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Original Scientific Paper

Welcome to Brazil: An Analysis of the Migration of Foreign Players to Brazilian Basketball

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Abstract

This study aimed to analyze the migration of foreign athletes to compete in the New Basketball Brazil (NBB). This descriptive study was used for documentary research, and data were collected from the National Basketball League (LNB), referring to all seasons of the competition. The results point to a gradual increase in the number of foreign players until the 2013/14 season, after a slight decline. It was also observed that Minas was the club that received the most foreigners and that counted on them in all the seasons. The country with the highest number of migrant athletes in the NBB was the United States. It was concluded that the pattern of migration of foreigners in Brazilian basketball is predominantly continental and that the coming of many Americans to Brazil can be explained by the fact that the United States is the mother country of many players whose quality is superior to their domestic demand. That leads these players to leave the world's largest basketball league, the NBA, corroborating the reality of other countries' leagues around the world.

Keywords: *Sport Migration, Basketball, Sport*

Introduction

Migration can be understood as a permanent or semi-permanent change of residence (Nolasco, 2016). However, Koser, & Salt (1997) have already warned that the academic literature is not unanimous in pointing to a solid definition of migration. For the authors, one of the major problems of this conceptual impasse is the determination of the time needed for the individual who moves from his place of origin, not his destination, since a short-term displacement can be considered as a movement or mobility, and not as migration (Koser & Salt, 1997). In a nutshell, the attributions found on migration refer to aspects that address the movement of people through the dimensions of space and time (Nolasco, 2016).

When considered as an area of study, migration is investigated in its relationship with different areas, including sports. Sports migration is a theme that has been consolidating and qualifying discussions (Magee & Sugden, 2002; Maguire, 2004), especially after the 1990s, when the first proposals for conceptual frameworks for researching the phenomenon occurred (Maguire, 1994). The most investigated sport modality is football, whereas other modalities

appear less frequently as a topic of interest among scholars who carry out research on the theme (Elliott & Maguire, 2008; Rojo, Simiyu, & Starepravo, 2020).

With regard to research on sports migration in Brazil, an important gap was found by an initial survey, as there are few published studies on the subject. Among them, there was one that addresses Kenyan street runners (Ribeiro, Lovisolo, Gomes, & Sant'anna, 2013), another that deals with volleyball (Garcia, Nascimento, & Pereira, 2017), one about collective Olympic modalities (Rúbio, 2017), a review of literature on expatriates in the sports context, derived from psychology studies (Faggiani et al., 2016) and some that deal with football (Silva, Rigo, & Freitas, 2012; Rial, 2008; Ribeiro & Dimeu, 2009). However, Brazilian football also appears in studies by international researchers (Magee & Sugden, 2002; Maguire & Pearton, 2000; Elliott, 2013).

Basketball is a sport that has not been studied in Brazil in terms of sports migration (Gonçalves, Rojo, Cavichioli, & Moraes, 2017). Although this modality is not considered popular in Brazil, basketball has recently undergone significant transformations, especial-

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ly with the creation and consolidation of the National Basketball League (LNB), an entity that brings together the elite of male athletes in the country and is responsible for organizing the New Basketball Brazil (NBB), the main basketball competition in the country.

Over its twelve years, the NBB has been through a gradual professionalization process, transferring this condition to participating clubs. As a result of this relevant contribution, basketball started being progressively commercialized and spectacularized in the country (Hirata, 2020).

In this process, hiring foreign athletes, North Americans and other nationalities, played a prominent role in improving the performance of the teams or by the technical skills of the athletes' performance, which, consequently, raises fans' interest (Hirata, 2020). After presenting the current scenario of professional basketball in Brazil, the general objective of this research is to analyze the migration profile of foreign athletes to compete in the NBB. As secondary objectives, an attempt was made to survey the number of athletes per season, check the athletes' countries of origin and which clubs received them.

Methodology

This research is characterized as descriptive-documental. Reports on foreign participation in the National Basketball

League (NBB) were used as a research source. The information was collected from the Ombudsman of the National Basketball League (LNB), the institution responsible for organizing the NBB. The request for information was made via email and phone calls.

The timeframe encompasses the NBB seasons from 2008 to 2018. Microsoft Excel software was used to organize the data contained in the reports, thus, generating the information for the analysis of this study. For the purposes of the analysis, we decided to present the basic statistics of the frequency percentage.

It is important to note that the number of players is presented from the sum of the volume of each season. In other words, the same athlete added a frequency mark for each season in which he participated, regardless of the team, and not just one mark in the total for number of seasons.

Results

The numbers referring to the distribution of foreign players in the NBB seasons include athletes of many nationalities, considering the teams participating since the first season of the competition, as it can be seen in Figure 1.

Figure 1 shows an increasing line in the number of foreign

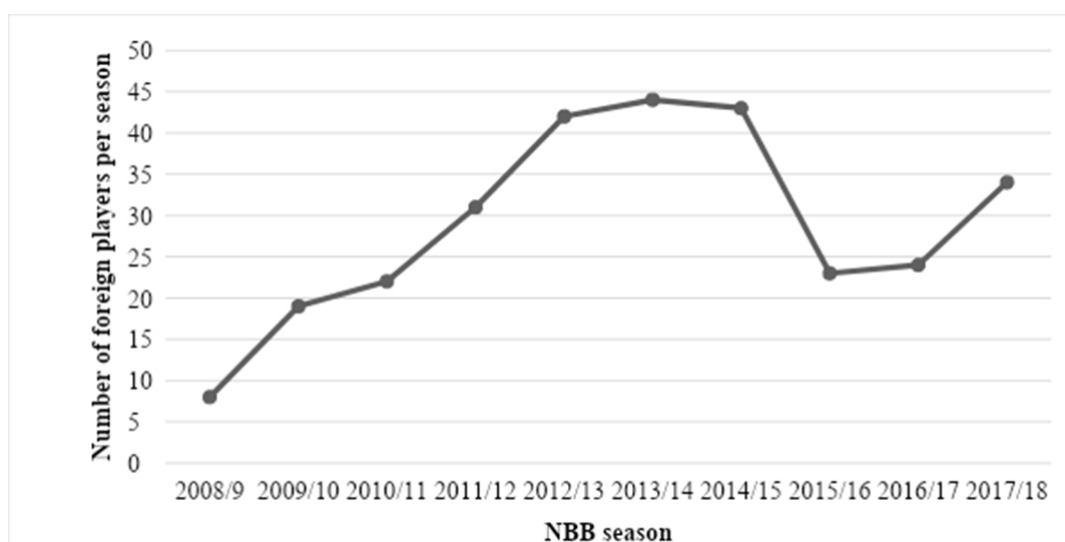


FIGURE 1. Number of foreign players per season of the NBB (Source: Prepared by the authors, based on data provided by the LNB)

players in the New Basketball Brazil between seasons 2008/09 and 2013/14, and between seasons 2015/16 and 2017/18. In the first season, only 8 players were distributed in seven teams, which represented 46.7% of the total of fifteen who competed in the league. The gradual increase takes place until the 2013/14 season, when the maximum number of players of non-Brazilian origin is reached in the NBB. There were 44 athletes in action during the season, distributed in all seventeen teams (100%) in the league.

During the 2012/13, 2013/14 and 2014/15 seasons, the number of foreign athletes remained practically the same, with 42, 44 and 43 athletes, respectively, and most of the participating teams also had at least one foreign player in their cast. In the 2015/16 season, there was a drop in participation in numbers of players, but the logic of previous seasons remained, with most of the participating teams having foreign athletes on their rosters.

Regarding the destination team of foreign players in the NBB editions, the following table shows in numbers the clubs that

received the most foreigners during the timeframe that encompassed the competition.

Table 1 shows by quantitative means that Minas Tênis Clube was the club that received the most foreign athletes in the accumulated total of ten seasons. By taking a deeper look at the club, we identified that it had the presence of foreign players in all seasons in the league with, at least, 2 players from another countries.

Despite the great presence of foreigners in that club, it is clear that the characteristics of the teams, whether they are large clubs or representatives of a municipality, are not a major factor in relation to sports migration. For example, among the six teams with the largest number of foreign players, three of them are clubs based in state capitals (Minas Tênis Clube - Belo Horizonte/MG, Pinheiros - São Paulo/SP and Flamengo - Rio de Janeiro/RJ) and three of them are representatives of large municipalities (Liga Sorocabana - Sorocaba/SP, Bauru - Bauru/SP and Franca - Franca/SP). The absolute numbers must be viewed with caution

Table 1. Number of foreign athletes by destination club (Source: Prepared by the authors, based on data provided by the LNB)

Destination Club	Participating Seasons	Total Foreign Athletes	Foreigners Average
Minas Tênis Clube	10	24	2,4
Pinheiros	10	22	2,2
Liga Sorocabana	7	21	3
Flamengo	10	20	2
Bauru	10	19	1,9
Franca	10	17	1,7
Mogi	6	16	2,6
Vitória	3	14	2,8
Paulistano	10	14	1,4
Uberlândia	5	13	2,6
São José	8	13	1,6
Limeira	6	13	2,1
Vila Velha	6	12	2
Palmeiras	3	11	3,6
Basquete Cearense	6	11	1,83
Macaé	4	10	2,5
Campo Mourão	2	6	3
Joinville	6	5	0,83
Brasília	9	5	0,55
Assis	3	5	1,66
Vasco	2	4	2
Araraquara	4	3	0,75
Espírito Santo	3	3	1
Tijuca	2	3	1,5
Botafogo	1	2	2
Rio Claro	2	2	1
Caxias do Sul	3	1	0,33
Goiânia	1	1	1
Total		290	

depending on the number of seasons that each team participated, because, when looking at the top of the table, it appears that the 6 teams that participated in the 10 seasons are also those that present important numbers for this statistic.

Another important category for analyzing the presence of foreign players in a given country and modality is their country of origin, information that can be identified in the data presented in Figure 2.

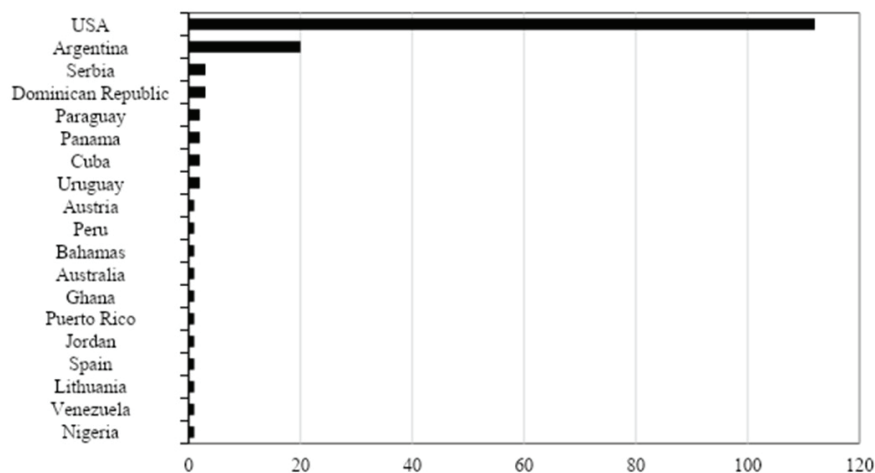


FIGURE 2. Number of athletes per country of origin. (Source: Prepared by the authors, based on data provided by the LNB).

When observing the graph with the countries of origin of the foreign players who worked in the NBB, at first, one can already see the variety of donor locations. Throughout the league's history, a total of nineteen different nationalities were represented by foreign athletes participating in the Brazilian competition.

Considering the nineteen countries with representatives in the NBB, all the continents are represented. In that scenario, there are six countries in Central and North America, with 77,07% of the foreigners, five countries in South America, with 16,56% of the foreigners, (added to the Americas, there are eleven countries or 93,63% of the foreigners,) four from Europe, which corresponds to 3.82% of the foreigners, two African countries, which is equivalent to 1,28% of the foreigners, one country from Asia, with 0,63 % of the foreigners, and one from Oceania, also with 0,63% of the foreigners.

If we focus on just one country in isolation, the massive presence of North American players is evident. Out of the nineteen countries, the United States alone represents 71.3% of the foreign athletes present in the 10 seasons of the NBB. This fact can be justified, although not exclusively, by the technical quality of North American players, many of whom do not find opportunities for professionalization in their own country and, therefore, seek peripheral markets to dedicate exclusively to playing basketball as professionals.

This trend is corroborated by a study named International Basketball Migration Report 2015, carried out in a partnership between the International Basketball Federation (FIBA) and the CIES Sports Observatory, which investigated the migration of basketball athletes in the main leagues in the world.

The second country with the largest number of foreign players is Argentina, with 12.7% of the players, which can also be explained to a large extent by the technical quality that Argentinian players have been presenting in recent decades. The other countries appear with few representatives, and eleven of them were represented by only one athlete.

Discussion

The first aspect presented by the results is the gradual increase in the number of foreigners in the NBB. As noted, until the 2013/14 season, there was a significant growth in the number of foreigners in the Brazilian league, to the point that all teams had at least one foreign player in their squad. By analyzing this movement, it is assumed that the consolidation of NBB as a league in constant search for professionalization and commercialization can boost the teams' possibilities of hiring foreign athletes (Capinussú & Apicelo, 2011; Hirata, 2020). However, even though the growing trend of foreign athletes in the NBB points this out, the Brazilian league is one of those with the lowest percentage of foreigners in their teams compared to the 16 major leagues in the world (CIES & FIBA, 2015). This question can be partially answered by the NBB General Regulation, which limits the participation of up to three foreign athletes per team. In most other leagues, regulations are less restrictive. Another way to explain that is linked to the economic reality of Brazil in comparison to more developed countries that tend to have financially stronger competitions and are consequently able to invest more in hiring foreign players.

According to Meneses, Júnior, & Almeida (2016), the performance of Brazilian basketball shows some evolution when its indexes are analyzed. For the authors, there has also been important changes in terms of play style, a factor credited to the increase in the number of foreign players in the league. In addition to the number of foreign players, a very relevant aspect in this regard is that a considerable volume of game is intended for these athletes. In the study by FIBA and CIES (2015), the NBB, despite being

the league with the lowest number of foreigners, is the third one that most provides playing time to foreigners, approximately 25 minutes per game, on average.

By observing the origin of the foreign players who play for the NBB, it is possible to think about some movement patterns of these migrants. Considering an analysis of the regions of origin to the destination in Brazil, migrant athletes can be classified into two of the categories presented by Maguire (1994): continental and transcontinental. The data show that 93.6% of foreign players made a continental movement, that is, their countries of origin are in the American continent. The other athletes, the minority (6.4%), have transcontinental migration as their standard, as they come from other continents. The figures for countries with active athletes in Brazilian basketball show a large proportion of players from the United States of America. This data represents some debatable situations in sport migration. By addressing the situation through an economic point of view, we can see that there is a contradiction in that information, as athletes from underdeveloped countries generally seek other more economically developed nations to work in (Magee & Sugden, 2002; Andreff, 2015). It is the case of the best players in the world, who seek to play in the NBA. Nationally, athletes like Leandro Barbosa, Nenê Hilário, Anderson Varejão, Thiago Spittler, among others, have followed this path. Regarding the NBB, it appears that an economically developed country (the United States) serves labor for a developing country (Brazil). Falcous & Maguire (2005) offer a possible explanation for this type of phenomenon when they state that, even though the United States are a country of socioeconomic centrality, where the largest basketball league in the world (the NBA) is hosted, and where, culturally, there is a greater sports consumption, there is also the massive development of talents among their school and university internships that feed the league, thus, resulting in a surplus. In fact, the production is immensely greater than the demand and, considering that the NBA is also the destination of the best basketball players in the world, the surplus of talents produced in the USA seek opportunities in countries around the world, as evidenced by the Brazilian reality. Chiba (2013) recalls that, during the 2010/2011 season, more than 5 university athletes participated in the NCAA, the main North American league for the formation of athletes that supply the NBA through Draft with new players. According to the author, NBA teams, in turn, need only 450 athletes to fill all vacancies in their rosters, with an average of 60 athletes annually recruited into the league and not only from the NCAA, but also from other parts of the world (NBA, 2019). In this sense, there is consistency in the proposals made in the studies by Crossan (2008), in which the author indicates the need to consider the socioeconomic and cultural conditions of the countries involved in the migration process. According to the author, it is also necessary to understand how the modality is understood in each country. It is important to say, then, that basketball is one of the main sports in the United States, that is, it is among the primary sports in that country. In Brazil, even though there have been historically successful times for the national basketball on the international scene, such as the men's world titles in 1959 and 1963, the sport is currently rebuilding professionalism. Even so, culturally, the predominant sport is football, which imposes on other modalities a secondary status in the sports scenario. That means less investment capacity by basketball teams.

Faced with these findings, even in financial conditions far below the ones provided by the NBA (due to the huge number of talented players in the USA), one of the options for these athletes is to migrate to other countries, even if semi-peripheral or peripheral, so that they will have the necessary conditions to continue working. In other leagues, athletes find the chance to play in countries where basketball is a culturally secondary sport, also because

the production of high-quality players in these countries tends to be proportionately lower. Studies by Crossan (2015; 2017) show that in the Czech basketball league, for example, the player profile desired by the teams became that of North American players. According to the interviewees, the visibility that this type of athlete attracts to the destination club is higher than that of local players or those of other nationalities. In the Brazilian case, one of the motivations of the teams is directly linked to an attempt to improve the qualification of their squad. In this perspective, considering the registration limitation of only three foreigners for each club (established by the NBB General Regulations), combined with the data previously presented on the condition of protagonism of foreign athletes in the teams, Balassiano (2017) highlights the importance of the work done by team's technical commissions in assembling the rosters. That includes reporting the participation and training of managers in events of the American League in order to improve the view on the athletes to be hired in the future and, in a way, enabling the strengthening of the technical level of the local league.

