Scientific Journal UDK 796/799 • ISSN 1821-2077 • e-ISSN 2620-0155

SPORT SCIENCE & PRACTICE

The Journal publishes original scientific and professional papers, review articles and patents from the following areas

Sports Theory
Methodology
Sports Psychology
Sports Sociology
Sports Training
Biomechanics
Kinesitherapy
Sports Medicine
Recreation
Fitness and Wellness
Management in Sports
Marketing in Sports
School Sports
Preschool Sports

The scientific journal SPORT – SCIENCE AND PRACTICE, founded in 2009 by decision
of the Board of Directors of the College of Sports and Health from Belgrade

UDK 796/799 • ISSN 1821-2077 • e-ISSN 2620-0155

Publisher

College of Sports and Health
Toše Jovanovića 11, Belgrade, Serbia
Tel. +381 11 7550 051
skola@vss.edu.rs; https://vss.edu.rs/

Editing and proofreading

Nada Šironja, B.A.

Translation into English

Katarina Ćirić, MA, College of Sports and Health, Belgrade, Serbia

Online Journal

http://sportnaukaipraksa.vss.edu.rs
Open source journal

Published semiannually

Scientific Journal

SPORT – Science & Practice

Vol. 13, №1 **June 2023**

Content

SPORT - Science & Practice, Vol. 13, №1, 2023, pp. 1-6.

Original scientific paper **CC BY**

MOVEMENT BEHAVIOURS OF PRESCHOOL CHILDREN IN BOSNIA AND HERZEGOVINA [1] [2]

UDK: 796.012.1-053.4-055.1/.3(497.6)
DOI: 10.5937/snp13-1-45165

Edin Užičanin[3]
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Dževad Džibrić
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Muris Đug
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Fuad Babajić
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Tarik Huremović
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Amra Nožinović Mujanović
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Edin Mujanović
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Sanjin Hodžić
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Jasmin Bilalić
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Almir Atiković
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Abstract: The World Health Organization (WHO) released guidelines for physical activity, sedentary behaviour, and sleep for children under 5 years of age in 2019. In response to these guidelines, this study aimed to determine the proportion of preschool children (ages 3-5 years) who met the WHO guidelines. The time spent in physical activity, sedentary behaviour and sleep were objectively measured using accelerometer (ActiGraph wGT3x-BT). Screen time and sleep quality were assessed via parent questionnaire. Focus groups were con-

[1] The paper was received on June 23, 2023 and accepted for publication on June 29, 2023.
[2] The paper was presented under the same title at the 5th International Scientific Conference "Sport, Recreation, Health", organized by the College of Sports and Health from Belgrade on May 19, 2023.
[3] ✉ edin.uzicanin@untz.ba

ducted with parents and childcare staff to determine the feasibility of the protocol. The results showed that only 23% of the children met all three guidelines, and compliance rates varied for each guideline. The physical activity time guideline was met by 64% of children, the sleep duration guideline was met by 74% of children, and the screen time guideline was met by 53% of children. Only a low proportion of children met the WHO guidelines. The methods and devices used in this pilot study proved to be feasible and this has paved the way to conduct the main SUNRISE study in Bosnia and Herzegovina.

Keywords: *movement behaviours, preschool children, screen time, sleep, sedentary behaviour*

INTRODUCTION

The worldwide outbreak of childhood obesity continues to pose a significant challenge to public health. Over the course of four decades, the number of girls and boys affected by obesity has surged from 5 million to 50 million and from 6 million to 74 million, respectively (NCD-RisC, 2017). The repercussions of childhood obesity are grave, including heightened likelihood of adult obesity and other health complications (Park et al., 2012; Ward et al., 2017).

Physical inactivity is recognized as a significant contributor to the prevalence of obesity. Previous research has established positive correlations between healthy levels of physical activity, screen time, sleep, and adiposity in middle and late childhood. Recently, systematic reviews have focused on the relationship between these factors in early childhood, as movement behaviours may persist from this period into middle or late childhood (Malina, 1996; Janz et al., 2005). These reviews have indicated either favourable or neutral associations. However, the majority of studies have been conducted in high or upper-middle-income countries, with limited data available from less-developed nations.

In addition to impacting their immediate health and quality of life, children who suffer from obesity are also at an increased risk of developing various non-communicable diseases, including diabetes, cardiovascular diseases, hypertension, stroke, and cancer (Park et al., 2012; Hu, 2008). Furthermore, obesity during childhood often persists into adolescence and adulthood, leading to chronic illness and premature death (Ward et al., 2017).

The World Health Organization (WHO) issued global guidelines in 2019 for children under the age of five concerning movement behaviours. The guidelines suggest that children aged three and four should engage in 180 minutes of physical activity, out of which 60 minutes should be of moderate to vigorous intensity (WHO, 2019). Additionally, they should limit their sedentary screen time to no more than one hour and strive to get 10 to 13 hours of quality sleep. The guidelines were developed based on systematic reviews conducted in this age group. Since their release, several studies have evaluated the prevalence of adherence to these guidelines and their correlation with adiposity and other health indicators (Chaput et al., 2017; Berglind et al., 2018; Draper et al., 2020; Tanaka et al., 2020).

Against this backdrop, this study endeavours to determine the proportion of Bosnian pre-schoolers who adhere to the WHO global guidelines and to explore the associations between guideline adherence, obesity, and motor development in this group of young children.

METHOD

Study setting and participants

The study was conducted in eight preschools in the city of Tuzla and Tuzla Canton: five preschools were in an urban area three in a rural-like setting (less-developed part of Tuzla Canton). The principal of each preschool was contacted, informed, and permission was granted for the study. The parents of eligible children were contacted through preschool class teachers to participate in the study. Interested parents were gathered in a hall room of the respective preschool. A team of ten data collectors (professors from the Faculty of Physical Education and Sport) was involved, conducting various measurements (height, weight, executive functions, and motor skills) and plac-

ing accelerometers on children. The purpose of the study was explained to the parents. Once the parents provided informed written consent, children aged between 3 and 5 took part in the study. Each preschool supported to make an arrangement in case a participating child became unsettled during the study.

The study was conducted between December 2022 and March 2023. All data collectors underwent extensive training prior to conducting field-level data collection. The parents/caregivers were asked to complete a questionnaire (in the local language) which provided demographic information for both the parent/caregiver and the child, as well as the movement behaviours of their child, within five days while the children wore accelerometers.

Measures and procedures

Anthropometrics

The height of the children was measured using a portable anthropometer (Martin Type Anthropometer) and the weight was measured barefoot using a digital scale (EGER www.eger.com). All measurements were taken twice and an average was used for analysis.

