.
- Autori su dužni da navedu sve izvore koje su koristili u pisanju njihovog rukopisa.
- Autori su dužni da se pridržavaju etičkih standarda koji se odnose na naučnoistraživački rad.

Obaveze recenzenta

- Recenzija mora biti objektivna. Komentari koji se tiču ličnosti autora smatraju se neprimjerenim. Sud recenzenta mora biti jasan i potkrepljen argumentima.
- Recenzenti bi trebalo svoje stavove da iskažu jasno, sa pratećim argumentima.
- Recenzenti bi trebalo da čuvaju u povjerenju sve informacije u vezi članka i smatraju ih privilegovanim informacijama.
- Recenzent ne smije da bude u sukobu interesa sa autorima ili financijerom istraživanja. Ukoliko postoji sukob interesa, recenzent je dužan da o tome momentalno obavijesti urednika.
- Recenzent koji sebe smatra nekompetentnim za temu ili oblast kojom se rukopis bavi dužan je da o tome obavijesti urednika.

Obaveze urednika

- Urednici imaju punu odgovornost i ovlaštenje da odbiju/prihvate članak.
- Urednici su odgovorni za sadržaj i ukupni kvalitet publikacije.
- Urednici bi uvijek trebalo da razmotre potrebe autora i čitaoca pri pokušaju da se poboljša publikacija.
- Urednici bi trebalo da sačuvaju anonimnost pregledanog članka.
- Urednici bi trebali da osiguraju da je sav materijal koji objavljuju u skladu sa međunarodno prihvatljivim etičkim smjernicama.
- Urednici bi trebalo da djeluju ukoliko posumnjaju na zloupotrebu, bez obzira da li je rad objavljen ili ne, i preduzmu mjere kako bi uspjeli da riješe problem.
- Urednici ne bi trebalo da odbace članak na osnovu sumnje.

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