Considering the objective of analyzing the migration of foreign athletes to compete in the NBB, the results showed that, during the first six seasons of the aforementioned league, there was a gradual increase in the number of foreign athletes who migrated to Brazilian basketball. The clubs that received these players the most were Minas Tênis Clube and Pinheiros, the first of which relied on foreigners in all seasons of the championship. It was also observed that the greatest provider of foreign players to Brazil was the United States, which often happens in other countries as well. This information reveals that the pattern of migration of players to the NBB is mostly continental, that is, the migrants are from the same continent. It is also possible to understand that the use of foreign players has increased as the competition has consolidated. It should be noted that the type of standard established shows that a central country sends its surplus labor force to a country with a semi-peripheral status in the world system. That can be explained by the main culture of basketball in the origin of these athletes, generating a high volume of talent production. It is important to note that this research has some limitations, such as the investigation of how many seasons each athlete participated in the NBB, how many teams they competed for, what their destination was before arriving or after leaving Brazilian basketball, among others that can be considered in future studies.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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References

- Andreff, W. (2001). The correlation between economic underdevelopment and sport. *European Sport Management Quarterly*, 1(4), 251-279. doi: 10.1080/16184740108721902
- Balassiano, F. (2017). Como parceria com a NBA ajudou a trazer reforços americanos para o NBB. Retrieved from: <https://balanacesta.blogosfera.uol.com.br/2017/11/06/como-parceria-com-a-nba-ajudou-a-trazerreforc-os-americanos-para-o-nbb/>
- Capinussu, J.M., & Apicelo, W. (2011). O retorno dos patrocinadores do Novo Basquete Brasil. *Revista Intercontinental de Gestão Desportiva-Rigd*, 1(2), 122-131.
- Chiba, N. (2013). Migratory motivations of American professional basketball players in Japan, Spain and Australia. *Asia Pacific Journal of Sport and Social Science*, 2(2), 104-116. doi: 10.1080/21640599.2013.830389
- CIES Sports Observatory & FIBA. (2015). *International Basketball Migration Report 2015*. Retrieved from: http://www.cies.ch/fileadmin/documents/News_Agenda_Publications/20151022_FIBA_CIES_IBMR_2015.pdf.
- Crossan, W. (2008). A preliminary categorization of sporting immigrants. Chapter taken from *Proceedings of the International Student Conference: Science in motion - Movement in science* (14-19). Prague: Charles University.
- Crossan, W. (2015). Marketing Immigrants in Czech Basketball. *Studia sportiva*, 9(1), 138-143. doi: 10.5817/StS2015-1-16
- Crossan, W. (2017). Representation of sporting migrants: primary versus secondary. *European Journal for Sport and Society*, 14(1), 5-25. doi: 10.1080/16138171.2017.1284378
- Elliott, R. (2013). New Europe, new chances? The migration of professional footballers to Poland's Ekstraklasa. *International Review for the Sociology of Sport*, 48(6), 736-750. doi: 10.1177/1012690212446472
- Elliott, R., & Maguire, J. (2008). Thinking outside of the box: Exploring a conceptual synthesis for research in the area of athletic labor migration. *Sociology of sport journal*, 25(4), 482-497. doi: 10.1123/ssj.25.4.482
- Faggiani, F., Lindern, D., Strey, A., Aiquel, P.F., Fulginiti, D., Sartori, C., & Lisboa, C.S.D.M. (2016). The Phenomenon of Expatriates in the Sports Context. *Psicologia: Ciência e Profissão*, 36(3), 738-747. doi: 10.1590/1982-3703001832016
- Falcous, M., & Maguire, J. (2005). Globetrotters and local heroes? Labor migration, basketball, and local identities. *Sociology of Sport Journal*, 22(2), 137-157. doi: 10.1123/ssj.22.2.137
- Garcia, R.M., Do Nascimento, D.R., & Pereira, E.G.B. (2017). The migratory process and the volleyball ranking: first approaches. *American journal of sport science*, 5(4), 21-26. doi: 10.11648/j.ajss.20170504.11
- Gonçalves, L.F., Rojo, J.R., Cavichioli, F.R., & Moraes, M. (2017). Mapeamento da produção do conhecimento sobre a modalidade do basquetebol nos periódicos brasileiros. *Pensar a prática*, 20(3), 461-475. doi: 10.5216/rpp.v20i3.41812
- Hirata, E. (2020). *"Liga forte, clubes fracos?": A espetacularização do basquete masculino brasileiro (2008-2019)*. Unpublished Doctoral Dissertation. Maringá, PR: Universidade Estadual de Maringá.
- Koser, K., & Salt, J. (1997). The geography of highly skilled international migration. *International Journal of Population Geography*, 3(4), 285-303. doi: 10.1002/(SICI)1099-1220(199712)3:4%3C285::AID-IJPG72%3E3.0.CO;2-W
- Magée, J., & Sugden, J. (2002). "The World at their Feet" professional football and international labor migration. *Journal of sport and social issues*, 26(4), 421-437. doi: 10.1177/0193732502238257
- Maguire, J. (1994). Preliminary observations on globalisation and the migration of sport labour. *The Sociological Review*, 42(3), 452-480. doi: 10.1111/j.1467-954X.1994.tb00097.x
- Maguire, J. (2004). Sport labor migration research revisited. *Journal of sport and social issues*, 28(4), 477-482. doi: 10.1177/0193732504269914
- Maguire, J., & Pearton, R. (2000). The impact of elite labour migration on the identification, selection and development of European soccer players. *Journal of sports sciences*, 18(9), 759-769. doi: 10.1080/02640410050120131
- Meneses, L.R., Gois Junior, L.E.M., & Almeida, M.B.D. (2016). Análise do desempenho do basquetebol brasileiro ao longo de três temporadas do Novo Basquete Brasil. *Revista Brasileira de Ciências do Esporte*, 38(1), 93-100. doi: 10.1016/j.rbce.2015.12.002
- National Basketball Association. (2019). *NBA Frequently Asked Questions*. Retrieved from: <https://www.nba.com/news/faq>
- Nolasco, C. (2016). Migrações internacionais: conceitos, tipologia e teorias. *Oficina do CES*, 434, 1-29.
- Rial, C. (2008). Rodar: a circulação dos jogadores de futebol brasileiros no exterior. *Horizontes antropológicos*, 14(30), 21-65. doi: 10.1590/S0104-71832008000200002
- Ribeiro, C.H., & Dimeo, P. (2009). The experience of migration for Brazilian football players. *Sport in Society*, 12(6), 725-736. doi: 10.1080/17430430902944159
- Ribeiro, C., Lovisollo, H., Gomes, A., & Sant'anna, A. (2013). There is a Kenyan in our race: athletics and migration in Brazil. *Revista Brasileira de Educação Física e Esporte*, 27(3), 401-410. doi: 10.1590/S1807-55092013000300007
- Rojo, J.R., Simiyu, W.W.N., & Starepravo, F.A. (2020). Research on sports migration: an analysis of methodological procedures. *Journal of Physical Education and Sport*, 20(2), 546-553. doi: 10.7752/jpes.2020.02081
- Rúbio, K. (2017). Processos migratórios e deslocamentos: caminhos que levaram atletas de modalidades coletivas aos Jogos Olímpicos de Barcelona em 1992. *Olimpianos-Journal of Olympic Studies*, 1(1), 53-67. doi: 10.30937/2526-6314.v1n1.id7
- Silva, D.V.D., Rigo, L.C., & Freitas, G.D.S. (2012). Considerações sobre a migração, a naturalização e a dupla cidadania de jogadores de futebol. *Journal of Physical Education*, 23(3), 457-468. doi: 10.4025/reveducfsv23i3.15381

Original Scientific Paper

Differences in Split Times between the Elite Breaststroke Swimmers

Ana Vasic¹, Marko Djurovic¹, Dejan Madic¹, Tomislav Okicic¹¹University of Nis, Faculty of Sport and Physical Education, Nis, Serbia**Abstract**

The aim of this research was to determine the differences between the finalists and semifinalists of the 2019 World Championships in the 100 m breaststroke. The total sample of subjects included in the study consisted of 23 male participants of the 2019 World Swimming Championships, who were divided into two groups. The first group consisted of finalists (24.75 ± 1.58 years; $n = 8$), and the second group of semifinalists (25.00 ± 3.38 years; $n = 15$). The results are taken from the official website of the International Swimming Federation (FINA). The variables analyzed in this study are: Split 1 - first passing time of the 100 m breaststroke, Split 2 - second passing time of the 100 m breaststroke, T100 - total time of the 100 m breaststroke. All data were processed by statistical analysis one-way ANOVA. The results of the research showed that there are no statistically significant differences between the final and semifinal groups in any of the examined variables, but there are evident numerical differences that are more pronounced in the Split 2 ($F = 2.063$; $p = .166$). Based on these results, it can be concluded that swimmers who excel in their abilities in the other 50 m of the race, or achieve better times in this segment of the race, will achieve a better final result.

Keywords: World Championships, Finalists, Semifinalists, Swimming

Introduction

When we talk about swimming competitions, we must mention that water sports, as well as swimming, are in charge of the International World Organization called FINA (Fédération Internationale de Natation Amateur), which was founded on July 19, 1908 during the Olympic Games in London by representatives of swimming sports federations from Belgium, Denmark, Germany, Finland, England, Sweden and Hungary. The World Championships in water sports have been held since 1973, organized by FINA. The first official world championship was held in Belgrade, at the swimming pool "Tasmajdan". The championships were held in the range of two, three, four, and even five years, but since 2001, the decision has been made to hold in the range of two year. The composition of this championship includes five sports: swimming, water polo, diving, synchronized swimming and long-distance swimming. The last championship was held in 2019 in Gwangju (Gwangju, South Korea), which is the 18th World Championships in swimming. Next World Championships were originally

scheduled to be held in 2021, but when the Tokyo 2020 Summer Olympics were postponed due to the COVID-19 pandemic the dates clashed, so the Championships dates were changed. The new dates are May 13–29, 2022. There are several disciplines: freestyle, backstroke, breaststroke, butterfly, individual medley and as well as individual medley relays. Over 2,200 athletes from more than 190 countries competed at the 2019 Water Sports World Championships, and athletes compete in 6 sports and a total of 76 disciplines: swimming (42 disciplines), long-distance swimming (7 disciplines), synchronized swimming (10 disciplines), diving (13 disciplines), free diving (2 disciplines) and water polo (2 disciplines). Swimming competitions took place in a total of 42 disciplines, 20 disciplines in men's events as well as women's events and two more disciplines in mixed relay competition. 87 competitors from 80 countries applied for the men's 100 m breaststroke event, and each of the countries was entitled to a maximum of two competitors in this discipline. All races were held at the swimming pool of the Nambu University Municipal Aquatics Center.

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Race analysis with a measurement of time during different part of a swimming race provides information about the swimmer effectiveness during the different part of a swimming race (Wakayoshi, Yoshida, Ikuta, Mutoh, & Miyashita, 1993). To assess those abilities used by elite swimmers, most of researchers have analyzed technical, tactical and kinematic characteristics during swimming competitions to determine their relationship with race performance. The analysis of swimmer specific motor abilities by analyzing the recorded race become a necessary tool for coaches, athletes, sport scientists (Jorgić, Okičić, Stanković, Dopsaj, & Thanopoulos, 2011). Thompson, Haljand, & MacLaren (2000) in their paper investigated the kinematic variables that influence the race performance of 100 m and 200 m breaststroke swimmers and found that the better breaststroke swimmers demonstrate greater competency in the kinematic variables, except stroke kinematics, which were unique to each individual. In swimming, basic kinematic characteristics are represented by appropriate technique characteristics i.e. spatial temporal parameters such as stroke length, stroke rate, stroke effectiveness, stroke index, start time, swimming speed, turn time and other parameters (Okičić, 1999). The aim of this paper was to determine the differences between split times in elite breaststroke swimmers, the obtained results will help coaches and swimmers in planning and programming training process.

Methods

The sample of participants

The sample of respondents consisted of 23 swimmers, 8 finalists (average age 24.75 ± 1.58 years) and 15 semifinalists (average age 25.0 ± 3.38 years) swimmers who was participated in the World Swimming Championship held in 2019 in the South Korean city of Gwangju. All respondents swam the 100 m breaststroke race and based on the swam times were ranked in the semifinal and final group. All meth-

ods and procedures of this investigation were approved by the ethical committee of the University of Niš, Faculty of Sport and Physical Education, Serbia, and they conformed to the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Procedures

The World Swimming Championships were held in 2019 in South Korea city of Gwangju in a 50 m long pool. All results are taken from the official website (FINA World Championship, 2019).

The following variables were used to evaluate the results in swimming: the first passing time of the finalists of the 100 m breaststroke – Split 1 Final (s); second passing time of the finalists of the 100 m breaststroke – Split 2 Final (s); total time of the finalists of the discipline 100 m breaststroke - T100 Final (s); the first passing time of the semifinalists of the 100 m breaststroke - Split 1 Semifinals (s); second passing time of the semifinalists of the 100 m breaststroke – Split 2 Semifinals (s); total time of the semifinalists of the discipline 100 m breaststroke – T100 Semifinals (s).

Statistical Analyses

For all the variables, the basic parameters of descriptive statistics were calculated. For data analysis, one-way ANOVA design was used to determine differences between the finalists and semifinalists of the 2019 World Championships in the 100 m breaststroke. The mean and standard deviation were determined for each variable. All the statistical operations were performed using software SPSS 19.0. (Chicago, IL, USA) and the level of significance was set at $p \leq 0.05$.

Results

Table 1. shows the results of the descriptive statistical parameters for used variables.

Table 1. Basic descriptive statistical parameters and the results of the ANOVA of the applied variables in the 100-m breaststroke

Variables	Groups	N	Mean	SD	CV	Min	Max	ANOVA	
								F	p
Yr	Final	8	24.75	1.58	6.4%	22.00	27.00	.039	.846
	Semifinals	15	25.00	3.38	13.5%	21.00	33.00		
Split 1	Final	8	27.60	.42	1.5%	26.60	27.94	.228	.638
	Semifinals	15	27.68	.38	1.4%	26.63	28.21		
Split 2	Final	8	31.12	.33	1.0%	30.54	31.49	2.063	.166
	Semifinals	15	31.37	.44	1.4%	30.25	31.98		
T100	Final	8	58.71	.69	1.2%	57.14	59.19	1.294	.268
	Semifinals	15	59.05	.67	1.1%	56.88	59.79		

Legend: Groups – groups of swimmers, N – number of participants, Mean – means; SD – standard deviation, CV – coefficient of variation, Min – minimal results, Max – maximal results, ANOVA F – F statistic, ANOVA p – level of significance, Yr – age of participants, Split 1 - first passing time of the 100 m breaststroke, Split 2 - second passing time of the 100 m breaststroke, T100 - total time of the discipline 100 m breaststroke.

By analyzing the values of the variation coefficient (CV) we can see that they were below 30%, which indicates that the results were confident and can be used for further analysis (Dopsaj & Bratuša, 2003). The ANOVA results indicate that there is no statistically significant difference in all applied variables (Split 1, $F = .228$; $p = .638$; Split 2, $F = 2.063$; $p = .166$; T100, $F = 1.294$; $p = .268$). Given that these are elite swimmers, it could be expected that there will be no large oscillations among swimmers in terms of statistical differences, but certainly that the numerical differences, which are clearly visible in certain variables (Table 1), will be important for further analysis as well as for the result at the end of the race. If we look at the medal winners, we can see that the differences between them are very small, especially between the bronze

and silver medal winners (58.63 s vs. 58.46 s). The bronze medal winner had a slower time in the 100 m breaststroke event by 0.17 s compared to the silver medal winner, which supports the fact that the differences between the medal winners are minimal. Also, minimal differences (0.01 s) can be seen between the 8th and 9th swimmers (59.21 s vs. 59.22 s), i.e. the swimmer who entered the finals and the swimmer who was dropped out of the final group. Observing the results from Table 1. it can be seen that for each of the variables there is a certain numerical difference between the semifinals and final group of competitors. In variable Split 1 we can see that the final group has a transit time of 27.59 ± 0.42 s, while the semifinals groups has a transit time of 27.67 ± 0.57 s, which shows that there is a certain difference between the groups,

and this difference has a value of 0.08 s. The variable Split 2 shows the values of the transit time in the final group (31.11 ± 0.33 s) and the values of the semifinal group (31.37 ± 0.44 s), which indicates that there is a numerical difference between the groups and it is 0.26 s. With the total time on the 100 m breaststroke section, we can see that the result of the final group (58.71 ± 0.69 s) and the semifinal group (59.05 ± 0.67 s) differs by 0.34 s. If we look at the F values, it can be noticed that the numerical differences between the finalists and semifinalists in the variable Split 2 ($F = 2.063$) are larger compared to Split 1 ($F = .228$), which speaks in favor of the fact that better ranked swimmers have the ability to swim faster second part of the race.

Discussion

The results of the conducted research show that there is no statistically significant difference in split times between the semifinals and final groups, but there is a numerical one, which tells us that swimmers with better abilities dominate in the second part of the race, which allows them to achieve better swimming results. Previous research has proven that the result in swimming is influenced by the speed of clean swimming, the reaction time at the start, the strokes frequency and the strokes length (Marković, Pašić, & Kulundžić, 2014). Observing the results of the research of Olstad et al. (2020) which was conducted on a sample of 15 top level male swimmers, it can be seen that the turns times contributed the most to the results ($44.30 \pm 0.58\%$), followed by clean swimming ($38.93 \pm 0.50\%$), start time ($11.39 \pm 0.22\%$) and finish time ($5.36 \pm 0.18\%$), respectively. Marković & Trivun (2012) came to the same conclusion with the addition that the start time, the split time at 50 m and the stroke length have no significance for the final result. The results of the conducted research are in accordance with the results of Marković & Trivun (2012), on the basis of which it can be said that a higher values swimming speed is needed to achieve a better result, and the faster turn time and finish time. Observing the results of Jorgić et al. (2011) conducted on a sample of 14 elite swimmers can be seen that specific motor skills (stroke efficiency, stroke rate, stroke length) statistically significantly affect the final results ($R = 0.99$, $R^2 = 0.98$, $F = 134$, 30 , $p = 0.000$). The obtained results of the research conducted within this paper tell us that the final result of the 100 m breaststroke depends on the time achieved in the second fiftieth of the race, but the results obtained by Dopsaj (2009) investigating the model tactics of elite swimmers of both sexes in race of 100 m, differ in relation to our results and he states that with the breaststroke swimming technique, there is a probability that the male swimmer who turns first in the final race will win with a probability of 43.45%, while with female swimmers this probability is significantly higher and amounts to 77.18%. Šiljeg, Leko, & Mikulić (2011) found that there was a statistically significant improvement in total time (1.55 s) which was mainly achieved based on a faster start and turn time. In individual parameters, there is a statistically significant difference in the start time, on the 25 m and 75 m, as well as in the time required for the turn. In the conducted research, there is no statistically significant difference in split times between swimmers of the final and semifinal group who participated in the 2019 World Championships in the variables: Split_1, $p = .638$, Split_2 ($p = .166$) and T_100 ($p = .268$). The highest F value occurred with the variable Split_2 ($F = 2.063$) which shows that the biggest changes between the finalists and semifinalists occur in the second part of the race, therefore it is the key moment at which individuals stand out, and those with better abilities have predispositions that the second part of the race swim faster and thus comes to victory.