Accelerometry

Children's movements were assessed using Actigraph GT3X+ accelerometers following the evidence-guided recommendation (Cliff et al., 2009). The devices were attached to an elastic belt and positioned on the right side of the child's body, just above the iliac crest. The sampling intervals, or epochs, were set at 15s and the sampling rate at 30Hz. The children, their teachers, and their parents were instructed to keep the accelerometers continuously on their waist for at least 72 h and only remove them for any water-based activities. The children and their parents were asked to make sure the children wear the accelerometers for 5 days.

Children who had at least one full day of 'valid' data were included in the later analysis. A valid day (i.e. 24 h) of data was confirmed by visual inspection of the acceleration graph via the ActiLife 6 software to ensure there were acceleration peaks throughout the monitoring days. Sleep time and non-wear time were excluded from the analysis. Sleep time was predetermined based on the average parent-reported wake-up time and bedtime of the sample. Non-wear time was defined as > 20 min of consecutive zero counts during waking hours. This included the time when the monitor was taken off for water activities and daytime naps. The final time was used to calculate the time spent in total physical activity (TPA), sedentary behaviour (SB), light physical activity (LPA), and moderate to vigorous physical activity (MVPA).

Sleep, screen-time, and sedentary activities

A self-administered parent questionnaire was used to assess sedentary screen time, sleep time, and demographic characteristics. Screen time was reported in hours and minutes, for example: "In 24 h in the past week, how much time did your child who is participating in this study spend using any electronic screen device (e.g., smartphone, tablet, video game) or watching television or movies, videos on the Internet while they were sitting or lying down?" Sleep time was reported in hours and minutes, for example: "How many hours of sleep does this child get in a typical 24-h day (including naps)?" The times to go to bed and wake up were included in order to exclude sleep time from the accelerometer data. The parents also reported the time spent outside, screen time and the use of screens before bedtime; the time spent restrained (strapped and unable to move), and the time spent sitting.

Sample size

According to the study protocol, the primary aim of this study was to determine the feasibility of recruiting children from urban and rural settings. In this study we had a sample of 115 children, 65 from urban and 50 from rural area.

Data analysis

All statistical analyses were performed using SPSS Statistics for Windows version 26.0 (IBM Corp, Armonk, NY). Descriptive statistics (mean and standard deviation) were calculated for all study variables. T-test for independent sample was conducted to examine differences in movement behaviours between the sexes and residential settings..

RESULTS

The study analysed a final sample of 115 child/parent pairs (52 boys and 63 girls) from urban (n = 66) and rural (n = 49) areas.

The results of the accelerometry are presented in Table 1. According to the findings, boys exhibited a significantly higher level of physical activity than girls (SED, p<0.009; MPA, p<0.007; VPA, p<0.007, and MVPA, p<0.004). However, there was no significant difference in physical activity levels between urban and rural children.

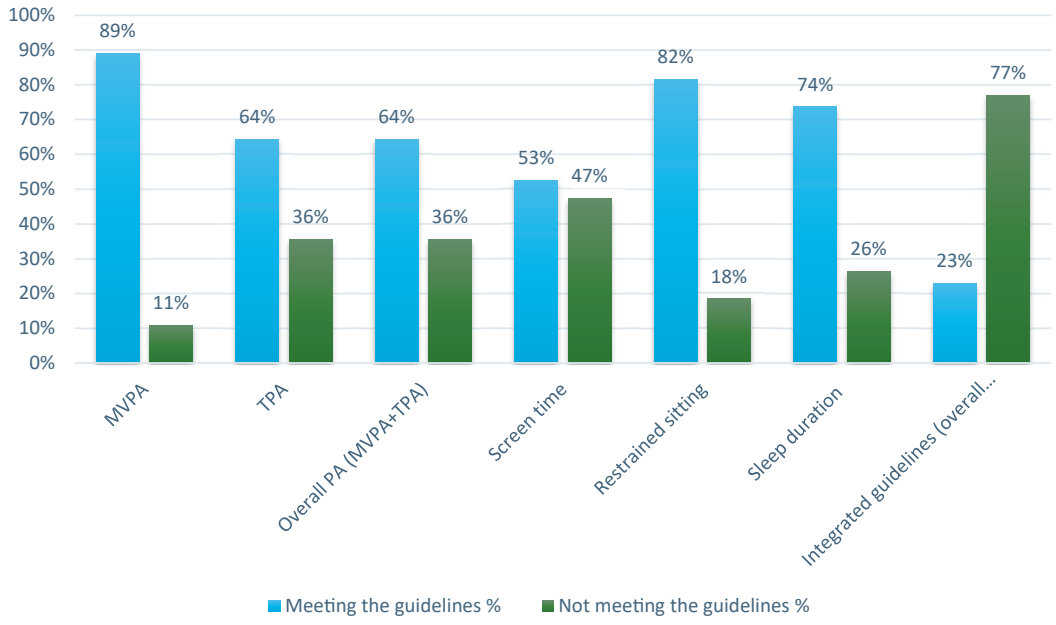
Table 1. *Accelerometry by sex and area*

	Total (n = 101)	Boys (n = 46)	Girls (n = 55)	p value ¥	Rural (n = 42)	Urban (n = 59)	p value ≠
SED (min/d)	622.0 ± 48.3	608.3 ± 48.5	633.4 ± 45.4	.009*	623.6 ± 6.0	620.8 ± 7.04	.770
LPA (min/d)	97.4 ± 16.5	98.7 ± 18.1	96.3 ± 15.0	.476	17.3 ± 2.6	15.9 ± 2.0	.510
MPA (min/d)	70.5 ± 18.9	76.0 ± 20.7	65.9 ± 16.0	.007*	15.7 ± 2.4	20.8 ± 2.7	.269
VPA (min/d)	24.1 ± 13.3	28.0 ± 15.3	20.8 ± 10.4	.007*	10.4 ± 1.6	25.8 ± 1.9	.136
MVPA (min/d)	94.6 ± 30.5	104.0 ± 34.2	86.8 ± 24.7	.004*	23.5 ± 3.6	34.4 ± 4.4	.181
TPA (min/d)	192.0 ± 41.2	202.7 ± 45.5	183.1 ± 35.2	.017	35.2 ± 5.4	44.7 ± 5.8	.210

Data are presented as mean ± SD for normally distributed data; * significance at p < 0.05; ¥p value for comparison by sex; ≠p value for comparison by area. SED, sedentary behaviour; LPA, light-intensity physical activity; MPA, moderate-intensity physical activity; VPA, vigorous-intensity physical activity; MVPA, moderate-to-vigorous-intensity physical activity; TPA, total physical activity

The number of children meeting the different components of the 24-hour movement guidelines is presented in Figure 1. The proportion of children meeting the physical activity (MVPA + TPA) guidelines was 64%, while the screen time and sleep guidelines were met by 53% and 74% of the sample, respectively. When considering all three guidelines together, only 23% of the sample met the integrated guidelines.

Figure 1. *Proportion of children meeting 24-hour movement guidelines*



DISCUSSION

This study investigated the compliance of Bosnian pre-schoolers with the World Health Organization (WHO) guidelines on movement behaviours. The results showed that only 23% of the children met all three guidelines, with 64%, 74% and 53% complying with the guidelines on physical activity time, sleep duration, and screen time, respectively. This study is the first to provide a comprehensive overview of the movement behaviours of Bosnian pre-schoolers, using an objective assessment of physical activity. Previous studies have reported similarly low compliance rates with the guidelines, ranging from 12.7% to 26%.

The proportion of children meeting the physical activity time guideline in this sample was 64%, similar or lower than the results reported in studies conducted in Canada (61.8%), Australia (89%), China (64.5%), Japan (75.4%), South Africa (84%), and higher than in Vietnam (50.4%) (Hinkley et al., 2020).

Although up to 89% of children in this study met the recommended 60 minutes of moderate-to-vigorous physical activity (MVPA), they only spent an average of 1.6 hours in LPA, much lower than the 3.75 hours, 3.5 hours, or 2.1 hours reported in Chinese, Canadian, and South African samples, respectively.

The study reported a high proportion of children meeting the sleep guideline - 74%, consistent with findings in Canada (83.9%) and Australia (93%) (Chaput et al., 2017; Matarma et al., 2018). In contrast, for screen time, only 53% of the sample met the guideline, which was considerably higher than the rates observed in Canada (24.4%), Australia (23%), and Japan (15.9%) (Chaput et al., 2017; Tanaka et al., 2020; Hinkley et al., 2020).

One of the key strengths of this study is the use of the 24-hour objective physical activity assessment of preschool children, which is uncommon in low-and middle-income countries. Furthermore, early motor development, a significant health indicator, was measured in the study.

The main limitation of this study is its small sample size and the lack of national representativeness of the study settings. In addition, screen time and sleep duration were assessed subjectively through parent questionnaires. However, the research sites were able to engage the community and facilitate data collection and address other methodological considerations.

CONCLUSIONS

The study examined the compliance of Bosnian pre-schoolers with the World Health Organization guidelines on movement behaviours, focusing on physical activity time, sleep duration, and screen time. The results showed that only 23% of the children met all three guidelines, and compliance rates varied for each guideline. However, the study's small sample size and lack of national representativeness were limitations. The findings highlight the need to promote healthy movement behaviours among Bosnian pre-schoolers.

REFERENCES

1. Berglind, D., Ljung, R., Tynelius, P., & Brooke, H.L. (2018). Cross-sectional and prospective associations of meeting 24-h movement guidelines with overweight and obesity in preschool children. *Pediatr Obes, 13*(7), 442–449.
2. Chaput, J-P., Colley, R.C., Aubert, S., Carson, V., Janssen, I., Roberts, K.C., & Tremblay, M.S. (2017). Proportion of preschoolaged children meeting the Canadian 24-Hour Movement Guidelines and associations with adiposity: results from the Canadian Health Measures Survey. *BMC Public Health, 17*(Suppl 5), 829.
3. Cliff, D.P., Reilly, J.J., & Okely, A.D. (2009). Methodological considerations in using accelerometers to assess habitual physical activity in children aged 0–5 years. *J Sci Med Sport, 12*(5), 557–567.
4. Draper, C.E., Tomaz, S.A., Cook, C.J., Jugdav, S. S., Ramsammy, C., Besharati, S., A van Heerden, Vilakazi, K., Cockcroft, K., Howard, S.J., & Okely, A.D. (2020). Understanding the influence owf 24-hour movement behaviours on the health and development of preschool children from low-income South African settings: the SUNRISE pilot study. *S Afr J Sports Med, 32*(1), 1–7.
5. Hinkley, T., Timperio, A., Watson, A., Duckham, R.L., Okely, A.D., Cliff, D., Carver, A., & Hesketh, K.D. (2020). Prospective associations with physiological, psychosocial and educational outcomes of meeting Australian 24-Hour Movement Guidelines for the Early Years. *Int J Behav Nutr Phys Act, 17*, 36.
6. Hu, F. (2008). *Obesity epidemiology*. NewYork: Oxford University Press, 301-319.
7. Janz, K.F., Burns, T.L., & Levy, S.M. (2005). Tracking of activity and sedentary behaviours in childhood: the Iowa Bone Development Study. *Am J Prev Med, 29*(3), 171–178.
8. Malina, R.M. (1996). Tracking of physical activity and physical fitness across the lifespan. *Res Q Exerc Sport, 67*(3 Suppl), S48-57.
9. Matarma, T., Lagstrom, H., Hurme, S., Tammelin, T.H., Kulmala, J., Barnett, L.M., & Koski, P. (2018). Motor skills in association with physical activity, sedentary time, body fat, and day care attendance in 5-6-year-old children - The STEPS Study. *Scand J Med Sci Sports, 28*(12), 2668–2676.
10. NCD Risk Factor Collaboration (NCD-RisC). (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *Lancet, 390*(10113), 2627–2642.
11. Park, M.H., Falconer, C., Viner, R.M., & Kinra, S. (2012). The impact of childhood obesity on morbidity and mortality in adulthood: a systematic review. *Obes Rev, 13*(11), 985–1000.
12. Tanaka, C., Okada, S., Takakura, M., Hasimoto, K., Mezawa, H., Ando, D., Tanaka, S., & Okely, A. (2020). Relationship between adherence to WHO "24-Hour Movement Guidelines for the Early Years" and motor skills or cognitive function in preschool children: SUNRISE pilot study. *Jpn J Phys Fitness Sports Med, 69*(4), 327–333.
13. Ward, Z.J., Long, M.W., Resch, S.C., Giles, C.M., Cradock, A.L., & Gortmaker, S.L. (2017). Simulation of growth trajectories of childhood obesity into adulthood. *N Engl J Med, 377*(22), 2145–2153.
14. World Health Organization. (2019). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. Geneva: World Health Organization, 1-22.

SPORT - Science & Practice, Vol. 13, №1, 2023, pp. 7-12.