By analyzing the results, we can conclude that there are evident numerical differences between finalists and semifinalists in the second split time, these differences are 0.26 s, while in the first

fiftieth they are 0.08 s. This data gives us the right to conclude that regardless of the fact that statistical differences in this discipline are not significant, numerical are those that separate swimmers and these differences are most noticeable in the second part of the race, or the last 50 m race, when those better swimmers stand out with their specific motor abilities and thus come to more noticeable results. Based on the obtained information, it can be concluded that the parameters that affect the result in swimming are numerous and that depending on these parameters, the result in swimming also depends, and superior swimmers who have better specific motor skills will certainly achieve better results. When summarizing previous research, we can say that some of the most important parameters in swimming on the 100 m section are the following: clean swimming, stroke frequency, stroke length, start time, turn time and finish time. These results provide coaches with a broader picture of the quality of performance in this discipline, as well as feedback on the effective performance of parts of the race that will later be treated through the training process and help develop these specific motor skills. These facts suggest that coaches should implement all of the kinematic components in training season and that they should attempt to identify the swimming speed, stroke rate to stroke length ratio most appropriate for the swimmers.

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There are no acknowledgements.

Conflict of Interest

The authors declare that there is no conflict of interest.

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References

- Dopsaj, M., & Bratuša, Z. (2003). Matematički model za procenu nivoa generalne plivačke pripremljenosti vaterpolista mlađeg uzrasta od 12 do 14 godina (In Serbian). *Nova sportska praksa*, 3(1-2), 47-55.
- Dopsaj, M. (2009). Analysis of competitive activity in the function of defining model indicators of swimming tactics on the section (Analiza takmičarske aktivnosti u funkciji definisanja modelskih pokazatelja taktike plivanja na deonici od 100m). In: Koprivica, V., & Juhas, I., (Eds.), *International Scientific Conference Theoretical, Methodological and Methodical Aspects of Competitions and Athletes' Preparation / Conference Proceedings* (23-28). Belgrade: Faculty of Sport and Physical Education.
- Jorgić, B., Okičić, T., Stanković, R., Dopsaj, M., Madić, D., & Thanopoulos, V. (2011). Parameters of situational motor skills of Serbian swimmers and their influence on swimming results. *Facta universitatis-series: Physical Education and Sport*, 9(4), 399-405.
- Marković, V., Pašić, G., & Kulundžić, D. (2014). Analysis of a swimming stroke in the 100m breaststroke swimming event in Athens in 2004. *Sport and Health*, 9(1), 58-64.
- Marković, V., & Trivun, M. (2012). Analysis of 100 meters freestyle swimming at the 1992-2008 Olympic Games. *Sports and Health*, 7(1), 61-70.
- Okičić, T. (1999). *Uticaj treninga plivanja na brzinu kao i na promene nekih dimenzija antropoloških karakteristika plivača mlađih kategorija (In Serbian)*. Unpublished master thesis. Niš: Faculty of Physical Education, University of Niš.
- Olstad, B. H., Wathne, H., & Gonjo, T. (2020). Key Factors Related to Short Course 100 m Breaststroke Performance. *International Journal of Environmental Research and Public Health*, 17(17), 6257.
- Šiljeg, K., Leko, G., & Mikulić, P. (2011). Situational success in 100-m backstroke event at the 2004 and 2008 European swimming championship. *Sport Science*, 4(2), 28-31.
- Thompson, K. G., Haljand, R., & MacLaren, D. P. (2000). An analysis of selected kinematic variables in national and elite male and female 100-m and 200-m breaststroke swimmers. *Journal of Sports Sciences*, 18(6), 421-431.
- Wakayoshi, K., Yoshida, T., Ikuta, Y., Mutoh, Y., & Miyashita, M. (1993). Adaptations to six months of aerobic swim training: Changes in velocity, stroke rate, stroke length and blood lactate. *International Journal of Sports Medicine*, 14(7), 368-372.
- FINA World Championship. (2019). *Swimming results men 100m breaststroke*. Retrieved from FINA website: <http://www.fina.org/event/18th-fina-world-chafaults/results-1>

Original Scientific Paper

The Attitudes of Montenegrin Billiard Players towards Health and Professionalism

Gordana Radoicic¹, Zoran Milosevic², Boris Zarkovic², Bojan Masanovic^{3,4}¹Independent Researcher, Podgorica, Montenegro, ²University of Novi Sad, Faculty of Sport and Physical Education, Novi Sad, Serbia, ³University of Montenegro, Faculty for Sport and Physical Education, Niksic, Montenegro, ⁴Montenegrin Sports Academy, Podgorica, Montenegro**Abstract**

The aim of this research is to examine attitudes of billiard players from Montenegro towards health and professionalism. The sample includes 78 active billiard players from Montenegro, average age of 33.35 ± 7.94 years, who expressed their attitudes by choosing one of offered answers to the asked question. The instrument of this research is a survey questionnaire. The first and third part of this questionnaire were created by these research authors, while second part of the questionnaire is taken over and modified from the research of Međimurec (2013). The results are analysed by the Google Forms platform. Based on the results of this research, it is concluded that Montenegrin billiard players have acceptable health habits and professional attitudes towards billiards.

Keywords: Attitudes, Snooker, Game, Health Behaviour, Public Health

Introduction

Most people who never tried playing billiards easily takes a stand that it is only a game. However, billiards is considered a sport, due to the great psycho-physical effort that a player must invest in, often, several hours of training or matches (Elmaged, 2017). Nikola Tesla's observation is recorded, he said among other things that in billiards there is an extraordinary connection between human mind and physical motor skills (Petrić, 2019). This statement most precisely reflects the experience of most players (Mishima & Sukanuma, 2016; Park, Choi, & Kang, 2017; Borysova, Nagorna, Shytova, & Mytko, 2019). That connection between idea, that is, personal perception of way of next shot performance and way of how body should perform it, is essence of this game (Radoičić, 2020). These two aspects of connection skill represent the playing style of a particular player. Also, it should not be forgotten that taking the correct stance is considered as crucial element of technique for all beginners in billiards, and that it is a precondition for every quality shot performance (Mishima & Sukanuma, 2016).

The first recognizable form of billiards was noticed in France in 1340. Back then it was played outside, on the lawn. Later, at the beginning of the 18th century, billiards became a favorite among the French and English nobles, and it was played indoors. In the 19th century, in period of Industrial revolution, billiards was developed

in form we know today (sky HISTORY, n.n.). From then until today, many billiards varieties were developed, the most popular are snooker and pool, and in pool four games, eight ball, nine ball, ten ball and straight pool (Elmaged, 2017). Billiards first appeared in Montenegro in 1836, when the then ruler, Petar II Petrović Njegoš, brought the first and only billiards in Montenegro from Vienna to Cetinje (Montenegro Travel, n.n.). Nowadays in Montenegro are played the first three aforementioned pool games, and snooker is on the rise.

Motives for participation in billiards are very various, from enjoyment, goal achievement, competition, to socialization, gambling, mental rehabilitation, or wish to spend time with a close person or to get benefits when enrolling at the university (Park, Choi, & Kang, 2017). Result have shown that most of them, 26% of respondents, plays billiards solely out of pleasure. However, not only affinity to some sport is enough for playing it, psychophysical health is also one of the most important preconditions (Borysova, Nagorna, Shytova, & Mytko, 2019). Namely, the key moments of each game (last shot in basketball, penalty, decisive ball in billiards, etc.) depend on the extremely good psychophysical condition of the player and athlete (Borysova et al., 2019), because the nervous system is responsible for a high level of movement accuracy, levels of stress and muscle mobility. The reason for that is actually that in billiards, every next situation at the table is al-

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ways different from the previous one and requires a lucid solution. Therefore, it is necessary for the players to be psychophysically healthy and prepared before every match, and they can achieve that by taking care of themselves and their way of life. Exactly body activity is significant protective health factor.

Based on facts that in general sportsmen are group of people who should strive to healthy lifestyle (Kotarska, L. Nowak, Szark-Eckardt, & M.A. Nowak, 2019), that some researchers state that even 70% of whole sport result depends on sportsmen nutrition (Burns, Schiller, Merrick, & Wolf, 2004), and that primarily individual meaning of professionalism is loyalty and perseverance to perform profession or activity in the best possible way (Vrcan, 1971), aim of this research is to determine attitudes of Montenegrin billiard players towards health and to estimate their health behaviour, and to determine their attitudes towards professionalism in billiards.

Methods

The population of this retrospective cross-sectional study includes 78 active billiard players from Montenegro, average age of 33.35±7.94 years. All respondents are adults with permanent residence at Montenegrin territory who are actively playing billiards (most of them longer than 5 years). The sample was selected to cover as many Montenegrin municipalities as possible. It is necessary to remind that all participants voluntarily participated in this research and they had the ability to resign their participation in this research at any point.

The instrument of this research is a survey questionnaire consisted of 21 questions divided in three subsystems. The first five questions from the questionnaire are related to socio-demographic characteristics of Montenegrin billiards players (gender, age, profession, educational background, city of residence). The following six questions are related to attitudes of Montenegrin billiards players towards health and health behaviour (alcohol consumption, cigarette consumption, regularity of breakfast, number of daily meals, daily meal schedule, extent of physical activity). The

next ten questions are related to attitudes of Montenegrin billiards players towards professionalism (playing experience, weekly frequency of play, daily frequency of play, weekly practice of another sport, participation at Montenegrin tournaments, participation at regional tournaments, possession of equipment, monthly financial investment, financial gain). The first and third part of this questionnaire which include examination of socio-demographic characteristics and attitudes towards professionalism were created by this research author, while the second part of the questionnaire which includes examination of attitudes towards health is partly taken over and modified from research of Medimurec (2013).

This researcher was conducted online, via the Google Forms platform in the period between October 10th and 24th in 2020. Questions were closed. Respondents at most questions had optional offered answers, and for a few questions they had to write their own answer. It is important to notice that the survey was anonymous and that all answers were strictly confidential. Also, this research author precisely checked and corrected, that is, removed all the questionnaires that were not neatly filled, and there were eight of them.

By filling out the questionnaire in Google Forms all results were automatically sent to a Google spreadsheet in percentage.

Results

Based on answers to questions from first subsystem (socio demographic characteristics) it is noticed: that billiards is dominantly played by male players (Figure 1); that Montenegrin billiards players are at average age of 33.35 years; that their professional orientation is diverse (entrepreneur, IT expert, private businessman, air traffic controller, caterer, architect, economist, engineer, aircraft mechanic, communicator, professor, student etc.); that Montenegrin billiards players are mostly university educated, then secondary educated, and in 6.4% they have a master’s degree (Figure 2). City of residence of Montenegrin billiards players is mostly Podgorica (52.56 %), then Bijelo Polje (20.51 %), Nikšić (12.82 %), Bar (8.97 %), Danilovgrad (3.85 %) and Budva (1.28 %).



FIGURE 1. Gender affiliation

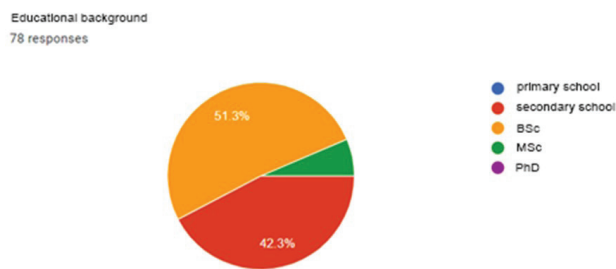


FIGURE 2. Educational background

Based on answers to questions from second subsystem (attitudes towards health and health behavior) is noticed: that not a single player uses alcohol daily, but periodically is used by vast majority of players (Figure 3); that players are dominantly

non-smokers, but also large number of them uses cigarettes daily (Figure 4); that Montenegrin billiards players are dominantly having breakfast daily, more than twice less percentage of them have it sometimes and the lowest percentage of them never have

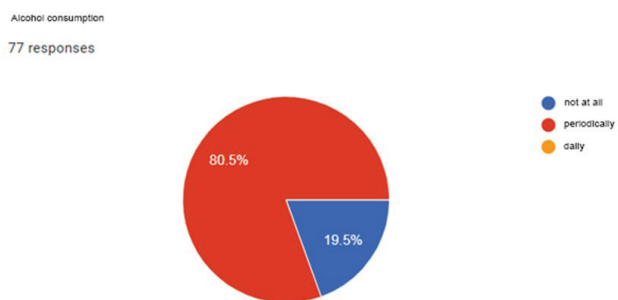


FIGURE 3. Alcohol consumption

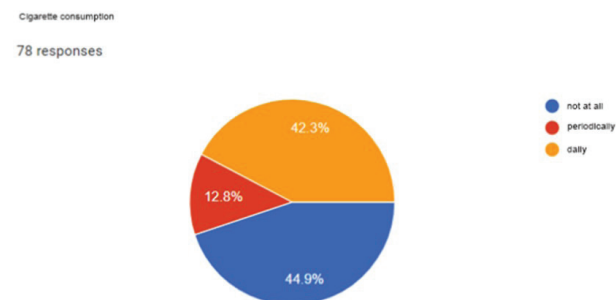


FIGURE 4. Cigarette consumption

I have breakfast
77 responses

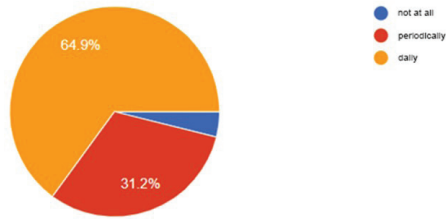


FIGURE 5. Regularity of breakfast

Number of meals per day
78 responses

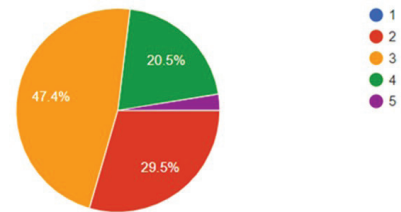


FIGURE 6. Number of daily meals

breakfast (Figure 5); that vast majority of Montenegrin billiards players mostly has three daily meals (Figure 6); that only 1.3% of Montenegrin billiards players has pause between last daily meal and first meal next day longer than 16 hours, and that pause is required in order to activate natural process of autophagy, so it

is clear that they dominantly don't follow most accurate trends and data about health nutrition (Figure 7); that Montenegrin billiards players are mostly performing physical activity 3-5 times per week, which means that besides billiards they perform some other activities (Figure 8).

Pause between the last daily meal and the first following day
78 responses

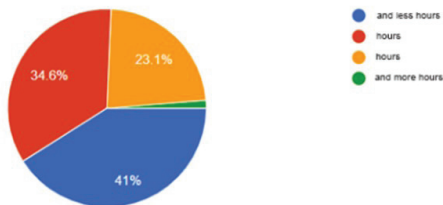


FIGURE 7. Daily meal schedule

I am engaged in physical activity
78 responses

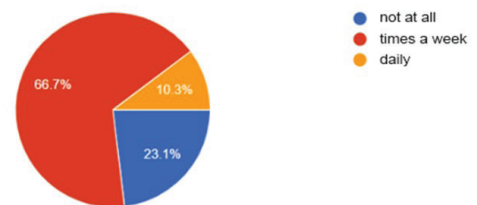


FIGURE 8. Extent of physical activity

Based on answers to questions from third subsystem (attitudes towards professionalism) it is noticed: that Montenegrin billiards players in the largest percentage are playing billiards longer than 5 years (Figure 9); that they are dominantly playing billiards 3-4 and more times per week (Figure 10); that, when playing, they spend more than 2 hours at the pool table (Figure 11); that vast majority of Montenegrin billiards players are engaged in some other physical activities 3-5 times per week (Figure 12); that those activities

besides billiards are diverse (gym, running, walking, cycling, mini football, basket, tennis); that participation at tournaments is various (equally large percentage of those players who participate at almost every and those who rarely participate), and it is interesting that it is also identical percentage ratio between those who participate at each one and those who don't participate at any (Figure 13); that a extremely low percentage of players goes to tournaments outside the borders of Montenegro (even in region) (Figure 14);

Playing billiards
78 responses

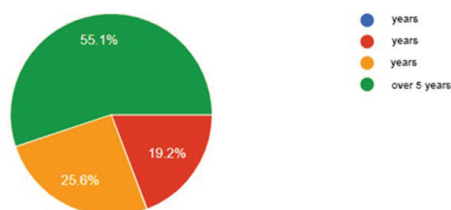


FIGURE 9. Playing experience

How much time I spend playing billiards weekly
78 responses

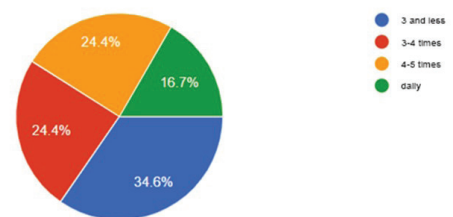


FIGURE 10. Weekly frequency of play

How much time I spend playing billiards Daily
78 responses

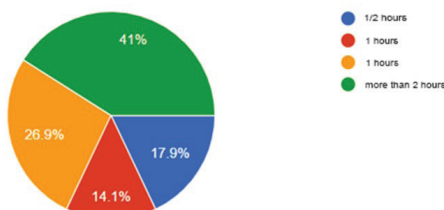


FIGURE 11. Daily frequency of play

I practice another activity
78 responses

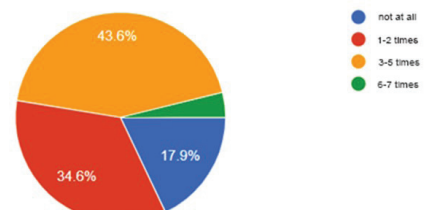


FIGURE 12. Weekly practice of another sport

I participate in tournaments in Montenegro
78 responses

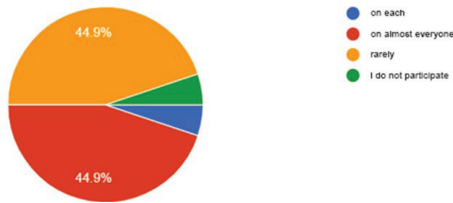


FIGURE 13. Participation at Montenegrin tournaments

I participate in tournaments in the region
77 responses

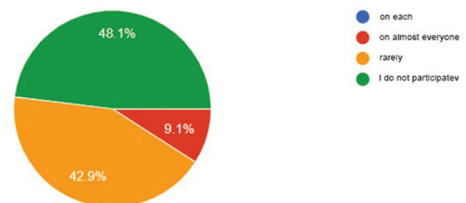


FIGURE 14. Participation at regional tournaments

I own my billiard equipment
78 responses

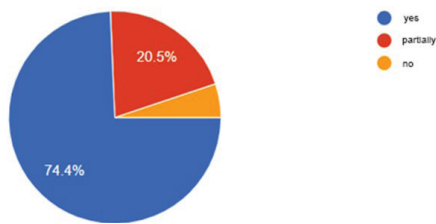


FIGURE 15. Possession of equipment

I invest in billiards on a monthly basis
78 responses

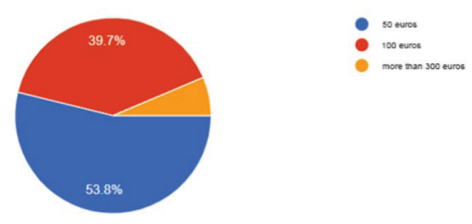


FIGURE 16. Monthly financial investment

Playing billiards brings me financial gain

78 responses

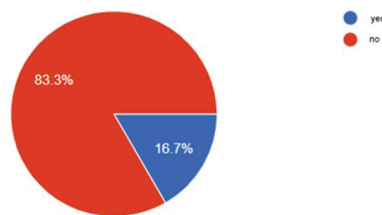


FIGURE 17. Financial gain

that players dominantly own personal billiards equipment (Figure 15); that players mostly don't invest large sums of money monthly (Figure 16); that there is extremely low percentage of those players who have financial gains by playing billiards (Figure 17).