Original scientific paper **CC BY**

INFLUENCE OF PREVIOUS MOTOR EXPERIENCE ON ATTITUDES ABOUT SERVICE-LEARNING AMONG STUDENTS [1] [2]

UDK: 796.012.1-057.874
378.147:796
DOI: 10.5937/snp13-1-44821

Đurđica Miletić[3]
Faculty of Kinesiology, University of Split, Croatia

Ivana Jadrić
University of Split, Croatia

Alen Miletić
Faculty of Kinesiology, University of Split, Croatia

Abstract: Service-Learning (SL) as a growing innovative pedagogical model, has recently become more popular in higher education area dedicated to physical activity. Since physical education (PE) students are oriented toward society, it is extremely important for them to develop a sense of connection and responsibility toward society during their studies. This research was carried out on a sample of 58 students of a PE study program, aged between 20 and 22. The first step of the research was to determine six different groups of students using the poly-structured interview about their previous motor experience while considering the type of activity, the length of time engaged in a certain activity and the level of motor skills. Six investigated groups were formed according to their dominant previous motor activity: artistic and aesthetic activities, society-oriented recreational activities, self-directed recreational activities, team sports, individual sports, and martial arts. In order to determine the students' perception of SL Benefits, the SELEB questionnaire was used. The original 27 items generated for the SELEB scale that measure the benefit categories were divided into six categories: civic responsibility, interpersonal skills, leadership ability, ability to apply knowledge, general life skills and critical thinking. One-way Analysis of Variance was used to analyse the differences in investigated groups defined by previous motor experience on SL attitudes among students. The results showed significant differences between groups in SL experience ($F_{5,52} = 3{,}19$; $p=0{,}014$). The highest value on the SELEB scale was recorded in the group with dominant artistic and aesthetic activities, and the lowest value on the SELEB scale was recorded in a group with dominant previous experience in individual sports. Significant differences were determined with the post-hoc Tukey HSD test between groups with minimal previous experience in individual sports and groups with dominant previous experience in society-oriented recreational activities, team sports, and artistic/aesthetic activities.

Keywords: *SELEB scale, Sustainable Development Goals, physical activities*

[1] The paper was received on May 28, 2023, edited on July 7, 2023, accepted for publication on July 12, 2023.
[2] The paper was presented under the same title at the 5th International Scientific Conference "Sport, Recreation, Health", organized by the College of Sports and Health from Belgrade on May 19, 2023.
[3] ✉ durdica.miletic@kifst.eu

INTRODUCTION

Physical education at the university level is constantly developing in accordance with the modern goals of education toward inclusion. Since physical education is at its origin oriented towards global health, which implies sustainable development goal (SDG) number 3 (global health and well-being), it is not unusual that other methods lead to convergence towards listening to the needs of society, integrated at the university level of physical education. One of the possible tools is a service-learning (SL) method, which has recently gained significant acceptance among universities. Since physical education students are oriented toward developing a sense of connection and responsibility towards society during their studies, service-learning seems to fit their learning requirements (Herold & Waring, 2018). Francisco-Garcés et al. (2022) reported on the exponential uptake of the implementation of service-learning at the universities, among others, in the field of physical activity and sport (PAS), but they also pointed out the need to improve the quality of research in this field. The main focus of this new, innovative teaching method is challenge-based learning and the fact that learning is based on real-world problems and practices. It meets today's needs because using this tool, students are learning how to act proactively, work in teams with students from other study areas and react to social incites and problems (Jadrić et al., 2022). According to Warren (2012), the rise of service-learning has sparked great interest among educators at all educational levels and academic disciplines, including physical education. This approach brings interdisciplinary student-cantered collaboration opportunities and a tool integrated with real-world examples. As major advantages of service-learning in the educational process, authors point out the following: the acquisition of necessary academic and personal skills (Hébert & Hauf, 2015), the development of critical thinking (Flinders, 2013), teamwork (Pazos et al., 2020) and the enhancement of interpersonal and human-relations skills (Prentice & Garcia, 2010). Also, the level of self-efficacy and social development of students who participated in the service-learning experience is higher, and students become aware of social problems and expand their network of social contacts. There are numerous different previous studies that deal with the problem of measuring the effects and benefits of service learning. Marco-Gardoqui et al. (2020) analysed the results among more than 4,000 students involved in service-learning activities as part of a systematic review of the published literature on the benefits of applying the service-learning methodology to business students. They reported that students see a number of effects after participating in a service-learning experience, with the most common outcome being greater social engagement. Larsen (2017) also stated that service-learning experiences would benefit student learning outcomes. For example, SL experiences increase students' civic responsibility, the sense of efficacy, and professional and interpersonal skills. However, the literature analysing the benefits of applying learning activities among physical education students is still limited.

One of the possible tools that can be used for measuring the benefits of the SL is the SELEB scale. It arose out of the need to identify benefits associated with the acknowledgement that students are likely to perceive a wide range of potential benefits from service-learning. Toncar et al. (2006) developed a scale called SELEB, which they judged to be useful for assessing the quality and efficiency of service-learning initiatives from the student's perspective. The title of the scale SELEB was created by a combination of key letters **SE**rvice **LE**arning **B**enefit (SELEB) and primarily refers to the measurement of the benefits that service-learning brings to students. The final scale consists of 27 items representing six core dimensions of the benefit categories: civic responsibility, interpersonal skills, leadership ability, ability to apply knowledge, general life skills and critical thinking. Accordingly, the scale can be used to develop specific service-learning goals, to measure how effectively those goals are being met, and to change project-specific aspects in response to student input. For the benefit of physical education students, by providing a way to measure student perceptions of service-learning experiences, the SELEB scale can help educators and researchers better understand the impact of service-learning on student learning outcomes and personal development.

The main goal of this research is to determine which of the six examined groups based on previous motor experience (artistic and aesthetic activities, society-oriented recreational activities, independent recreational activities, team sports, individual sports and martial arts) will best influence students' service-learning activities (civic responsibility, interpersonal skills, leadership ability, ability to apply knowledge, general life skills and critical thinking) defined by the SELEB scale.

METHOD

Sample of subjects

This research was carried out on a sample of 58 students of a PE study program, aged between 20 and 22. The participants became familiar with service-learning activities through their study program. Participation in the study was voluntary and the participants were informed that they could withdraw at any time. This research was implemented as a pilot study that provides an introductory picture of the issue of introducing service-learning into the education of kinesiology students.

Data collection

The first phase of the research was to identify research groups based on the subject's previous experience regarding motor skills. Using the poly-structured interview the same investigator examined all 58 students in order to determine the type of their dominant previous sports or other motor activity. After the three dominant lifetime motor skills were determined, each student determined their own level of motor skills mastery on a scale from 1 to 3. Level 3 denotes a professional level of motor skill mastery such as athletes with international competition experience. Level 2 denotes moderate but still significant motor skill mastery. Level 1 denotes motor skill mastery on an amateur or basic level. According to the information obtained, the groups of students were determined based on the type and level of their previous physical activity experience or motor skill mastery. The six investigated groups were formed according to their dominant previous motor activity: artistic and aesthetic activities, society-oriented recreational activities, self-directed recreational activities, team sports, individual sports, and martial arts. The participants from all groups were given basic information and instructions regarding: a) basic information on the study and the study objectives, b) basic information on the questionnaire being conducted and the way to fill out the questionnaire, as well as anonymity in the interpretation of results.

Variables

In the second phase of the experiment, students were asked to fill out the SELEB questionnaire. In order to identify the benefits that SL brings to students, Toncar et al. (2006) developed a questionnaire with the aim to identify the benefits of service-learning activities, consisted of six factors: civic responsibility, interpersonal skills, leadership ability, critical thinking, ability to apply knowledge and general life skills. Six factors were covered with a list of the 27 items that captured the range of benefits reported in prior literature. Subjects were asked to indicate how important each of the 27 items was to their educational experience, using a seven-point Likert scale anchored by "not at all important" and "very important."

Statistical procedures

One-way Analysis of Variance was used to analyse the differences in six investigated groups defined by their previous motor experience: artistic and aesthetic activities (U), society-oriented recreational activities (RS), self-directed recreational activities (RI), team sports (G), individual sports (I), and martial arts (B); and the students' attitudes on SL defined by six factors of SELEB scale (civic responsibility, interpersonal skills, leadership ability, critical thinking, ability to apply knowledge, and general life skills). The post-hoc Tukey HSD test was used to determine significant differences between means. The significance level was set at $p<0.05$.

RESULTS

Firstly, descriptive statistics was calculated for analysing and comparing the subscales of SELEB. The mean values and standard deviations of the participants scored on the SELEB sub-scales, on the overall subject sample are shown in Table 1. All six sub-scales were tested (critical thinking, civic responsibility, interpersonal skills, leadership ability, ability to apply knowledge, and general life skills). The highest mean was detected at the sub-scale ability to apply knowledge and the lowest at the sub-scale general life skills. Basic statistical parameters show satisfactory dispersion of sub-scale distributions.

Table 1. *Descriptive statistics of SELEB sub-scales*

N=58	*Min*	*Max*	*Mean*	*SD*	*Skew*	*Kurt*
Critical thinking	3.00	7.00	5.67	1.13	-.60	-.23
Civic responsibility	3.00	7.00	5.63	.76	-.77	1.34
Interpersonal skills	2.40	7.00	5.69	.91	-.97	1.57
Leadership ability	3.25	7.00	5.70	.79	-.70	.57
Ability to apply knowledge	3.33	7.00	5.96	.84	-1.21	1.29
General life skills	3.00	6.30	4.92	.74	-.65	.24
SELEB	3.74	7.00	5.65	.69	-.59	.14

In order to determine which of the six research groups will best correlate with students' service-learning attitudes, the one-way Analysis of Variance (one-way ANOVA) was used (Image 1). The post-hoc Tukey HSD test was conducted to determine significant differences between means (Table 2). According to the post-hoc Tukey HSD test, significant differences were noticed between the artistic and aesthetic activities research sub-group and individual sports sub-group in favour of the artistic and aesthetic activities research sub-group (p = 0.02).

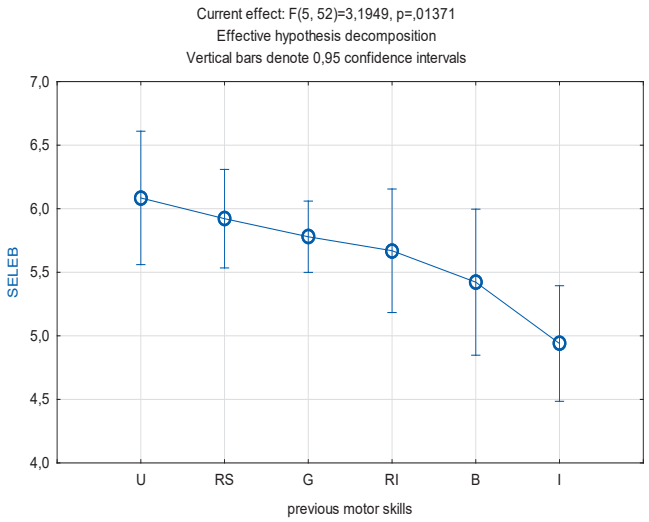
Table 2. *Post–hoc Tukey HSD test – differences between six research groups*

	Groups defined according previous motor experience					
	U	RS	G	RI	B	I
U		1,00	0,91	0,85	0,53	0,02*
RS	1,00		0,99	0,96	0,70	0,02*
G	0,91	0,99		1,00	0,87	0,03*
RI	0,85	0,96	1,00		0,99	0,25
B	0,53	0,70	0,87	0,99		0,77
I	0,02*	0,02*	0,03*	0,25	0,77	

Sub-groups: artistic and aesthetic activities (U), society-oriented recreational activities (RS), team sports (G), self-directed recreational activities (RI), martial arts (B) and individual sports (I)

Then, significant differences were obtained between the society-oriented recreational activities research sub-group and the individual sports sub-group in favour of the society-oriented recreational activities research sub-group (p = 0.02). Finally, according to the post-hoc Tukey HSD test, significant differences were found between the team sports research sub-group and the individual sports sub-group in favour of the team sports research sub-group (p = 0.02).

Image 1. *One–way Analysis of Variance (one-way ANOVA) between six research groups correlated with student's SL attitudes.*



DISCUSSION

The overall SELEB scale and subscales results are comparable with previous studies. McGorry (2012) used the 12-item SELEB scale representing four underlying factors: practical skills, interpersonal skills, civic and personal responsibility in a sample of undergraduate students. The results were compared with mean scores obtained in the current research. The mean scores were between 5.3 for civic responsibility and 6.4 for interpersonal skills.

The highest value on the SELEB scale was recorded in the group with dominant artistic and aesthetic previous experience, and the lowest value of the SELEB scale was recorded in the group with dominant previous experience in individual sports. The artistic and aesthetic group members have prior experience in playing instruments, drawing, social dancing, and other activities with an artistic and/or aesthetic component. We can assume that such previous experiences affect a higher level of socialization, and thus social sensitivity, which we correlate with the motivation to participate in service-learning activities. On the other hand, long-term practice of individual sports can contribute to a reduced interest in understanding and engaging in service-learning activities. Further research is needed to confirm these assumptions.

Significant differences were determined using the post-hoc Tukey HSD test between groups with minimal previous experience in individual sports and groups with dominant previous experience in society-oriented recreational activities, team sports, and artistic/aesthetic activities.