Discussion

Billiards has been played in Montenegro since (Montenegro Travel, n.n.), and it's organizational level peak was reached in period of existence of national billiards association of Montenegro in period from 1996 to 2011 (personal communication, D. Šćepanović; personal communication, D. Garić). However, neither then, nor today, when this sport evidently stagnate, there was not enough data about billiards as a game, nor about the characteristics, attitudes and thoughts of billiard players in this area. So this study can be freely considered as pioneering when it comes to billiards, because it publishes data about attitudes of Montenegrin billiards players towards health, their health behaviour, and professional approach to this sport for the first time in public.

Results primarily indicate that Montenegrin billiards players gave an impression of organized group which gathers with aim to improve status of billiards in Montenegro. Having in mind for how long they successfully accomplish to organize and professionally work without an umbrella organization, it is easy to conclude that they are engaged in this with huge love for this sport. First subsystem questionnaire answers have shown that players are in very good ages for competition (average age of 33.35 years indicates presence at competitions of most of the players for next 15

years, for example, Ronnie O'Sullivan is 45 and has no intention of retiring), that billiards is played throughout Montenegro (Bijelo Polje – north region; Podgorica, Nikšić, Danilovgrad – central region; Bar, Budva – south region), also that players are highly educated (58% of players has BSc or MSc degrees). These facts are extremely encouraging because high education level indicates that there are well-situated and influential people, and they can raise this organization at a higher level. Only parameter that may be considered as negative is non-participation of females, which is a huge lag behind world billiards standards. One of the reasons is surely environment in which these competitions are organized, because those are mostly billiards clubs which are parts of some bars. The Montenegrin society, which is extremely traditional, still does not look with approval at the stay of women in those places, so for traditionally brought up Montenegrin women this will be brake for in following period for more massive engagement in organized competition system. Results of second questionnaire subsystem indicate that players pay attention physical fitness, that is, that physical engagement of players is from rated from extremely high to daily (as for 77% of players). According to International Federation of Sports Medicine, 1989, which says that every grown up person should be from 3 to 5 times per week (lasting 30 to 60 minutes) engaged in aerobic exercise programs such as walking, running, swimming, hiking, cycling etc., it may be concluded that, when it comes to Montenegrin billiards players, this segment is at very high level. But, all other parameters from this group of questions indicate that Montenegrin billiards players have inap-

appropriate health behavior. Moreover, alcohol and cigarette use is excessive (over 80% of players use alcohol sometimes; 55% use cigarettes and 42% of them use them daily) and familiarity with the newest trend of healthy nutrition are minimal. This part players should improve, because it is known that correct health behavior a key factor to achieving superior physical preparedness, and correct nutrition habits are the base for healthy sport behavior of every individual (Hodić & Železnik, 2020). It is inevitable again to mention Ronnie O'Sullivan who, realizing the positive impact of nutrition on health and quality of his game, in detail elaborated his own diet, and two years ago published a book named "Top of your game: Eating for mind and body". Results of the third questionnaire subsystem indicate that Montenegrin billiards players expressed exceptional professionalism level, which is even over expectations according to this sport's current status in society. Negative answers to the questions about participation at tournaments in Montenegro and in the region may be justified by not having an umbrella organization which could provide funds for participation at tournaments, because respondents in most majority answered that they don't have financial gain by playing this sport, so it is a need. That contradiction between this subsystem answers is very interesting, they indicate players' high level of professionalism which is not returned to them with financial gain. Božović has similar dilemma (2008), who in his paper "Amateurism and professionalism" notes that, dilemma of demarcation of amateurism and professionalism in sport is not easy at all, by stating that amateur sport unlike professional is much closer to properties of game while professional sport becomes a job, executive, without enjoyment in the game. This pleasure, it would be said, is not missing to Montenegrin billiards players, and it is hard to get rid of the impression that their results would be much better than current ones if players have better opportunities of competition organization and attendance at national or regional tournaments.

It is also worth noting that this study has achieved its goal: specifically, it has notably supplemented the existing database regarding the relation of Montenegrin billiards players towards health, their health behavior, and their professional approach to this sport. A sample of the examined population, gives a clear picture of what the situation was in Montenegro on this issue, because it covered the majority of active Montenegrin billiards players, but this study has limitations. The main limitation of this study was that data were based on self-assessment, therefore the recommendations for future research refer to the further expansion of the existing database about billiards as a sport itself, about characteristics (morphological, motor, psychological etc.), health behavior, attitudes and thoughts of billiards players, with usage of exact measuring instruments which would provide us more reliable results. Certainly, this does not call into question the significance of this pioneering study whose practical significance reflects in opportunity to use obtained data for improvement of current public attitude towards this sport which has its developing potential is proven at high level. It can also contribute to people

who are interested in development of billiards to, based on this research collected data, plan their operation because billiards in Montenegro should be, besides synonymous with Biljarda, become synonymous with successful national sport in future.

Acknowledgments

The authors wish to thank the all respondents - billiard players from Montenegro who participated in this research, and to Danijel Garić and Dragan Šćepanović for their help in conducting this research.

Conflict of Interest

The authors declare that there is no conflict of interest.

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References

- Borysova, O., Nagorna, V., Shytova, S., Mytko, A. (2019). Model characteristics of the psychophysiological state of highly-qualified athletes in a stressful situation. *Sport Science and Human Health*, 1(1), 12-17. doi: 10.28925/2664-2069.2019.1.1.
- Božović, R. R. (2008). Amaterizam i profesionalizam u sportu. *Sociološka Luča*, 2(2), 36-48.
- Burns, R.D., Schiller, M.R., Merrick, M.A., & Wolf, K.N. (2004). Intercollegiate student athlete use of nutritional supplements and the role of athletic trainers and dietitians in nutrition counseling. *Journal of the American Dietetic Association*, 104(2), 246-249.
- Elmaged, A.M. (2017). Is Billiards considered a sport? *International Journal of Physical Education, Sports and Health*, 4(3), 248-251.
- Hodić, V., & Železnik, D. (2020). Promocija zdravlja u vrhunskom sportu. In *10. Znanstvena konferenca z mednarodno udeležbo s področja zdravstvenih in socialnih ved* (90-105). Slovenj Gradec, Slovenija : Fakulteta za zdravstvene in socialne vede.
- International Federation of Sports Medicine. (1989). Physical exercise: an important factor for health. *International Journal of Sports Medicine*, 10(6), 460-461.
- Kotarska, K., Nowak, L., Szark-Eckardt, M., & Nowak M.A. (2019). Intensity of Health Behaviors in People Who Practice Combat Sports and Martial Arts. *International Journal of Environmental Research and Public Health*, 16(14), 2463.
- Medimurec, A. (2013). *Povezanost optimizma i zdravstvenog lokusa kontrole sa zdravstvenim ponašanjima studenata*. Neobjavljeni diplomski rad. Osijek: Filozofski fakultet.
- Mishima, M., & Suganuma, A. (2016, October). Development of stance correction system for billiard beginner player. In *2016 International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS)* (1-5). Phuket, Thailand: IEEE Xplore. doi: 10.1109/ISPACS.2016.7824701
- Montenegro Travel. (n.n.). *Biljarda*. Retrieved from: <https://www.montenegro.travel/objekti/biljarda>
- Park, J. S., Choi, J. W., & Kang, S. G. (2017). Analysis on the Participation Motivation of Billiard Players. *Journal of the Korea Convergence Society*, 8(12), 369-378. doi: 10.15207/JKCS.2017.8.12.369
- Petrić, R. (2019, Maj 17). *Bilijar nije samo zabava, već i strast*. Retrieved from Vijesti Online website: <https://www.vijesti.me/vijesti/drustvo/384141/bilijar-nije-samo-zabava-vec-i-strast>
- Radoičić, G. (2020). *Stavovi crnogorskih igrača bilijara o zdravlju, profesionalizmu i potrebi osnivanja bilijar saveza*. Neobjavljeni diplomski rad. Nikšić: Fakultet za sport i fizičko vaspitanje.
- sky HISTORY. (n.n.). *History of Snooker and Pool*. Retrieved from: <https://www.history.co.uk/history-of-sports/history-of-snooker-and-pool>
- Vrcan, S. (1971). Sociolog pred fenomenom nogometa. *Sociologija*, 1.

Review Paper

The Effect of Exercising on the Decrease Back Pain: A Systematic Review

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Abstract

The aim of this study was to determine the impact of exercising on the back pain. Tools used for the literature review are electronic databases: Google Scholar, PubMed, Medline, Mendeley, for the time period from 2010 to 2019. After the selection of papers regarding the criteria, 20 studies that suit the needs of this systematic review were selected. Therapeutic training for relieving back pain is very heterogeneous, a total of 12 different therapeutic exercise programs were conducted. The most used programs are pilates and conventional (traditional) program for relieving back pain, followed by stabilization exercises, as well as other methods, such as: sling method, motor control exercises, stretching exercises, segment stabilization, as well as combined programs. Based on the analysis of the research conducted so far, it has been determined that exercising has positive impact in decreasing pain intensity and the level of disability, on the increase of the maximum strength, durability and trunk flexibility, as well as on the improvement of the overall health related functionality of patients with back pain. It has been concluded that program of exercises has a multiple positive impact on the health of patients with the chronic back pain and that exercising to these patients is, therefore, recommended.

Keywords: *Back Pain, Lumbal Syndrome, Training Effects, Exercise*

Introduction

Technological and organizational changes in the industry during the last couple of decades have significantly increased a number of jobs conducted in monotonous and body postures with limited movements (Amit, Manish, & Taruna, 2013). Moreover, looking at the daily activities of the contemporary human, it can be noticed that almost all activities, from having breakfast, to working in the office, to watching television in the evening, humans conduct in the sitting position. This indicates that the sedentary lifestyle is one of the leading causes of the back pain occurrence (Sarabon, Palma, Vengust, & Strojnik, 2011). Back pain develops in over 80% of population at some point in their lives and it is considered to be the main health issue in the developed countries and to be responsible for major treatment, work absence and invalidity related expenses (Sarabon et al., 2011). Back pain syndrome is one of the most common causes of disability and is increasing faster than any other (Amit et al., 2013; Sarabon et al., 2011). Pain is the consequence of the pres-

sure of abdomen on the thoracic and lumbar-sacral part of the spine in sedentary position. Long-term irregular sitting position puts large load on the back muscles and on the inter-vertebral discs. Due to the additional pressure on the soft tissues (muscles, tendons and joints), work in sedentary position highly increases the back pain (Pranjic & Males-Bilic, 2015). Biomechanical risk factors for the lower back pain include: extended static posture (McGill, 2007), work in sitting position, frequent folding with rotations, lifting, pulling, pushing and vibrations, as well as the muscle weakness, especially in the sedentary position (Sarabon et al., 2011). Norris & Matthews (2008) stipulate that the causes of the back pain are multiple, but that the basis is the muscle dis-balance of the lumbar and abdominal region. Pranjic & Males-Bilic (2015) are warning us that the main cause of weakness of back and stomach muscles is insufficient physical activity (hypokineses). The more and more prevalent sedentary lifestyle, incorrect sitting posture and hypokineses are the factors that contribute to the decrease of the endurance of lumbar extensors

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and, therefore, to the appearance of the lumbar syndrome (McGill, 2007). Deep abdominal muscles, primarily *m. transversus abdominis* and *m. multifidus*, are responsible for maintaining spine stability and, therefore, their stability impacts the reduction of the lower back pain (Amit et al., 2013). Physiotherapists are using therapeutic exercises to reduce the pain, reduce the level of disability and to return some muscle functions (Brumitt, Matheson, & Meira, 2013). Sarabon et al. (2011) noticed that therapeutic training nowadays, in order to reduce the pain, is very heterogenic and varies significantly in type, intensity, frequency and training duration. The main purpose of the training is the improvement of the body posture, release of contracted muscles, improvement of strength, intensity and endurance of the abdominal muscles, as well as the improvement of the overall aerobic physical condition (Quittan, 2002).

The aim of this research was to determine the impact of exercising on the back pain. Gathering of the adequate data has been conducted from the previous experimental researches in the time period from 2010 to 2019, under the assumption that implementation of the exercising program decreases the back pain.

Methods

Data sourcing and strategy

For the literature review, following electronic databases were used: Google Scholar, PubMed, Medline, Mendeley in the period between 2010 and 2019. Key words used in the research were: back pain, training program, exercise. Research strategy was cus-

tomized for each electronic database, wherever it was possible, in order to increase sensitivity. All titles and abstracts were examined for potential papers that will be included in the systematic review. Also, reference lists from previous systematic reviews and original researches were examined. Relevant studies were systematized after detailed examination, based on fulfilling the criteria to be included.

Inclusion criteria

Criteria for being included from the study: experimental research determining the impact of exercising on the back pain, research in English language, research published between 2010 and 2019, research published as a full paper.

Exclusion criteria

Criteria for being excluded from the study: research written in any language other than English, research published before 2010, research not published as a full paper (abstracts), systematic research, research that did not show systematic approach to obtaining results, duplicates.

Data extraction and selection

Experimental research which met the set criteria was then analyzed and presented based on the following parameters: references (the first author and year of publication), the sample of participants, research duration, type of treatment, measurement instruments, results and conclusion.

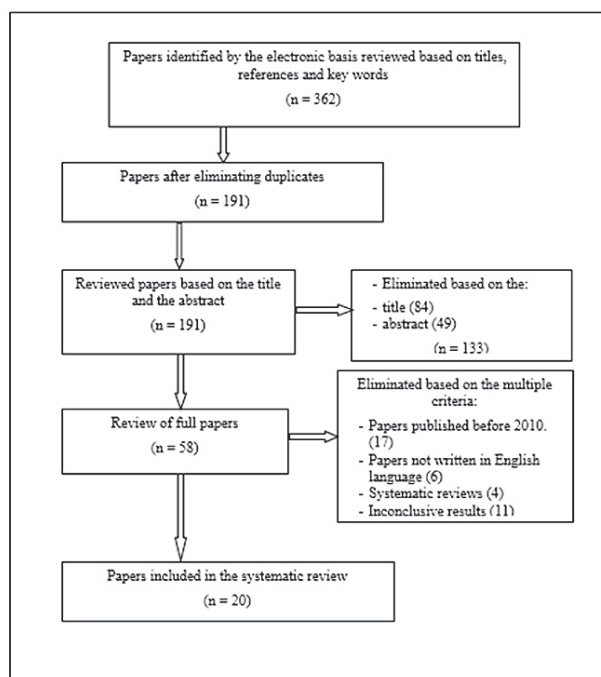


FIGURE 1. Diagram of the paper analysis

Results

This systematic review included 20 studies that examined the impact of exercising on the back pain. Studies jointly included 1174 participants who suffered from back pain, at least 10 and at most 296 participants per study. The most frequently used measurement instruments were: VAS (Visual Analogue Scale) with emphasis on the following muscles: *musculus multifidus*, *musculus quadratum lumborum*, *musculus erector spinae*, 18 out of 20 papers, followed by ODI (Osvestri Disability Index) used in 11 studies and RMQ (Roland-Morris's Questionnaire) used in 6 studies. Several studies examined the muscle activation after the

back pain relief treatment, and *musculus transversus abdominis*, therefore, the deep muscles that are, according to Amit et al. (2013) responsible for spine stability. In these 20 studies a total of 35 interventions was implemented, which were a part of 12 different programs of therapeutic exercises, in line with claims by Sarabona et al. (2011), who stipulate that contemporary therapeutic training for back pain relief are very heterogenous, but that the basis for all the programs is strengthening of the abdominal deep muscles. Duration of programs was from 4 to 16 weeks, out of which the most frequent duration was 8 weeks (in 8 papers), and the treatments included were from 1 to 3 times per week.