The society-oriented recreational activities group imply previous engagement in activities such as cooking, operating machines, hiking, fishing, gardening, etc.; while team sports experiences assume long-term participation in sports such as football, basketball, volleyball, handball or water polo. Members of both research groups showed significantly more interest in service-learning activities than members of the individual sports group. However, it is important to note that this is only a preliminary observation and further analysis is needed to draw more definitive conclusions.

CONCLUSIONS

In conclusion, previous motor experience can affect attitudes and motivation for contributing to service-learning activities among physical education students. We can presume that students with previous experiences in artistic and aesthetic activities, society-oriented recreational activities, and team sports will be more inclined to engage in service-learning activities. Further research of physical education students' involvement in service-learning projects and their reflection on benefits after service-learning activities is needed to confirm these results.

REFERENCES

1. Flinders, B. A. (2013). Service-Learning Pedagogy: Benefits Of A Learning Community Approach. *Journal of College Teaching & Learning –Third Quarter 2013, 10*(3), 159-166.
2. Francisco-Garcés, X., Salvador-Garcia, C., Maravé-Vivas, M., Chiva-Bartoll, O., & Santos-Pastor, M. L. (2022). Research on Service-Learning in Physical Activity and Sport: Where We Have Been, Where We Are, Where We Are Going. *International Journal of Environmental Research and Public Health, 19*(11), 6362.
3. Hébert, A., & Hauf, P. (2015). Student learning through service learning: Effects on academic development, civic responsibility, interpersonal skills and practical skills. *Active Learning in Higher Education, 16*(1), 37–49.
4. Herold, F., & Waring, M. (2018). An investigation of pre-service teachers' learning in physical education teacher education: Schools and university in partnership. *Sport, Education and Society, 23*(1), 95-107.
5. Jadrić, I., Bilić, I., & Miletić, Đ. (2022). Institutionalisation of the service-learning as a tool in higher education image building. *Proceedings of the 1st International Scientific and Professional Conference on Service-Learning "COMMUNITY-ENGAGED UNIVERSITY"*, May 20, 2022, Split, Croatia.
6. Larsen, M. A. (2017). International service-learning: Rethinking the role of emotions. *Journal of Experiential Education, 40*(3), 279–94.
7. Marco-Gardoqui, M., Eizaguirre, A., & García-Feijoo, M. (2020). The impact of service-learning methodology on business schools' students worldwide: A systematic literature review. *PLoS ONE, 15*(12).
8. McGorry, S. Y. (2012). No significant difference in service learning online. *Journal of Asynchronous Learning Networks, 16*(4), 45-54.
9. Pazos, P., Cima, F., Kidd, J., Ringleb, S., Ayala, O., Gutierrez, K., & Kaipa, K. (2020). Enhancing Teamwork Skills Through an Engineering Service-learning Collaboration. *2020 ASEE Virtual Annual Conference Content Access*, Virtual Online.
10. Prentice, M., Garcia, R. M. (2000). Service learning: the next generation in education. *Community College Journal of Research and Practice, 24*(1), 19–26.
11. Toncar, M. F., Reid, J. S., Burns, D. J., Anderson, C. E., & Nguyen, H. P. (2006). Uniform assessment of the benefits of service learning: The development, evaluation, and implementation of the SELEB scale. *Journal of Marketing Theory and Practice, 14*(3), 223-238.
12. Warren, J. L. (2012). Does service-learning increase student learning? A meta-analysis. *Michigan journal of community service learning, 18*(2), 56-61.

SPORT - Science & Practice, Vol. 13, №1, 2023, pp. 13-20.

Original scientific paper **CC BY**

DIFFERENCES IN PHYSICAL ACTIVITY OF ADOLESCENTS OF DIFFERENT SEXES BETWEEN 12 AND 15 YEARS OLD ON DIFFERENT DAYS OF WEEK [1] [2]

UDK: 796.012.1-055.1/.2(497.4)
DOI: 10.5937/snp13-1-44828

Vesna Štemberger
Faculty of Education, University of Ljubljana, Slovenia

Tanja Petrušič[3]
Faculty of Education, University of Ljubljana, Slovenia

Abstract: Achieving the recommended daily level of physical activity (PA) in adolescent boys and girls helps improve their cardiovascular health, maintain a healthy body weight, and promote mental health. The purpose of our study was to determine whether there were statistically significant differences between boys and girls aged 12 to 15 years with respect to age and amount of PA on different days of the week. The sample included 606 7th, 8th, and 9th grade students from four Slovenian elementary schools who participated in the study by completing a questionnaire (IPAQ; International Physical Activity Questionnaire, 2006). We used a quantitative research approach and the method was causal-non-experimental. The Shapiro-Wilk test was used to determine whether the data were normally distributed at a statistically significant level of risk ($p > 0.05$). Because of the non-normal distribution of the variables ($p < 0.001$), the non-parametric Mann-Whitney test was used to determine statistically significant differences between genders, and the Kruskal-Wallis test was used to determine statistically significant differences between age groups. Boys were statistically significantly more active than girls on all days of the week except Wednesday (Mon.: $p=0.018$; Tues.: $p=0.001$; Thurs.: $p=0.020$; Fri.: $p=0.015$, Sat.: $p=0.012$; Sun.: $p=0.001$). Significant differences in PA levels between seventh-, eighth-, and ninth- graders occurred only on Sundays ($p<0.001$), with PA levels changing with student age. The study's findings that adolescent boys are statistically significantly more active than girls raise concerns about gender differences in PA participation during this critical developmental period. Such differences may contribute to long-term health consequences and perpetuate gender inequalities in overall fitness and well-being. The observed differences in PA between boys and girls during adolescence highlight the need for targeted interventions and strategies to promote and improve PA among girls. Addressing the underlying factors that contribute to lower activity levels among girls is essential to promoting a more equitable and inclusive approach to PA promotion.