Table 1. Systematic review and characteristics of the papers included

Authors and year of study	Sample	Research duration	Type of treatment	Measurement instruments	Results	Conclusion
Franca et al., 2010.	30 PNSCLBP	6 weeks	G1: SS, 2x per week per 30 m G2: SE, 2x per week per 30'	VAS (cm) MGPO ODI PBU (mmHg)	G1: VAS (5.8±1.61↓), MGPO (31.80±6.06↓), ODI (15.26±3.43↓), PBU TrA (4.46±2.22↓) G2: VAS (3.6±1.56↓), MGPO (17.87±6.73↓), ODI (8.86±2.82↓), PBU TrA (-0.40±1.60↓)	Both treatments proved efficient in pain relief and reducing the level of disability. SS group has shown significant difference in all the variables related to strengthening the surface muscles, including the m. transversus abdominis, where relative results were 48.3%.
Unsgaard-Tondel et al., 2010.	109 PNSCLBP (G1=36, G2=36, G3= 37); 19-60y.	8 weeks	G1: MC, 1 x per week per 40' G2: SL; 1 x per week per 40' G3: CBE, 1 x per week per 1h	VAS (0-10 cm) ODI FT PAAQ	G1: NPRS (PP 1.54↓, HLP 1.16↓), ODI (7.66↓), FT (4.50↓), FAB (PA 0.44↓; J 1.33↓) G2: NPRS (TB 0.97↓, HLP 1.49↓), ODI (6.10↓), FT (3.87↓), PA (PA 2.02↓; J 1.74↓) G3: NPRS (PP 0.57↓, HLP 0.96↓), ODI (3.09↓), FT (1.21↓), PA (PA 0.62; J 1.09↓)	No significant differences were found between groups, even though MC group had somewhat better results than the CBE group.
Chan et al., 2011.	46 PNSCLBP (G1=22, G2=24)	8 weeks	G1: CBE 3 x per week G2: CBE + AE (40%-60%) HR max, 3 x per week per 20'	VAS (100mm) AS DAE	G1: VAS (25↓), AS (10↓), DAE (7.1↑) G2: VAS (28↓), AS (9.8↓), DAE (12.6↑)	Both groups achieved improvement, but there was no significant difference between groups. This implies that aerobic training, compared to the existing conventional training, does not improve the PNSCLBP status.
Cuesta-Vargas et al., 2011.	46 PNSCLBP	15 weeks	EG: MMP (SE, manual therapy, CBE) + 20 min AE running in the water, 3 x per week CG: MMP (SE, Manuel therapy, CBE), 3 x per week	VAS (100mm) RMQ SFT FT MISLP	EG: VAS (36.1±25↓) RMQ(3.0±4.8↓) SFT (10.6 ±12.9↓), FT (12.7±24.4↓), MISLP (12.8±9.1) CG: VAS (34.1±26↓) RMQ (1.6±1.5↓) SFT (8.9±13↓), FT (13.1±17.3↓), MISLP (16.8±21.9)	Pain, disability, health condition, strength and muscle durability and lumbar range of movement has significantly increased in both groups. MMP +AE performed better than MMP, but difference was not significant.
Sarabon et al., 2011.	10 PNSCLBP (3 males, 7 females) 47.7y.	8 weeks	EG: ABS by using the unstable surfaces and unexpected movements, 2 x per week per 50-70'	VAS ODI MAS FT	EG: ODI (3.9↓), VAS (15.0↓), MFAS (42±15%↑), MFLAS (33±25%↑), FT EC(p<0.05↑) FT PC (p<0.01↑)	Treatment has proven to be efficient in decreasing the pain and increasing the strength and flexibility. Significant decrease after the intervention for 39% in disability and 15% in the pain intensity. Significant increase in the maximum flexor strength and lateral abdominal flexor, as well as passive flexibility of the extensors and joint flexors in the hip joint. No significant difference in sex and age.
Franca et al., 2012.	30 PNSCLBP M and F, 41.9 y.	6 weeks	G1: SS, 2x per week per 30' G2: SG, 2x per week per 30'	VAS (pain, 10cm) MGPO (pain, 0-78 questions in 4 groups) ODI (0-47) PBU activation (mmHg)	SS: VAS (5.88↓), MGPO (32.8↓), ODI (15.27↓), PBU (4.66↓) SG: VAS (3.20↓), MGPO (14.86↓), ODI (9.53↓), PBU (0.67↓),	SS group achieved significant improvement in regard to the pre-test variables; in the range 90-99%, only PBU was 48%. On the other hand, SG has also achieved improvement, but in the range 37-56%, and PBU statistically insignificant 6.6%. Both techniques have decreased pain and level of disability, but SS was superior.

(Continued on next page)

Authors and year of study	Sample	Research duration	Type of treatment	Measurement instruments	Results	Conclusion
Javadian et al., 2012.	30 PNSCLBP 18-45 y	8 weeks	EG: ABS + CBE CG: CBE	VAS (mm) ODI (%) SLFT DAFM DAE	EG: VAS (29.60↓), ODI (32.34↓), DAFM (34.03↑), DAE (43.70↑), RLFD (33.85↑), DLLF (31.85↑) CG: VAS (21.06↓), ODI (23.18↓), DAFM (26.44↑), DAE (29.56↑), RLFD (26.50↑), DLLF (12.35↑)	Stabilizing exercises in combination with routine exercises have proven to be more efficient than solely routine exercises for pain relief, decrease of the functional stability and muscle durability in patients with lumbar syndrome symptoms, even though both programs have created positive effects. Stabilizing exercises increased the level of muscle activity and decreased the tiredness of local muscles.
Yoo & Lee, 2012.	30 PNSCLBP (G1 = 15, G2 =15); 20.3 y	4 weeks	G1: SL; 3 x per week G2: PT; 3 x per week	VAS (0-10cm) MAS (N)	G1: VAS (3.2±2.6↓), MAS (276.7±171.4↑) G2: VAS (2.8±0.8↓), MAS (135.2±61.1↑)	Both sling and pilates training decreased the chronic lower back pain, increased patients' strength in the lumbar area and decreased VAS results, even though sling program was somewhat more successful.
Masharawi & Nadaf, 2013.	40 PNSCLBP female, (G1 = 20, G2 =20); 45-65 y.	4 weeks	EG: AS + SG, 2 x per week per 45' KG: DNE	VAS RMQ SLFT	EG: VAS (2.32↓), RMQ (4.9↓), SLFT (9.26↑), SLFT (5.95↑) CG: no significant changes	Functional exercising program increased functionality, pain status, lumbar flexion and widening the movement range of women who suffer from the lumbar syndrome.
Shnayderman & Katz-Leurer, 2013.	52 PNSCLBP (G1 = 26, G2 =26); 18-65 y	6 weeks	G1: AE walking on the treadmill (50% HR max), 2 x per week G2: CBE, 2 x per week	W6 FT ODI DAFM DAE PAAQ	G1: W6 (71.0↑), FT (10.1↑), ODI (11.8↓), DAFM (1.1↑), DAE (1.2↑), FAB (2.0↓) G2: W6 (43.0↑), FT (8.1↑), ODI (8.4↓), DAFM (0.6↑), DAE (1.3↑), FAB (6.0↓)	Significant increase in all measurements in both groups was noticed. Six-weeks-program of walking on the treadmill was as efficient as the six-weeks-program of lower back strengthening exercises.
Sung, 2013.	46 PNSCLBP G1: 25 (47.7g) G2: 21 (53.1)	4 weeks	G1: ABS, 2 x per week per 20' G2: DNE, 2 x per week per 20'	ODI MF	G1: ODI (13.16 /28.8%↓), MF no difference G2: ODI (2.23/8.3%↓), MF no difference	ABS intervention has decrease the level of disability after the intervention period. Nevertheless, no significant difference was proven to exist in muscle tiredness during the 4-weeks period of intervention in both groups.
Cho et al., 2014.	30 PNSCLBP (EG = 15, CG =15);	4 weeks	EG: CSE, 3 x per week per 30' CG: DNE	VAS (100mm) APMT FT	EG: VAS (20.5↓), VASM (24.4↓), APMT m. quadratum lumborum (1.4↓), AMR (22.4↑) CG: no significant changes	Core strengthening program has proven to be efficient in decreasing the pain and increasing the range of movement in patients with chronic lower back pain.
You et al., 2014.	40 PNSCLBP (19 males, 21 females)	8 weeks	EG: ASE + DEAS CG: ASE	ODI RMQ VAS BT PDI	EG: ODI (8.90↓), RMQ (7.40↓), VAS (2.95↓), PDI (11.75↓), PRS(22.15↓), BT (5.35↑)	Experimental group has shown significant improvement compared to the control group. Significant decrease of 32.5% (VAS), 23.2% (PDI) и 21.5% (PRS).
Mostagi et al., 2015.	22 PNSCLBP (G1 = 11, G2 =11); 18-55 y	8 weeks	G1: PT 2 x per week per 1h G2: CBE 2 x per week per 1h	VAS QQ 0-100 FT SFT	G1: VAS (2.6↓), QQ (11.5↓), FT (16.6↓), SFT (24↑) G2: VAS (1.8), QQ (17.7↓), FT (10.39↓), SFT (19↑)	No significant difference was found between groups, QQ was somewhat more successful than pilates in improving functionality and flexibility.

Authors and year of study	Sample	Research duration	Type of treatment	Measurement instruments	Results	Conclusion
Shamsi et al., 2015.	39 PNSCLBP (G1 = 19, G2 = 20); 18-60y, VAS 3-6	16 training sessions	G1: ABS 3 x per week per 20' G2: CSE 3 x per week per 14'	VAS ODI SLFT	G1: VAS (36.3↓), ODI (17.8↓), SLFT (0.44↓) G2: VAS (38.1↓), ODI (12.4↓), SLFT (0.23↓)	Both tests achieved positive effects in all variables. No significant differences between groups were found.
Kliziene et al., 2017.	54 PNSCLBP females (EG = 27, CG = 27), 45-31 y.	16 training sessions	EG: PT, 2 x per week per 60' CG: HR	MAS (isokinetic) ID VAS	MAS extensor (41.21%↑), MAS flexor (21.53%↑), ID (p<0.001↑), VAS (2.01↓) CG: no significant changes	Pilates program had significant impact on the improvement of the maximum extensor and flexor, and on the decrease of pain in the lumbar area and on the isometric durability of the abdominal muscles.
Valenza et al., 2017.	54 PNSCLBP (EG = 27, CG = 27)	8 weeks	EG: PT 1 x per week CG: HR	RMQ VAS ODI SLFT FT BT	EG: RMQ (5.31±3.37↓), VAS (2.3±1.9↓) ODI (16.35 ± 14.07↓), SLFT (7.62±2.56↑), TF (10.11 ± 8.84↑), BT (70.48±71.24↑)	Pilates program has proven to be efficient in decreasing the level of disability, pain, increasing flexibility and balance in patients with unspecified lumbar back pain.
Cruz-Díaz et al., 2018.	64 PNSCLBP (EG = 32, CG = 32);	12 weeks	EG: PT 1 x per week CG: HR	RMQ VAS PAAQ	RMQ (5.00↓), VAS (2.75↓), PAAQ (7.0↓) CG: no significant changes	Significant difference between groups was noticed as well as the improvement of the pilates group in all variables. Bigger changes were achieved in the disability tests, tests of the pain intensity and on the Tamp kinesophobia scale.
Miyamoto et al., 2018.	296 PNSCLBP, 4 groups of 78 participants, 18-80 y	8 weeks	G1: HR G2: PT, 1 x per week G3: PT, 2 x per week G4: PT, 3x per week	RMQ VAS PSD GEE	PT 3x: VAS (5.6↓), RMQ (11.3↓), PSD (5.0↓) PT 2x: VAS (4.0↓), RMQ (7.8↓), PSD (6.3↓) PT 1x: VAS (3.3↓), RMQ (6.8↓), PSD (6.9↓)	All pilates groups had significant difference in relation to the control group. Nevertheless, it was established that there was no significant difference between pilates groups, even though group PT3S achieved the best results.
Sipaviciene et al., 2018.	106 PNSCLBP, (EG = 55, CG = 51); 53.3 y.	12 weeks	EG: ABS CG: HR	MAS and ANS (isokinetic) ODI VAS	EG: VAS (44.0%↓), ODI (48.74%↓), IPTF (21.53%), DAE (41.25%), CSA -R m.multifidus (37.41%), CSA - L (37.53%) CG: No significant changes	After 12-weeks exercising program for lumbar muscle stabilization, multi-fundus muscles and abdomen muscles stabilization, rotation was improved, while the level of disability and of the chronic back pain was decreased.

Note: AE – Aerobic Training; ABS – Abdominal Stabilization; AMR – Active Movement Range; ANS – Angle Speed; APTM – Anglo Meter for the Pain Tolerance Measurement; AS – Aberdeen Scale; ASE – Abdomen Stretching Exercises; BT – Balance test; CBE – Conventional Back Exercises; CG – Control Group; CSA – L – Cross-Sectional Area, Left Side; CSA – R – Cross-Sectional Area, Right Side; CSE – Core Strengthening Exercise; DAE – Durability of the Abdominal Extensor; DAFM – Durability of the Abdominal Flexor Muscles; DEAS – Dorsiflexion Exercises of the Ankle with Straps; DLLF – Durability of the Left Lateral Flexor; DNE – Did Not Exercise; EC-m. erector spinae; EG – Experimental Group; F – Female; FAB – Fear-Avoidance Beliefs Questionnaire FT – Flexibility Test; G (1-3) – groups (1-3); GEE – Global Expected Effect; HLP – Highest Level of Pain; HR – Heart Rate; ID – Isometric Durability; IPTF – Isokinetic Peak Torque Flexion; J – Job; M – Male; MAS – Maximum Abdominal Strength; MC – Motor Control; MGPO – Mc Gill Pain Questionnaire; MF – Muscle Flexion; MFAS – Maximum Flexor Abdominal Strength; MFLAS – Maximum Flexor Lateral Abdominal Strength; MISLP – Maximum Isometric Strength of the Lumbar Part; MMP – multi-modal physical therapy; NPRS – Numeric Pain Rating Scale; ODI – Oswestri Disability Index; PA – Physical Activity; PAAQ – Physical Activity Avoidance Questionnaire; PBU – Pressure Biofeedback Unit; PC – Physical Condition; PDI – Pain Disability Index; PFT – Passive flexibility test; PNSCLBP – Patients with Non-Specific Chronic Lower Back Pain; PP – Present Pain; PRS – Pain Rating Scale; PSD – Patients Specific Disability; PT – Pilates training; QQ – Quebec Questionnaire; RLFD – Right Lateral Flexor Durability; RMQ – Roland-Morris's Questionnaire; SE – Strengthening Exercises; SFT – Sorensen Functionality Test; SG – Stretching Group; SL – Sling Exercises; SLFT – Schobert's Lumbar Flexibility Test; SS – Segmental Stabilization; Tra – m. transversus abdominis; VAS – Visual Analog Scale; VASAM – Visual Analog Scale During; W6 – Walking for 6 minutes.

The most frequent therapeutic programs were: pilates and conventional (traditional) program for back pain relief (8 programs), followed by the stabilization exercises (6 programs), as well as other methods, such as: sling method, motoric control exercises, stretching exercises, segmental stabilization, as well as combined programs, in which participants were succumbed to different treatments simultaneously (such as back exercises and walking in the aerobic zone etc.). The main purpose of all therapeutic exercising programs is the posture improvement, relief from muscle cramps, improvement of the intensity, strength and abdominal muscle durability, as well as the increase of the overall aerobic physical condition (Quittan, 2002).

Discussion

Exercising program has proven to be efficient in decreasing the level of disability (Valenza et al., 2017) and lumbar pain intensity (Cruz-Díaz, Romeu, Velasco-González, Martínez-Amat, & Hita-Contreras, 2018; Kliziene et al., 2017; Yoo & Lee, 2012). Also, positive impact on flexibility and balance has been stipulated (Valenza et al., 2017), as well as on the maximum extensors and abdominal flexors strength (Kliziene et al., 2017; Yoo & Lee, 2012), on the isometric abdominal muscle durability (Kliziene et al., 2017), as well as on the Tamp kinesiphobia scale (Cruz-Díaz et al., 2018). No significant differences were found between pilates groups, even though it has been determined that group who exercised pilates three times per week has shown better results (Miyamoto et al., 2018).

Stabilization exercises have proven to be efficient in decreasing pain intensity (Javadian, Behtash, Akbari, Taghipour-Darzi, & Zekavat, 2012) and the level of disability (Shamsi, Sarrafzadeh, & Jamshidi, 2015; Sipaviciene, Kliziene, Pozeriene, & Zaicenkoviene, 2018; Sung, 2013; Sarabon et al., 2011). Significant improvement of the maximum flexor strength and lateral abdominal flexor strength, as well as of the passive flexibility of extensors and flexors of the hip joint has been established (Shamsi et al., 2015; Sarabon et al., 2011). Program had positive impact on increasing the level of lumbar muscles and deep muscles activation (Javadian et al., 2012; Sipaviciene et al., 2018). When it comes to the impact on the muscle tiredness, Sung (2013) did not find any significant difference, compared to Javadian et al. (2012) who determined that pilates impacted the decrease of local muscles tiredness.

Conventional therapeutic back exercises had significant impact on decreasing the level of disability and pain intensity (Chan, Mok, & Yeung, 2011; Cuesta-Vargas, García-Romero, Arroyo-Morales, Diego-Acosta, & Daly, 2011; Mostagi et al., 2015; Shnayderman, & Katz-Leurer, 2013; Unsgaard-Tøndel, Fladmark, Salvesen, & Vasseljen, 2010). Exercises had positive impact on the increase of functionality and trunk flexibility (Cuesta-Vargas et al., 2011; Mostagi et al., 2015; Shnayderman & Katz-Leurer, 2013; Unsgaard-Tøndel et al., 2010). Improvement of the durability of muscle flexors and abdominal extensors has been determined too (Chan et al., 2011; Cuesta-Vargas et al., 2011; Shnayderman & Katz-Leurer, 2013). Additionally, significant improvement has been established by using: questionnaire on avoiding physical activity (Unsgaard-Tøndel et al., 2010), walking test (Shnayderman & Katz-Leurer, 2013), as well as on the assessment of the abdomen muscle strength and the overall health condition of the patient (Cuesta-Vargas et al., 2011).