Keywords: *boys, girls, physical activity, sport*

[1] The paper was received on June 1, 2023; edited on July 14 and July 29, 2023; accepted for publication on August 2, 2023.
[2] The paper was presented under the same title at the 5th International Scientific Conference "Sport, Recreation, Health", organized by the College of Sports and Health from Belgrade on May 19, 2023.
[3] ✉ tanja.petrusic@pef.uni-lj.si

INTRODUCTION

Regular physical activity (PA) is of paramount importance for the overall health and well-being of adolescents aged 12 to 15 (Lang et al., 2023). Participation in PA on different days throughout the week provides a variety of benefits, ranging from improved physical and mental health to social benefits and the development of healthy habits (Tapia-Serrano et al., 2023). PA on any day of the week has significant physical health benefits, including maintenance of a healthy weight, improved cardiovascular health, and reduced risk of developing chronic diseases such as diabetes, hypertension, and obesity (Agbaje, 2023; García-Hermoso et al., 2022; Sudikno et al., 2023). PA also has a positive effect on psychological well-being by effectively reducing stress and anxiety (Förster et al., 2023; Smout et al., 2023; Yman et al., 2023). It also enhances cognitive function, improving academic performance (Gallardo et al., 2023; Haverkamp et al., 2021). Regular engagement in PA throughout the week provides adolescents with valuable opportunities to socialize and promotes a sense of belonging and social connection (Schirmer et al., 2023). Regular PA during adolescence helps establish healthy habits that can persist into adulthood and lead to lifelong improvements in health and overall well-being (Cachón-Zagalaz et al., 2023). Playing different sports allows adolescents to improve their physical fitness in different ways (Ługowska et al., 2023). Football improves cardiovascular fitness, endurance, and coordination (Nobari et al., 2023); basketball improves cardiovascular health, strength, endurance, and hand-eye coordination (Soares et al., 2023); tennis improves agility, hand-eye coordination, balance, strength, mental focus, concentration, and strategic thinking (Parpa et al., 2022); swimming is a low-impact sport that promotes cardiovascular health, builds strength and endurance, and improves overall flexibility (Wirth et al., 2022). Because adolescence is a critical period for bone development, PA, especially weight-bearing exercise, plays a critical role in building strong bones and reducing the risk of osteoporosis later in life (Christofaro et al., 2022; Geng et al., 2023). Combating sedentary behaviours such as excessive screen time and prolonged sitting is critical to promote PA and avoid negative health outcomes (Longobucco et al., 2023; Wilhite et al., 2023). Regular PA is associated with improved cognitive function and attention span in adolescents (Gilbert et al., 2023), whereas physical inactivity can lead to difficulties with concentration and decreased cognitive abilities (Pastor et al., 2022). Encouraging adolescents to try different sports that match their interests can facilitate the improvement of their physical fitness while helping them discover passions and develop new skills (Nery et al., 2023). Incorporating PA into their daily lives is critical to promoting their holistic well-being at this crucial stage of their development.

The positive effects of daily PA in adolescents have already been researched (Agbaje, 2023; Cachón-Zagalaz et al., 2023; Fu et al., 2023; Guimarães et al., 2023). However, our interest lies in exploring whether boys and girls of different ages make different decisions regarding the choice and amount of PA. The aim of the study was to determine whether statistically significant differences exist between boys and girls aged 12 to 15 with respect to the age and amount of PA on different days of the week and whether the frequency of activity changes with age.

The purpose of this study holds importance for the field of science and practitioners working with adolescents in this area because it provides valuable insight into gender differences, age-related patterns, and potential decreases in activity frequency among adolescents. The findings can serve as the basis for targeted interventions that promote equality in PA promotion and contribute to the existing knowledge base to ultimately promote healthier behaviours and well-being among young individuals.

METHOD

We used a quantitative research approach and a cause-and-effect, non-experimental method in conducting the research.

Sample of subjects

The study sample was random and included 606 7th, 8th, and 9th grade students from four elementary schools in Slovenia. 33.4% of the students included in the study were in the 7th grade, 32.7% were in the 8th grade, and 33.9% were in the 9th grade.

Sample of variables

The questionnaire that was used, IPAQ (International Physical Activity Questionnaire) (Hagströmer et al., 2006), included 10 questions, of which 2 were closed-ended, 7 were on a 5-point Likart frequency scale, and 1 was open-ended. First, the participants were asked about the amount and choice of PA in the past seven days: PA during free time, during physical education classes (PE), during breaks, in the afternoon and evening, on weekends, and according to the day of the week.

Research protocol

Data collection took place over 10 days in March 2023. The students received the questionnaire from their PE teachers during the PE class, filled it out immediately, and returned it to their teacher.

Data processing methods

The collected data were processed using the program IBM SPSS Statistics 22. First, the basic statistics were calculated and then the Shapiro-Wilk test was used to check whether the data were normally distributed at a statistically significant risk level ($p > 0.05$). Due to the non-normal distribution of the variables ($p < 0.001$), the nonparametric Mann-Whitney test was used to determine statistically significant differences between genders, and the Kruskal-Wallis test was used to determine statistically significant differences between age groups.

Statistical significance between gender and age was set at $p \leq 0.05$.

RESULTS

Table 1 shows the number of girls and boys participating in the study, their age, and the grade they attend.

Table 1. *Data on the number, gender, and age of students included in the study*

Grade	Uzrast (godine)	Boys		Girls		Missing		Total	
		Frequency (N)	Percent (%)	Frequency (N)	Percent (%)	Frequency (N)	Percent (%)	Frequency (N)	Percent (%)
7.	12.4 ± 0.5	101	**50.0**	93	46.0	8	4.0	202	100
8.	13.4 ± 0.5	90	**45.5**	90	**45.5**	18	9.1	198	100
9.	14.3 ± 0.5	105	**51.2**	95	46.3	5	2.4	205	100
Total	13.3 ± 0.9	296	**40.5**	278	38.2	31	5.1	605	100

Table 1 shows that boys (50.0%) outnumbered girls (46.0%) in the study from the 7th grade onward (average age 12.4 ± 0.5 years). In the 8th grade (average age 13.4 ± 0.5 years), the percentage of boys and girls was equal (45.5%), while in the 9th grade (average age 14.3 ± 0.5 years), boys (51.2%) again outnumbered girls (46.3%).

Next, we were interested in whether there were statistically significant differences between gender and age groups in the frequency of PA on different days of the week. We used the nonparametric Mann-Whitney test (gender) or the Kruskal-Wallis test (age). The results are presented in Table 2 and in Table 3.

Table 2. *Statistically significant differences in activity on different days of the week according to the gender of students*

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Gender differences	**Man-Vitni U**	35302.500	32955.000	35770.500	34822.000	34616.000	34768.500	32968.500
	Wilkokson W	73252,500	70905,000	73445,500	71950,000	71472,000	72718,500	70369,500
	Z	-2.358	-3.475	-1.827	-2.335	-2.442	-2.500	-3.251
	Asimp. znač. (2-strana)	**.018**	**.001**	.068	**.020**	**.015**	**.012**	**.001**

Table 2 shows that boys were more active than girls in the last seven days before the survey (highlighted in gray and bold). Girls, on the other hand, were not statistically significantly more active than boys in any case.

Table 2 shows significant differences in activity frequency between boys and girls on most days of the week (Monday: p=0.018; Tuesday: p=0.001; Thursday: p=0.020; Friday: p=0.015; Saturday: p=0.012; Sunday: p=0.001). However, no significant difference was found on Wednesday (p=0.68). On all other days, boys were more active than girls.