The rest of the studies were less represented in the review, even though a certain effectiveness of programs has been established. For example, a method of segmental stabilization has proven to be extremely efficient in pain relief and in decreasing the level of disability compared to the pre-test range of 90-98% for all variables, except on the PBU test, where an improvement of 48% has been detected (Franca, Burke, Caffaro, Ramos, & Marques, 2012; Fran-

ca, Burke, Hanada, & Marques, 2010). Sling method had significant impact on decreasing the pain intensity (Unsgaard-Tøndel et al., 2010; Yoo & Lee, 2012), level of invalidity, on the improvement of the trunk flexion and on the results of the questionnaire on the fear of physical activity (Unsgaard-Tøndel et al., 2010), as well as on the improvement of the patient's lumbar strength (Yoo & Lee, 2012). Strength exercises have proven to be efficient in pain relief (Cho, Kim, & Kim, 2014; Cuesta-Vargas et al., 2011; Franca et al., 2010), in decreasing the level of disability (Cuesta-Vargas et al., 2011; Franca et al., 2010), in increasing the lumbar area range of movements (Cho et al., 2014), as well as on the overall health condition of the patient and muscle durability (Cuesta-Vargas et al., 2011). Stretching method has proven to have positive impact on the pain relief (Masharawi & Nadaf, 2013; Sung, 2013), on decreasing the level of invalidity in the range 37-56% (Sung, 2013), and in improving lumbar area flexibility (Masharawi & Nadaf, 2013). It had statistically insignificant impact on the lumbar area muscle activation of 6.6% (Sung, 2013). Only one study considered motor control, but has proven a significant impact of this method on decreasing the level of disability and pain intensity, on increasing the abdominal flexion and on the results of the questionnaire on avoiding physical activity. (Unsgaard-Tøndel et al., 2010). Additionally, one paper examined the impact of the exercises of dorsiflexion of the ankle with straps in combination with exercises for stretching of the trunk. A significant decrease of 32.5% on the pain questionnaire and of 23.2% on the disability index has been established (You, Kim, Oh, & Chon, 2014). Besides the exercising systems, impact of aerobic walking training and walking has been examined and it was determined that it has positive effects on: decreasing the level of disability and pain intensity, increasing the level of flexibility, abdominal flexor muscles durability, as well as on the results on the walking test and questionnaire on avoiding physical activity (Shnayderman & Katz-Leurer, 2013).

Therefore, it has been established that all therapeutic exercising programs have significant impact on decreasing the level of disability and back pain intensity. Also, exercising has positive impact on the maximum strength, muscle durability and trunk flexibility. Positive effects have been achieved in the level of muscle activation, functionality, balance, health status and the results on the kinesiphobia scale.

Certain authors compared two and more therapeutic programs, in order to determine differences between them. Therefore, it has been concluded that there are no significant differences between conventional therapeutic program and pilates, except the fact that conventional program has proven to be somewhat more successful than pilates in improvement of functionality and flexibility (Mostagi et al., 2015). When comparing sling and pilates, pilates has proven to be somewhat more successful (Yoo & Lee, 2012). Also, no significant differences between stabilization and conventional program were found. No significant differences between groups of motor control, conventional and sling method were found, even though the group who was undertaking motor exercises achieved somewhat better results than the conventional group (Unsgaard-Tøndel et al., 2010). Certain authors have in their papers stipulated segmental stability as a significantly superior program compared to strength and stretching exercises (Franca et al., 2010, Franca et al., 2012). Walking on the treadmill program and abdomen strengthening exercises program have proven to be more efficient than aerobic activities (Shnayderman & Katz-Leurer, 2013), while the additional aerobic training has not been proven to have any impact on the back pain (Cuesta-Vargas et al., 2011).

In general, exercising positively impacts the decrease of the level of disability and lumbar pain intensity, as well as on other factors. Nevertheless, there are certain limitations when it comes

to comparing different programs and their results. One of the main limitations is the large number of various exercising programs reviewed, a total of 12. Other limitations are related to the fact that many programs include similar or same elements, so it was not easy to determine a border between them. Also, there are other differences to be considered, such as the duration of the program, number of training sessions per week, the duration of the single training session, differences related to sex, age, level of disability and so on. On the other hand, mentioned parameters are pointing us towards the topics for future research.

Conclusion

Systematic review included 20 studies and analyzed the impact of a total of 35 exercising programs. The most frequently used therapeutic programs were as follows: pilates, conventional (traditional) program for back pain relief, stabilization exercises, as well as sling, motor control exercises, stretching, segmental stabilization, combined programs and so on. Mostly, the impact examined was the one that particular exercising program can have on the level of disability, pain intensity, motoric capabilities, muscle activation level and so on.

Based on the results obtained, it has been established that the exercising program has multiple positive impacts on the patients with the back pain, as follow: decreasing the level of disability, decreasing the lumbar area pain intensity, development of the maximum flexor strength, strength of the lateral flexors and abdomen extensors, increase of extensors and hip joint flexors, improvement of stability and balance, isometric durability of muscle flexors and abdomen extensors, increasing of the level of lumbar and abdomen muscles activation, improvement of the overall health condition and functionality of the patient, better results at the questionnaire on avoiding physical activity.

Finally, it can be concluded that exercising has multiple positive effects on the back pain patients. For these reason, exercising is being recommended to all patients with back pain.

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Conflict of Interest

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References

- Amit, K., Manish, G., & Taruna, K. (2013). Effect of trunk muscles stabilization exercises and general exercises on pain in recurrent non specific low back ache. *International Research Journal of Medical Sciences*, 1(1), 23-26.
- Brumitt, J., Matheson, J.W., & Meira, E.P. (2013). Core stabilization exercise prescription, part I: current concepts in assessment and intervention. *Sports Health*, 5(6), 504-509.
- Chan, C.W., Mok, N.W., & Yeung, E.W. (2011). Aerobic exercise training in addition to conventional physiotherapy for chronic low back pain: a randomized controlled trial. *Archives of physical medicine and rehabilitation*, 92(10), 1681-1685.
- Cho, H.Y., Kim, E.H., & Kim, J. (2014). Effects of the CORE exercise program on pain and active range of motion in patients with chronic low back pain. *Journal of physical therapy science*, 26(8), 1237-1240.
- Cruz-Díaz, D., Romeu, M., Velasco-González, C., Martínez-Amat, A., & Hita-Contreras, F. (2018). The effectiveness of 12 weeks of Pilates intervention on disability, pain and kinesiophobia in patients with chronic low back pain: a randomized controlled trial. *Clinical rehabilitation*, 32(9), 1249-1257.
- Cuesta-Vargas, A.I., García-Romero, J.C., Arroyo-Morales, M., Diego-Acosta, Á.M., & Daly, D.J. (2011). Exercise, manual therapy, and education with or without high-intensity deep-water running for nonspecific chronic low back pain: a pragmatic randomized controlled trial. *American journal of physical medicine & rehabilitation*, 90(7), 526-538.
- Franca, F.R., Burke, T.N., Caffaro, R.R., Ramos, L.A., & Marques, A.P. (2012). Effects of muscular stretching and segmental stabilization on functional disability and pain in patients with chronic low back pain: a randomized, controlled trial. *Journal of manipulative and physiological therapeutics*, 35(4), 279-285.
- Franca, F.R., Burke, T.N., Hanada, E.S., & Marques, A.P. (2010). Segmental stabilization and muscular strengthening in chronic low back pain: a comparative study. *Clinics*, 65(10), 1013-1017.
- Javadian, Y., Behtash, H., Akbari, M., Taghipour-Darzi, M., & Zekavat, H. (2012). The effects of stabilizing exercises on pain and disability of patients with lumbar segmental instability. *Journal of back and musculoskeletal rehabilitation*, 25(3), 149-155.
- Kliziene, I., Sipaviciene, S., Vilkiene, J., Astrauskiene, A., Cibulskas, G., Klizas, S., & Cizauskas, G. (2017). Effects of a 16-week Pilates exercises training program for isometric trunk extension and flexion strength. *Journal of bodywork and movement therapies*, 21(1), 124-132.
- Masharawi, Y., & Nadaf, N. (2013). The effect of non-weight bearing group-exercising on females with non-specific chronic low back pain: A randomized single blind controlled pilot study. *Journal of back and musculoskeletal rehabilitation*, 26(4), 353-359.
- McGill, S. (2007). *Low Back Disorders*. Champaign: Human Kinetics, 568-574.
- Miyamoto, G.C., Franco, K.F.M., van Dongen, J.M., dos Santos Franco, Y.R., de Oliveira, N.T.B., Amaral, D.D.V., ... & Cabral, C.M.N. (2018). Different doses of Pilates-based exercise therapy for chronic low back pain: a randomised controlled trial with economic evaluation. *British Journal of Sports Medicine*, 52(13), 859-868.
- Mostagi, F.Q.R.C., Dias, J.M., Pereira, L.M., Obara, K., Mazuquin, B.F., Silva, M.F., ... & Lima, T.B. (2015). Pilates versus general exercise effectiveness on pain and functionality in non-specific chronic low back pain subjects. *Journal of bodywork and movement therapies*, 19(4), 636-645.
- Norris, C., & Matthews, M. (2008). The role of an integrated back stability program in patients with chronic low back pain. *Complementary therapies in clinical practice*, 14(4), 255-263.
- Pranjic, N., & Males-Bilic, L.J. (2015). Lumbar pain syndrome in a new work environment in the era of the new economy: occupational risk factors. *Acta Medica Croatica*, 69(1), 49-57.
- Shamsi, M.B., Sarrafzadeh, J., & Jamshidi, A. (2015). Comparing core stability and traditional trunk exercise on chronic low back pain patients using three functional lumbopelvic stability tests. *Physiotherapy theory and practice*, 31(2), 89-98.
- Shnayderman, I., & Katz-Leurer, M. (2013). An aerobic walking programme versus muscle strengthening programme for chronic low back pain: a randomized controlled trial. *Clinical rehabilitation*, 27(3), 207-214.
- Sipaviciene, S., Kliziene, I., Pozeriene, J., & Zaicenkoviene, K. (2018). Effects of a Twelve-Week Program of Lumbar-Stabilization Exercises on Multifidus Muscles, Isokinetic Peak Torque and Pain for Women with Chronic Low Back Pain. *Journal of Pain & Relief*, 7(309), 2167-0846.
- Sung, P.S. (2013). Disability and back muscle fatigability changes following two therapeutic exercise interventions in participants with recurrent low back pain. *Medical science monitor: international medical journal of experimental and clinical research*, 19, 40.
- Sarabon, N., Palma, P., Vengust, R., & Strojnik, V. (2011). Effects of trunk functional stabiliz training in subjects suffering from chronic low back pain: a pilot study. *Kinesiology Slovenica*, 17(2).
- Unsgaard-Tøndel, M., Fladmark, A. M., Salvesen, Ø., & Vasseljen, O. (2010). Motor control exercises, sling exercises, and general exercises for patients with chronic low back pain: a randomized controlled trial with 1-year follow-up. *Physical therapy*, 90(10), 1426-1440.
- Valenza, M.C., Rodríguez-Torres, J., Cabrera-Martos, I., Díaz-Pelegriña, A., Aguilar-Ferrández, M.E., & Castellote-Caballero, Y. (2017). Results of a Pilates exercise program in patients with chronic non-specific low back pain: a randomized controlled trial. *Clinical rehabilitation*, 31(6), 753-760.
- Quittan, M. (2002). Management of back pain. *Disability and rehabilitation*, 24(8), 423-434.
- Yoo, Y.D., & Lee, Y.S. (2012). The effect of core stabilization exercises using a sling on pain and muscle strength of patients with chronic low back pain. *Journal of physical therapy science*, 24(8), 671-674.
- You, J.H., Kim, S.Y., Oh, D.W., & Chon, S.C. (2014). The effect of a novel core stabilization technique on managing patients with chronic low back pain: A randomized, controlled, experimenter-blinded study. *Clinical rehabilitation*, 28(5), 460-469.

Short Report

Sport, Physical Exercise and Public Health in Georgia

Maia Margvelashvili¹¹Georgian State Teaching University of Physical Education and Sport, Department of Sport Management, Tbilisi, Georgia**Abstract**

The present study is focused on the sport, physical exercise, and their role in the public health of Georgia. In this paper, the situation created by the COVID-19 global pandemic and its negative consequences on the physical or mental health of individuals was not considered, as at this stage, as the pandemic is not yet about to recede, it is too early to draw any far-reaching conclusions. Life after the pandemic will be quite different, but the significance of sports and physical activity for human health will probably become more in the spotlight. The paper discusses the low participation in physical activity of the population in Georgia as the risk factor for non-contagious diseases, as well as explains and analysis many reasons for such low engagement. Finally, the paper provides some recommendations, which in the author's opinion, will be beneficial for achieving growth of participation of the Georgian population in mass sport and physical activities.

Keywords: *Georgian sport, Physical Activity, Population, Impact on Health*

Introduction

To estimate the contribution of sport and physical exercise to the health of nations, first need to be distinguished sport and exercise and physical activity. Physical activity by Khan et al. (2012) is “any bodily movement produced by skeletal muscles that results in energy expenditure” and is positively linked with physical fitness. Extensive components of physical activity include work, transport, domestic, and leisure time, consisting of exercise, sports, and structured recreation. An exercise has the features of “planned, structured and repetitive bodily movement, the objective of which is to improve or maintain physical fitness”. Sport is a subset of exercise that can be accomplished individually or as a part of a team. Participants follow common rules and expectations and there is a defined purpose.

Donaldson (2000), stated that the benefits of physical activity for public health are great. Physical activity is closely associated with better health and reduced all-cause mortality, including reduced fatality from coronary heart disease, stroke, colon cancer, etc. Exercise helps to reduce blood pressure and hypertension, and can protect against the development of type II diabetes mellitus. According to Wannan & Shaper (1992), people who are physically inactive have twice the risk of coronary heart disease and three times the risk of stroke than active people.

The World Health Organization (2011) stated that physical inactivity is now identified as the fourth leading risk factor for global mortality. Physical inactivity levels are raising in many countries with major implications for the prevalence of non-contagious diseases (NCDs) and the general health of the population worldwide.

In this paper the situation created by the COVID-19 global pandemic and its negative consequences on the physical or mental health of individuals was not considered. Of course, at this early stage, while the pandemic is not yet about to recede, as evidenced by the current state of the world, it is too early to draw any far-reaching conclusions. A survey commissioned by Nuffield Health (2020) found that more than three-quarters of people in the United Kingdom chose a new form of exercise in addition to walking, jogging, or cycling - activities at home such as yoga, weight loss exercises, and home treadmills. Not surprisingly, walking exercise turned out to be the most popular activity. Herein, almost two-thirds of people reported that physical exercises were significant for their mental health and wellbeing.

Undoubtedly, life after the pandemic will be quite different, but the significance of sports and physical activity for human health will probably become more in the spotlight and prepara-

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tions for it should not be delayed by policymakers and organizers of this field.

Trends in Georgia

The Constitution of Georgia (Article 5, Social State) states: "The state shall take care of the development of sports, establishing a healthy lifestyle, and engaging children and youth in physical education and sports" (Constitution of Georgia, 1995).

According to Georgian Sport (2021) in all sports of Georgia registered 171696 athletes, 7004 trainers and 2739 referees, including 39305 women, 132391 men and 954 para-athletes. The number of medals won at various international tournaments in various sports is growing every year. Despite the pandemic, for the last year Georgian athletes won 145 medals on the international arena, including 43 gold. In total at all international competitions Georgian athletes have won 3244 gold, 2505 silver and 3309 bronze medals. Not a bad result for the country with a population of 3,985,076 people.

But, in general, according to Georgian Strategic Analysis Center (2019), the state of sport in Georgia reflects the situation of countries in transition.

According to European Union, United Nations Development Programme and Parliament of Georgia survey (2017), the number of people involved in sports in the country for the last 35 years decreased significantly: 33 thousands in 2010, in contrast of 1 million in 1975.

Low physical activity of the population in Georgia as well as low level of participation in sports exercises is observed in various studies. Results of a public opinion poll Georgia social and marketing research (GEOSOMAR), conducted by the Ministry of Sport and Youth Affairs in 2013, have revealed that about 70% of the respondents are not engaged in a physical activity at all. Only 20% of schoolchildren aged from 6 to 18 year are registered in sport clubs (European Union, United Nations Development Programme and Parliament of Georgia, 2017).

This is when, according to the World Health Organization (2011), insufficient physical activity is one of the major risk factors for death from non-contagious diseases worldwide.

In this context, according to European Union, United Nations Development Programme and Parliament of Georgia survey (2017), several major non-contagious diseases have the highest mortality rates in Georgia: 1) Cardiovascular diseases, hypertension - 71%; 2) Cancer - 12%; 3) Diseases of the respiratory system - 1%; 4) Other diseases, malnutrition conditions and injuries - 14%.

According to survey of Gamkrelidze, Mebonia, Sturua, Demetrashvili, & Kakutia (2016), conducted through the technical and financial support of World Health Organization and the National Center of Disease Control and Public Health of Georgia: level of physical activity in 17.4% of respondents (male 16.2%, female 18.4%) does not meet World Health Organization recommendations on physical activity.

Above research results clearly highlight immediate need to implement an effective system for non-contagious diseases prevention and control, as well as raise awareness, encourage healthy lifestyle and decrease non-contagious disease risk factors.

Regular physical activity is one of the most important ways of reducing non-contagious diseases and related costs. According to the study conducted by the Korepanov et al. (2019), insufficient physical activity (17.4%) determined by World Health Organization recommendations will cost Georgia an average of 20.25 million USD. From this, direct healthcare costs are 14.9 million, while the productivity loss expenses are 5.350 million Dollars.

Major barriers that hamper engagement of population including youth/adolescents in physical/athletic activities are: not

supportive regulatory environment, lack of state funding for the developments of sport and physical activities, lack of clubs and other sport organizations, lack of professional personnel, not favorable infrastructure (there are only about 550 sports facilities across the country, of which 40% need to be renovated and rehabilitated), obsolete equipment, lack of tailored sport and physical activity programs for disadvantaged groups of population funded by state, limited partnerships with private sector, lack of effective inter-sectoral collaboration, etc.

Conclusion

Based on above, we can conclude that political measures for the increase of the physical activity of the population, accessibility of the sports infrastructure and the reduction of non-contagious diseases are insufficient. In this regard, we recommend Public authorities to achieving growth of participation of Georgian population in mass sport and physical activities through:

- amending existing legislation to develop comprehensive Strategic Development and Action Plans with relevant assignments and ensure access of all population to desired sport facilities, public authorities to develop system of public sport facilities with the same quality of services as private ones, which are expensive and not accessible for most of population;
- ensuring inclusion of children in early and pre-school education institutions in compulsory, regular physical activities, as well as arrange/develop sport infrastructure for sport and physical education lessons at institutions of general education;
- ensuring parks and recreation zones with friendly environment for sport exercises and physical activities, including walking paths as main activity of elderly people is walking, as well as consider developing of pedestrian and cycling networks in a city planning and relevant urban plans.

Implementation of above recommendations requires significant financial resources, which for obvious reasons, is problematic. However, given to international research, the lack of physical activity for Georgia is worthy an average of 16.8 million Georgian Lari (GEL) annually, and out of this number, direct health care expenses are 12.4 million GEL, and the products loss equals 4.4 million GEL (Thematic Inquiry Report of the Sports and Youth Affairs Committee, 2020). Even if the State directs only this amount of funds to the development of mass sports and physical activities, it will be enough for gradually improving the situation in a few years.

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References

- Constitution of Georgia.* (1995). Retrieved from: <https://matsne.gov.ge/en/document/view/30346?publication=36>
- Donaldson, L.J. (2000). Sport and exercise: the public health challenge. *British Journal of Sports Medicine*, 34(6), 409-420. doi: 10.1136/bjism.34.6.409
- European Union, United Nations Development Programme and Parliament of Georgia (2017). *Project "Georgian State Sports Policy, Basic survey results"* [In Georgian]. Retrieved on December 5, 2020, from: <http://www.parliament.ge/uploads/other/80/80559.pdf>
- Gamkrelidze, A., Mebonia, N., Sturua, L., Demetrashvili, N., Kakutia, N. (2016), *Non-contagious Diseases Risk-factor STEPS Survey, Georgia*. Retrieved from: <https://www.ncdc.ge/Handlers/GetFile.ashx?ID=67a7cad9-b8e0-438c-b74c-f5303418e033>
- Georgian Sport.* (2021, January 10) Retrieved from Georgian Sport website: <http://sport.gov.ge/>
- Georgian Strategic Analysis Center. (2019), *National Sports Governance*

- Observer - Country Report: Georgia. Retrieved on December 12, 2020, from https://gsac.ge/wp-content/uploads/2019/02/Final_Report_NSGO_Georgia_ENG.pdf
- Khan, K., Thompson, A.M., Blair, S.N., Sallis, J.F., Powell, K.E., Bull, F., & Bauman, A. (2012). Sport and exercise as contributors to the health of nations. *The Lancet*, 380(9836), 59-64. doi: 10.1016/S0140-6736(12)60865-4
- Korepanov, A., Bzikadze, M., Oboladze, D., Arziani, G., Pruidze, R., Megrelashvili, N., Giutashvili, N., Kakhidze, S., Gaprindashvili, N., Songhulashvili, S., & Kvernadze, T. (2019), *Regulatory Impact Assessment of the Draft Law on Physical Education and Sports - Final Report*. Retrieved from: http://www.parliament.ge/ge/ajax/downloadFile/122028/RIA-ENG_final_12-07-2019
- Nuffield Health. (2020, May 10). *Over half of Brits have taken up a new form of exercise during lockdown, with many vowing to continue with their new regimes*. Retrieved from Nuffield Health website: <https://www.nuffieldhealth.com/article/over-half-of-brits-have-taken-up-a-new-form-of-exercise-during-lockdown-with-many-vowing-to-continue-with-their-new-regimes>
- Thematic Inquiry Report of the Sports and Youth Affairs Committee. (2020, October 20). How to increase engagement of Georgia's population in sports and physical activities? Retrieved from United Nations Development Programme website: https://www.ge.undp.org/content/georgia/en/home/library/democratic_governance/parliament-thematic-inquiry-sport.html
- Wannamethee, G., & Shaper, A.G. (1992). Physical activity and stroke in British middle aged men. *British Medical Journal*, 304(6827), 597-601. doi: 10.1136/bmj.304.6827.597
- World Health Organization (2011, November 18), *Global Recommendations on Physical Activity for Health*. Retrieved from World Health Organization website: <https://www.who.int/publications/i/item/9789241599979>

Guidelines for Authors

Revised October 2017

*** Please use the bookmark function to navigate within the guidelines. ***

When preparing the final version of the manuscripts, either NEW or REVISED authors should strictly follow the guidelines. Manuscripts departing substantially from the guidelines will be returned to the authors for revision or, rejected.

1. UNIFORM REQUIREMENTS

1.1. Overview

The *Journal of Anthropology of Sport and Physical Education* (JASPE) applies the Creative Commons Attribution (CC BY) license to articles and other works it publishes.

There is no charge for submissions and no page charge for accepted manuscripts. However, if the manuscript contains graphics in color, note that printing in color is charged.

JASPE adopts a double-blind approach for peer reviewing in which the reviewer's name is always concealed from the submitting authors as well as the author(s)'s name from the selected reviewers.

JASPE honors six-weeks for an initial decision of manuscript submission.

Authors should submit the manuscripts as one Microsoft Word (.doc) file.

Manuscripts must be provided either in standard UK or US English or Montenegrin language. Chosen language standards should be consistent throughout the manuscripts.

Format the manuscript in A4 paper size; margins are 1 inch or 2.5 cm all around.

Type the whole manuscript double-spaced, justified alignment.

Use Times New Roman font, size eleven (11) point.

Number (Arabic numerals) the pages consecutively (centering at the bottom of each page), beginning with the title page as page 1 and ending with the Figure legend page.

Include line numbers (continuous) for the convenience of the reviewers.

Apart from chapter headings and sub-headings avoid any kind of formatting in the main text of the manuscripts.

1.2. Type & Length

JASPE publishes following types of papers:

Original scientific papers are the results of empirically- or theoretically-based scientific research, which employ scientific methods, and which report experimental or observational aspects of anthropology of sport and physical education from five major fields of anthropology: cultural, global, biological, linguistic and medical. Descriptive analyses or data inferences should include rigorous methodological structure as well as sound theory. Your manuscript should include the following sections: Introduction, Methods, Results, and Discussion.

Open Submissions

Indexed

Peer Reviewed

Original scientific papers should be:

- Up to 3000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 30;
- Maximum combined total of 6 Tables/Figures.

Review papers should provide concise in-depth reviews of both established and new areas, based on a critical examination of the literature, analyzing the various approaches to a specific topic in all aspects of anthropology of sport and physical education from five major fields of anthropology: cultural, global, biological, linguistic and medical.

Open Submissions

Indexed

Peer Reviewed

Review papers should be:

- Up to 6000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 100.

Editorials are written or commissioned by the editors, but suggestions for possible topics and authors are welcome. It could be peer reviewed by two reviewers who may be external or by the Editorial Board.

Open Submissions

Indexed

Peer Reviewed

Editorials should be:

- Up to 1000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 10.

Short reports of experimental work, new methods, or a preliminary report can be accepted as two page papers. Your manuscript should include the following sections: Introduction, Methods, Results, and Discussion.

Open Submissions

Indexed

Peer Reviewed

Short reports should be:

- Up to 1500 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 15.

Peer review - fair review provides authors who feel their paper has been unfairly rejected (at any journal) the opportunity to share reviewer comments, explain their concerns, and have their paper reviewed for possible publication in JASPE.

Open Submissions

Indexed

Peer Reviewed

Peer review - fair review should be:

- Up to 1500 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 15.

Invited papers and award papers include invited papers from authors with outstanding scientific credentials. Nomination of invited authors is at the discretion of the JASPE editorial board. JASPE also publishes award papers selected by the scientific committee of the publisher's conferences.

Open Submissions

Indexed

Peer Reviewed

Invited papers and award papers should be:

- Up to 3000 words (excluding title, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References);
- A structured abstract of less than 250 words;
- Maximum number of references is 30;
- Maximum combined total of 6 Tables/Figures.

1.3. Submission

JASPE only accepts electronic submission to the e-mail of the Journal Office: jaspe@ucg.ac.me.

Submitted material includes:

- A manuscript prepared according to the Guidelines for the Authors;
- A signed form that states the study was not previously published, nor has been submitted simultaneously for consideration of publication elsewhere, that states that all of the authors are in agreement with submission of the manuscript to JASPE, and that, for studies that use animal or human individuals, authors must include information regarding their institution's ethics committee, and which identifies the official approval number;
- A signed form that there is no conflict of interest.

Name the files according to the family name of the first author. Authors submitting revised versions of the manuscript can use the identification number of their manuscript as provided by the Journal Office. *See example:*

- ✓ FAMILY NAME-manuscript.doc – (main manuscript file)
- ✓ FAMILY NAME-statement.PDF – (authorship statement)
- ✓ FAMILY NAME-declaration.PDF – (declaration of potential conflict of interest)
- ✓ FAMILY NAME-fig1.tiff – (Figure 1)

1.4. Peer Review Process

A manuscript submitted for publication will be submitted to the review process as long as it fits the following criteria:

- The study was not previously published, nor has been submitted simultaneously for consideration of publication elsewhere;
- All persons listed as authors approved its submission to JASPE;
- Any person cited as a source of personal communication has approved the quote;
- The opinions expressed by the authors are their exclusive responsibility;
- The author signs a formal statement that the submitted manuscript complies with the directions and guidelines of JASPE.

The editors-in-chief and associate editors will make a preliminary analysis regarding the appropriateness, quality, originality and written style/grammar of the submitted manuscript. The editors reserve the right to request additional information, corrections, and guideline compliance before they submit the manuscript to the ad-hoc review process.

JASPE uses ad-hoc reviewers, who volunteer to analyze the merit of the study. Typically, one or two expert reviewers are consulted in a double-blind process. Authors are notified by e-mail when their submission has been accepted (or rejected). Minor changes in the text may be made at the discretion of the editors-in-chief and/or associate editors. Changes can include spelling and grammar in the chosen language, written style, journal citations, and reference guidelines. The author is notified of changes via email. The final version is available to the author for his or her approval before it is published.

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The editors of JASPE consider plagiarism to be a serious breach of academic ethics. Any author who practices plagiarism (in part or totality) will be suspended for six years from submitting new submissions to JASPE. If such a manuscript is approved and published, public exposure of the article with a printed mark (“plagiarized” or “retracted”) on each page of the published file, as well as suspension for future publication for at least six years, or a period determined by the editorial board. Third party plagiarized authors or institutions will be notified, informing them about the faulty authors. Plagiarism will result in immediate rejection of the manuscript.

JASPE only publishes studies that have been approved by an institutional ethics committee (when a study involves humans or animals). Fail to provide such information prevent its publication. To ensure these requirements, it is essential that submission documentation is complete. If you have not completed this step yet, go to JASPE website and fill out the two required documents: Declaration of Potential Conflict of Interest and Authorship Statement. Whether or not your study uses humans or animals, these documents must be completed and signed by all authors and attached as supplementary files in the originally submitted manuscript.

1.6. After Acceptance

After the manuscript has been accepted, authors will receive a PDF version of the manuscripts for authorization, as it should look in printed version of JASPE. Authors should carefully check for omissions. Reporting errors after this point will not be possible and the Editorial Board will not be eligible for them.

Should there be any errors, authors should report them to the Office e-mail address jaspe@ucg.ac.me. If there are not any errors authors should also write a short e-mail stating that they agree with the received version.

1.7. Code of Conduct Ethics Committee of Publications



JASPE is hosting the Code of Conduct Ethics Committee of Publications of the **COPE** (the Committee on Publication Ethics), which provides a forum for publishers and Editors of scientific journals to discuss issues relating to the integrity of the work submitted to or published in their journals.

2. MANUSCRIPT STRUCTURE

2.1. Title Page

The first page of the manuscripts should be the title page, containing: title, type of publication, running head, authors, affiliations, corresponding author, and manuscript information. *See example:*

Analysis of Dietary Intake and Body Composition of Female Athletes over a Competitive Season

Original Scientific Paper

Diet and Body Composition of Female Athletes

Svetlana Nepocatych¹, Gytis Balilionis¹, Eric K. O'Neal²

¹Elon University, Department of Exercise Science¹, Elon, NC 27215

²University of North Alabama, Department of Health, Physical Education and Recreation, Florence, AL 35632

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S. Nepocatych

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100 Campus Dr.

2525 CB

Elon, NC 27244

United States

E-mail: snepocatych@elon.edu

Word count: 2,946

Word count: 4259

Abstract word count: 211

Number of Tables: 3

2.1.1. Title

Title should be short and informative and the recommended length is no more than 20 words. The title should be in Title Case, written in uppercase and lowercase letters (initial uppercase for all words except articles, conjunctions, short prepositions no longer than four letters etc.) so that first letters of the words in the title are capitalized. Exceptions are words like: "and", "or", "between" etc. The word following a colon (:) or a hyphen (-) in the title is always capitalized.

2.1.2. Type of publication

Authors should suggest the type of their submission.

2.1.3. Running head

Short running title should not exceed 50 characters including spaces.

2.1.4. Authors

The form of an author's name is first name, middle initial(s), and last name. In one line list all authors with full names separated by a comma (and space). Avoid any abbreviations of academic or professional titles. If authors belong to different institutions, following a family name of the author there should be a number in superscript designating affiliation.

2.1.5. Affiliations

Affiliation consists of the name of an institution, department, city, country/territory (in this order) to which the author(s) belong and to which the presented / submitted work should be attributed. List all affiliations (each in a separate line) in the order corresponding to the list of authors. Affiliations must be written in English, so carefully check the official English translation of the names of institutions and departments.

Only if there is more than one affiliation, should a number be given to each affiliation in order of appearance. This number should be written in superscript at the beginning of the line, separated from corresponding affiliation with a space. This number should also be put after corresponding name of the author, in superscript with no space in between.

If an author belongs to more than one institution, all corresponding superscript digits, separated with a comma with no space in between, should be present behind the family name of this author.

In case all authors belong to the same institution affiliation numbering is not needed.

Whenever possible expand your authors' affiliations with departments, or some other, specific and lower levels of organization.

2.1.6. Corresponding author

Corresponding author's name with full postal address in English and e-mail address should appear, after the affiliations. It is preferred that submitted address is institutional and not private. Corresponding author's name should include only initials of the first and middle names separated by a full stop (and a space) and the last name. Postal address should be written in the following line in sentence case. Parts of the address should be separated by a comma instead of a line break. E-mail (if possible) should be placed in the line following the postal address. Author should clearly state whether or not the e-mail should be published.

2.1.7. Manuscript information

All authors are required to provide word count (excluding title page, abstract, tables/figures, figure legends, Acknowledgements, Conflict of Interest, and References), the Abstract word count, the number of Tables, and the number of Figures.

2.2. Abstract

The second page of the manuscripts should be the abstract and key words. It should be placed on second page of the manuscripts after the standard title written in upper and lower case letters, bold.

Since abstract is independent part of your paper, all abbreviations used in the abstract should also be explained in it. If an abbreviation is used, the term should always be first written in full with the abbreviation in parentheses immediately after it. Abstract should not have any special headings (e.g., Aim, Results...).

Authors should provide up to six key words that capture the main topics of the article. Terms from the Medical Subject Headings (MeSH) list of Index Medicus are recommended to be used.

Key words should be placed on the second page of the manuscript right below the abstract, written in italic. Separate each key word by a comma (and a space). Do not put a full stop after the last key word. *See example:*

Abstract

Results of the analysis of

Key words: *spatial memory, blind, transfer of learning, feedback*

2.3. Main Chapters

Starting from the third page of the manuscripts, it should be the main chapters. Depending on the type of publication main manuscript chapters may vary. The general outline is: Introduction, Methods, Results, Discussion, Acknowledgements (optional), Conflict of Interest (optional), and Title, Author's Affiliations, Abstract and Key words must be in English (for both each chosen language of full paper). However, this scheme may not be suitable for reviews or publications from some areas and authors should then adjust their chapters accordingly but use the general outline as much as possible.

2.3.1. Headings

Main chapter headings: written in bold and in Title Case. *See example:*

✓ **Methods**

Sub-headings: written in italic and in normal sentence case. Do not put a full stop or any other sign at the end of the title. Do not create more than one level of sub-heading. *See example:*

✓ *Table position of the research football team*

2.3.2 Ethics

When reporting experiments on human subjects, there must be a declaration of Ethics compliance. Inclusion of a statement such as follow in Methods section will be understood by the Editor as authors' affirmation of compliance: "This study was approved in advance by [name of committee and/or its institutional sponsor]. Each participant voluntarily provided written informed consent before participating." Authors that fail to submit an Ethics statement will be asked to resubmit the manuscripts, which may delay publication.

2.3.3 Statistics reporting

JASPE encourages authors to report precise p-values. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Use normal text (i.e., non-capitalized, non-italic) for statistical term "p".

2.3.4. 'Acknowledgements' and 'Conflict of Interest' (optional)

All contributors who do not meet the criteria for authorship should be listed in the 'Acknowledgements' section. If applicable, in 'Conflict of Interest' section, authors must clearly disclose any grants, financial or material supports, or any sort of technical assistances from an institution, organization, group or an individual that might be perceived as leading to a conflict of interest.

2.4. References

References should be placed on a new page after the standard title written in upper and lower case letters, bold.

All information needed for each type of must be present as specified in guidelines. Authors are solely responsible for accuracy of each reference. Use authoritative source for information such as Web of Science, Medline, or PubMed to check the validity of citations.

2.4.1. References style

JASPE adheres to the American Psychological Association 6th Edition reference style. Check "American Psychological Association. (2009). Concise rules of APA style. American Psychological Association." to ensure the manuscripts conform to this reference style. Authors using EndNote® to organize the references must convert the citations and bibliography to plain text before submission.

2.4.2. Examples for Reference citations

One work by one author

- ✓ In one study (Reilly, 1997), soccer players
- ✓ In the study by Reilly (1997), soccer players
- ✓ In 1997, Reilly's study of soccer players

Works by two authors

- ✓ Duffield and Marino (2007) studied
- ✓ In one study (Duffield & Marino, 2007), soccer players
- ✓ In 2007, Duffield and Marino's study of soccer players

Works by three to five authors: cite all the author names the first time the reference occurs and then subsequently include only the first author followed by et al.

- ✓ First citation: Bangsbo, Iaia, and Krustруп (2008) stated that
- ✓ Subsequent citation: Bangsbo et al. (2008) stated that

Works by six or more authors: cite only the name of the first author followed by et al. and the year

- ✓ Krustруп et al. (2003) studied
- ✓ In one study (Krustруп et al., 2003), soccer players

Two or more works in the same parenthetical citation: Citation of two or more works in the same parentheses should be listed in the order they appear in the reference list (i.e., alphabetically, then chronologically)

- ✓ Several studies (Bangsbo et al., 2008; Duffield & Marino, 2007; Reilly, 1997) suggest that

2.4.3. Examples for Reference list

Journal article (print):

Nepocatyč, S., Balilionis, G., & O'Neal, E. K. (2017). Analysis of dietary intake and body composition of female athletes over a competitive season. *Montenegrin Journal of Sports Science and Medicine*, 6(2), 57-65. doi: 10.26773/mjssm.2017.09.008

Duffield, R., & Marino, F. E. (2007). Effects of pre-cooling procedures on intermittent-sprint exercise performance in warm conditions. *European Journal of Applied Physiology*, 100(6), 727-735. doi: 10.1007/s00421-007-0468-x

Krustруп, P., Mohr, M., Amstrup, T., Rysgaard, T., Johansen, J., Steensberg, A., Bangsbo, J. (2003). The yo-yo intermittent recovery test: physiological response, reliability, and validity. *Medicine and Science in Sports and Exercise*, 35(4), 697-705. doi: 10.1249/01.MSS.0000058441.94520.32

Journal article (online; electronic version of print source):

Williams, R. (2016). Krishna's Neglected Responsibilities: Religious devotion and social critique in eighteenth-century North India [Electronic version]. *Modern Asian Studies*, 50(5), 1403-1440. doi:10.1017/S0026749X14000444

Journal article (online; electronic only):

Chantavanich, S. (2003, October). Recent research on human trafficking. *Kyoto Review of Southeast Asia*, 4. Retrieved November 15, 2005, from <http://kyotoreview.cseas.kyoto-u.ac.jp/issue/issue3/index.html>

Conference paper:

Pasadilla, G. O., & Milo, M. (2005, June 27). *Effect of liberalization on banking competition*. Paper presented at the conference on Policies to Strengthen Productivity in the Philippines, Manila, Philippines. Retrieved August 23, 2006, from <http://siteresources.worldbank.org/INTPHILIPPINES/Resources/Pasadilla.pdf>

Encyclopedia entry (print, with author):

Pittau, J. (1983). Meiji constitution. In *Kodansha encyclopedia of Japan* (Vol. 2, pp. 1-3). Tokyo: Kodansha.

Encyclopedia entry (online, no author):

Ethnology. (2005, July). In *The Columbia encyclopedia* (6th ed.). New York: Columbia University Press. Retrieved November 21, 2005, from <http://www.bartleby.com/65/et/ethnolog.html>

Thesis and dissertation:

Pyun, D. Y. (2006). *The proposed model of attitude toward advertising through sport*. Unpublished Doctoral Dissertation. Tallahassee, FL: The Florida State University.

Book:

Borg, G. (1998). *Borg's perceived exertion and pain scales*: Human kinetics.

Chapter of a book:

Kellmann, M. (2012). Chapter 31-Overtraining and recovery: Chapter taken from Routledge Handbook of Applied Sport Psychology ISBN: 978-0-203-85104-3 *Routledge Online Studies on the Olympic and Paralympic Games* (Vol. 1, pp. 292-302).

Reference to an internet source:

Agency. (2007). Water for Health: Hydration Best Practice Toolkit for Hospitals and Healthcare. Retrieved 10/29, 2013, from www.rcn.org.uk/newsevents/hydration

2.5. Tables

All tables should be included in the main manuscript file, each on a separate page right after the Reference section.

Tables should be presented as standard MS Word tables.

Number (Arabic) tables consecutively in the order of their first citation in the text.

Tables and table headings should be completely intelligible without reference to the text. Give each column a short or abbreviated heading. Authors should place explanatory matter in footnotes, not in the heading. All abbreviations appearing in a table and not considered standard must be explained in a footnote of that table. Avoid any shading or coloring in your tables and be sure that each table is cited in the text.

If you use data from another published or unpublished source, it is the authors' responsibility to obtain permission and acknowledge them fully.

2.5.1. Table heading

Table heading should be written above the table, in Title Case, and without a full stop at the end of the heading. Do not use suffix letters (e.g., Table 1a, 1b, 1c); instead, combine the related tables. *See* example:

✓ **Table 1.** Repeated Sprint Time Following Ingestion of Carbohydrate-Electrolyte Beverage

2.5.2. Table sub-heading

All text appearing in tables should be written beginning only with first letter of the first word in all capitals, i.e., all words for variable names, column headings etc. in tables should start with the first letter in all capitals. Avoid any formatting (e.g., bold, italic, underline) in tables.

2.5.3. Table footnotes

Table footnotes should be written below the table.

General notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here. General notes are designated by the word *Note* (italicized) followed by a period.

✓ *Note.* CI: confidence interval; Con: control group; CE: carbohydrate-electrolyte group.

Specific notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. ^{a,b,c}), and order the superscripts from left to right, top to bottom. Each table's first footnote must be the superscript ^a.

✓ ^aOne participant was diagnosed with heat illness and n = 19.^bn = 20.

Probability notes provide the reader with the results of the texts for statistical significance. Probability notes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || etc.

✓ *P<0.05, †p<0.01.

2.5.4. Table citation

In the text, tables should be cited as full words. *See* example:

- ✓ Table 1 (first letter in all capitals and no full stop)
- ✓ ...as shown in Tables 1 and 3. (citing more tables at once)
- ✓ ...result has shown (Tables 1-3) that... (citing more tables at once)
- ✓ ...in our results (Tables 1, 2 and 5)... (citing more tables at once)

2.6. Figures

On the last separate page of the main manuscript file, authors should place the legends of all the figures submitted separately.

All graphic materials should be of sufficient quality for print with a minimum resolution of 600 dpi. JASPE prefers TIFF, EPS and PNG formats.

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Figures and figure legends should be completely intelligible without reference to the text.

The price of printing in color is 50 EUR per page as printed in an issue of JASPE.

2.6.1. Figure legends

Figures should not contain footnotes. All information, including explanations of abbreviations must be present in figure legends. Figure legends should be written below the figure, in sentence case. *See* example:

- ✓ **Figure 1.** Changes in accuracy of instep football kick measured before and after fatigued. SR – resting state, SF – state of fatigue, * $p > 0.01$, † $p > 0.05$.

2.6.2. Figure citation

All graphic materials should be referred to as Figures in the text. Figures are cited in the text as full words. *See* example:

- ✓ Figure 1
 - × figure 1
 - × Figure 1.
 - ✓ ...exhibit greater variance than the year before (Figure 2). Therefore...
 - ✓ ...as shown in Figures 1 and 3. (citing more figures at once)
 - ✓ ...result has shown (Figures 1-3) that... (citing more figures at once)
 - ✓ ...in our results (Figures 1, 2 and 5)... (citing more figures at once)

2.6.3. Sub-figures

If there is a figure divided in several sub-figures, each sub-figure should be marked with a small letter, starting with a, b, c etc. The letter should be marked for each subfigure in a logical and consistent way. *See* example:

- ✓ Figure 1a
- ✓ ...in Figures 1a and b we can...
- ✓ ...data represent (Figures 1a-d)...

2.7. Scientific Terminology

All units of measures should conform to the International System of Units (SI).

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples.

Decimal places in English language are separated with a full stop and not with a comma. Thousands are separated with a comma.

Percentage	Degrees	All other units of measure	Ratios	Decimal numbers
✓ 10%	✓ 10°	✓ 10 kg	✓ 12:2	✓ 0.056
× 10 %	× 10 °	× 10kg	× 12 : 2	× .056

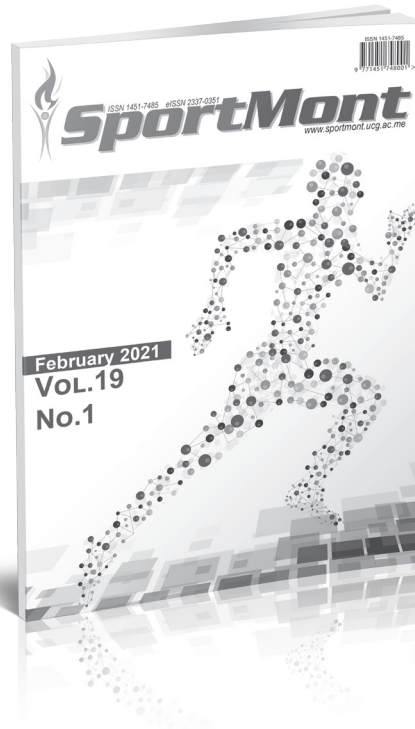
Signs should be placed immediately preceding the relevant number.

✓ 45±3.4	✓ p<0.01	✓ males >30 years of age
× 45 ± 3.4	× p < 0.01	× males > 30 years of age

2.8. Latin Names

Latin names of species, families etc. should be written in italics (even in titles). If you mention Latin names in your abstract they should be written in non-italic since the rest of the text in abstract is in italic. The first time the name of a species appears in the text both genus and species must be present; later on in the text it is possible to use genus abbreviations. See example:

✓ First time appearing: *musculus biceps brachii*
Abbreviated: *m. biceps brachii*



ISSN 1451-7485

Sport Mont Journal (SMJ) is a print (ISSN 1451-7485) and electronic scientific journal (eISSN 2337-0351) aims to present easy access to the scientific knowledge for sport-conscious individuals using contemporary methods. The purpose is to minimize the problems like the delays in publishing process of the articles or to acquire previous issues by drawing advantage from electronic medium. Hence, it provides:

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- Fast publication time;
- Peer review by expert, practicing researchers;
- Post-publication tools to indicate quality and impact;
- Community-based dialogue on articles;
- Worldwide media coverage.

SMJ is published three times a year, in February, June and October of each year. SMJ publishes original scientific papers, review papers, editorials, short reports, peer review - fair review, as well as invited papers and award papers in the fields of Sports Science and Medicine, as well as it can function as an open discussion forum on significant issues of current interest.

SMJ covers all aspects of sports science and medicine; all clinical aspects of exercise, health, and sport; exercise physiology and biophysical investigation of sports performance; sport biomechanics; sports nutrition; rehabilitation, physiotherapy; sports psychology; sport pedagogy, sport history, sport philosophy, sport sociology, sport management; and all aspects of scientific support of the sports coaches from the natural, social and humanistic side.

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EVROPSKA GRAĐANSKA PERSPEKTIVA

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EAPA-BCH

SCIENTIFIC PROJECT

Efekti autofagije i fizičke aktivnosti na tjelesnu kompoziciju, indeks tjelesne mase, stres, zdravstveno ponašanje, kognitivne sposobnosti i društvenu uključenost starijih osoba

(Projekat finansiran od strane Ministarstva nauke, direktorijata za mlade, a koji sprovodi Fakultet za sport i fizičko vaspitanje Univerziteta Crne Gore)

Glavni cilj projekta je da se primjenom naprednih praksi utvrde efekti autofagije i fizičke aktivnosti na tjelesnu kompoziciju, indeks tjelesne mase, trenutni nivo doživljaja stresa, zdravstveno ponašanje, kognitivne sposobnosti i nivo društvene uključenosti starijih osoba.

Projekat ima i svoj radni dio koji podrazumijeva organizovanje besplatnog vježbanja starijim osobama 3 puta nedeljno u trajanju od 6 mjeseci.

Učesnici mogu biti sve osobe iznad 50 godina a prijave se primaju na mail adresu fakultetzasportnk@ucg.ac.me i telefon fakulteta +38240235207. Svi su koji žele da uzmu aktivno učešće u ovom projektu koji njima može unaprijediti život, a naučnoj zajednici Crne Gore može donijeti značajna teorijska znanja koja će se u budućnosti koristiti u praktične svrhe su dobrodošli.

Svim učesnicim će na početku biti ponuđena najsavremenija dijagnostika, koja će im pružiti uvid u vlastito zdravstveno stanje, kako fizičko tako i kada su neki psihološki parametri u pitanju. Nakon toga će učesnici biti prema sopstvenim interesovanjima podijeljeni u grupe koje će raditi prema različitim programima.

1. Prva grupa će vježbati 3 puta nedeljno 6 mjeseci u prostorijama Fakulteta za sport i fizičko vaspitanje.

2. Druga će samo primjenjivati izmijenjeni način ishrane i voditi tačnu evidenciju o stepenu poštovanja zadataka koji im se postave. Ishrana će biti takva da se napravi pauza u unošenju hrane u trajanju 16 sati između poslednjeg dnevnog obroka i prvoga obroka u sledećem danu, a sve u cilju pokretanja procesa Autofagije koji ima blagotvorno dejstvo na organiza.

3. Treća grupa će kombinovati vježbanje i izmijenjenu ishranu, tj. biće kombinacija prethodno pomenutih zadataka.

4. Četvrta grupa će biti kontrolna. Njeni članovi će proći dijagnostiku i pomoći da se utvrdi kakve su prirodne promjene u organizmu za pomenuti šestomjesečni period, odnosno da li ih ima.

Svim prijavljenim osobama, koje imaju interesovanje za to, će prije početka rada biti održana dva predavanja o pomenutom izmijenjenom načinu ishrane koji danas postaje sve popularniji u svijetu pa ga primjenjuju i vrhunski sportisti poput Novaka Đokovića.

Još jednom treba napomenuti da će svaka od 4 grupe na poklon dobiti najsavremeniju dijagnostiku kompletnog psihofizičkog stanja koja je inače i nedostupna i skupa.

Prijavlivanje može da počne odmah, broj učesnika za grupe koje bi vježbale u prostorijama fakulteta je ograničen.



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MONTENEGRIN SPORTS ACADEMY

Founded in 2003 in Podgorica (Montenegro), the Montenegrin Sports Academy (MSA) is a sports scientific society dedicated to the collection, generation and dissemination of scientific knowledge at the Montenegrin level and beyond.

The Montenegrin Sports Academy (MSA) is the leading association of sports scientists at the Montenegrin level, which maintains extensive co-operation with the corresponding associations from abroad. The purpose of the MSA is the promotion of science and research, with special attention to sports science across Montenegro and beyond. Its topics include motivation, attitudes, values and responses, adaptation, performance and health aspects of people engaged in physical activity and the relation of physical activity and lifestyle to health, prevention and aging. These topics are investigated on an interdisciplinary basis and they bring together scientists from all areas of sports science, such as adapted physical activity, biochemistry, biomechanics, chronic disease and exercise, coaching and performance, doping, education, engineering and technology, environmental physiology, ethics, exercise and health, exercise, lifestyle and fitness, gender in sports, growth and development, human performance and aging, management and sports law, molecular biology and genetics, motor control and learning, muscle mechanics and neuromuscular control, muscle metabolism and hemodynamics, nutrition and exercise, overtraining, physiology, physiotherapy, rehabilitation, sports history, sports medicine, sports pedagogy, sports philosophy, sports psychology, sports sociology, training and testing.

The MSA is a non-profit organization. It supports Montenegrin institutions, such as the Ministry of Education and Sports, the Ministry of Science and the Montenegrin

Olympic Committee, by offering scientific advice and assistance for carrying out coordinated national and European research projects defined by these bodies. In addition, the MSA serves as the most important Montenegrin and regional network of sports scientists from all relevant sub-disciplines.

Over the years the Montenegrin Sports Academy (MSA) has established a productive pool of vital partnerships within the sports science related industry. Apart from two-way visibility, these partnerships provide mutual exchange of scientific research and competence.

Most of the MSA activities and services it provides would not be possible without the continuous support of its partners.

The Montenegrin Sports Academy very much appreciates the support of:

- Ministry of Science of Montenegro
- Ministry of Education of Montenegro
- Ministry of Health of Montenegro
- University of Montenegro
- Montenegrin Olympic Committee
- Institute of Public Health of Montenegro
- European College of Sports Science
- Volleyball Federation of Montenegro
- Faculty for Sport and Physical Education a University of Montenegro
- Athletic Federation of Montenegro
- Regional Diving Center
- Karate Federation of Montenegro
- Karate club "Budućnost"
- Football Club "Sutjeska"
- Football Club "Mladost"
- Water Polo and Swimming Association of Montenegro

The main scientific event organized by the Montenegrin Sports Academy (MSA) is the annual conference held in the first week of April.

Annual conferences have been organized since the inauguration of the MSA in 2003. Today the MSA conference ranks among the leading sports scientific congresses in the Western Balkans. The conference comprises a range of invited lecturers, oral and poster presentations from multi- and mono-disciplinary areas, as well as various types of workshops. The MSA conference is attended by national, regional and international sports scientists with academic careers. The MSA conference now welcomes up to 200 participants from all over the world.

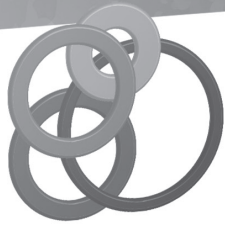


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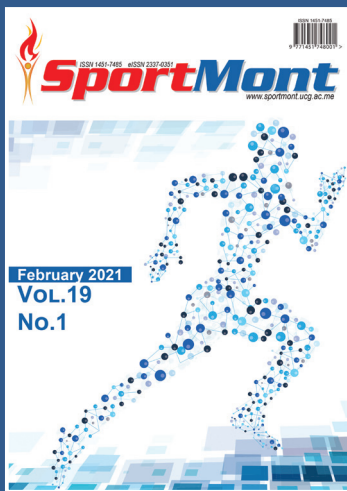
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Sports Science and Medicine Journals from Montenegrin Sports Academy

We have expanded the quality of our journals considerably over the past years and can now claim to be the market leader in terms of breadth of coverage.

As we continue to increase the quality of our publications across the field, we hope that you will continue to regard MSA journals as authoritative and stimulating sources for your research. We would be delighted to receive your comments and suggestions, mostly due to the reason your proposals are always welcome.

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