Table 3. *Statistically significant differences in activity on different days of the week according to the age of students*

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Age differences	**Kruskal-Wallis**	.659	1.738	4.495	1.562	1.249	5.452	15.760
	Df	2	2	2	2	2	2	2
	Asymp. Sig.	.719	.419	.106	.458	.536	.065	**.000**

We also examined how student activity differs by age on different days of the week (*Table 3*). Statistically significant differences by the students' age appear only on Sunday (p<0.001), with the frequency of their activity changing with age (the seventh graders were the most active, followed by the eighth graders; the ninth graders were the least active).

DISCUSSION

The aim of the study was to determine whether statistically significant differences exist between boys and girls aged 12 to 15 with respect to the age and amount of PA on different days of the week and whether the frequency of activity changes with age. Adolescents aged 12 to 15 years, regardless of their gender and age, should achieve the recommended daily level of PA, as this has numerous positive effects on their overall health, which is also confirmed by Nery et al. (2023), Smout et al. (2023), Sudikno et al. (2023), Tapia-Serrano et al. (2023) and Yman et al. (2023). The results of our study showed that boys are statistically significantly more active than girls on every day of the week except Wednesday, which raises concerns about gender differences in PA participation during this critical developmental period. Such differences may contribute to long-term health consequences and perpetuate gender inequalities in overall fitness and well-being (Barth Vedøy et al., 2021; Biadgilign et al., 2022; Brazo-Sayavera et al., 2021; Li et al., 2022; Ostermeier et al., 2021; Telford et al., 2016; True et al., 2021). Similar findings were also obtained by Mello et al (2023), who divided children and adolescents aged 0 to 19 years into groups based on the results, with boys mostly assigned to groups with high PA, whereas girls were assigned to groups with low PA. However, boys with higher PA also spent statistically significantly more time watching TV and playing video games, while girls spent more time doing housework and other paid activities. For boys, such a result is also a problem, because too much time in front of the screen has a negative impact on the development of important cognitive skills such as attention, memory and critical thinking (Taylor et al., 2023; Wang et al., 2023). The observed differences in PA between boys and girls during adolescence highlight the need for targeted interventions and strategies to promote and improve PA among girls. Addressing the underlying factors that contribute to lower activity levels among girls is essential to promoting a more equitable and inclusive approach to PA promotion. Understanding the factors that influence gender differences in adolescent PA is critical to developing effective interventions. Factors such as social norms, cultural influences, perceptions of body image, and access to sports and recreational facilities need to be explored and addressed in order to create an environment that promotes and supports boys' and girls' equal participation in physical activities. In addition, adolescents aged 12 to 15 who spend more time in front of screens are at a higher risk of engaging in inappropriate behaviours, such as inadequate communication with parents and peers (including bullying) and gambling (Hökby et al., 2023). It is very important for adolescents to find a healthy balance between screen time, PA, social contact with peers, and engaging in various hobbies that interest them. Parents can help them limit television, video games, computers, and phones and encourage the development of healthy habits (Przybylski et al., 2020). The results of our study also showed us that there were no statistically significant differences in the amount of PA between the seventh, eighth, and ninth graders during the week, which was not surpris-

ing because adolescence is a time of rapid growth and development and PA patterns should not differ significantly within the relatively close age groups of seventh, eighth, and ninth graders. These age groups have similar activity patterns and interests, resulting in comparable levels of PA.

A limitation of the study was mainly that the actual daily PA on different days of the week was not measured with accelerometers, because the data were collected only based on the students' answers in a questionnaire. Nevertheless, the study provided insight into higher activity levels in boys than in girls aged 12 to 15 on almost all days of the week.

CONCLUSIONS

The results show that boys are statistically significantly more active than girls, which is an important finding because understanding gender differences in PA patterns during adolescence is critical for developing targeted interventions and promoting healthy behaviours. By examining whether there are significant differences between boys and girls in terms of their age and amount of PA on different days of the week, the study provided insights into inequalities in activity levels and strategies to bridge these gaps. This information is valuable for educators, parents, and policymakers seeking to develop effective programs tailored to the specific needs of boys and girls to promote a more inclusive and equitable approach to PA promotion. On the other hand, examining the potential decline in PA frequency among adolescents as they age is crucial to identifying critical periods when interventions and support are most needed. Adolescence is a transitional period characterized by various physiological, psychological, and social changes that may influence PA patterns. By examining whether activity frequency declines with age, this study provided insight into potential barriers or factors that influence declining activity levels. These findings may aid in the development of targeted interventions and strategies to maintain or increase adolescent PA during this critical developmental period.

Based on the data collected, we can advise that parents and teachers in elementary schools should raise awareness of the importance of an active lifestyle as students get older and implement various interventions to encourage students to engage in active leisure activities while increasing the level and amount of their daily PA.

REFERENCES

1. Agbaje, A. O. (2023). Associations of accelerometer-based sedentary time, light physical activity and moderate-to-vigorous physical activity with resting cardiac structure and function in adolescents according to sex, fat mass, lean mass, BMI, and hypertensive status. *Scandinavian Journal of Medicine & Science in Sports*. https://doi.org/10.1111/sms.14365
2. Barth Vedøy, I., Skulberg, K. R., Anderssen, S. A., Tjomsland, H. E., & Thurston, M. (2021). Physical activity and academic achievement among Norwegian adolescents: Findings from a longitudinal study. *Preventive Medicine Reports, 21*. https://doi.org/10.1016/j.pmedr.2021.101312
3. Biadgilign, S., Gebremichael, B., Abera, A., & Moges, T. (2022). Gender Difference and Correlates of Physical Activity Among Urban Children and Adolescents in Ethiopia: A Cross-Sectional Study. *Frontiers in Public Health, 10*. https://doi.org/10.3389/fpubh.2022.731326
4. Brazo-Sayavera, J., Aubert, S., Barnes, J. D., González, S. A., & Tremblay, M. S. (2021). Gender differences in physical activity and sedentary behavior: Results from over 200,000 Latin-American children and adolescents. *PLoS ONE, 16*. https://doi.org/10.1371/journal.pone.0255353
5. Cachón-Zagalaz, J., Carrasco-Venturelli, H., Sánchez-Zafra, M., & Zagalaz-Sánchez, M. L. (2023). Motivation toward Physical Activity and Healthy Habits of Adolescents: A Systematic Review. *Children, 10*(4), 659. https://doi.org/10.3390/children10040659
6. Christofaro, D. G. D., Tebar, W. R., Saraiva, B. T. C., da Silva, G. C. R., dos Santos, A. B., Mielke, G. I., Ritti-Dias, R. M., & Mota, J. (2022). Comparison of bone mineral density according to domains of sedentary behavior in children and adolescents. *BMC Pediatrics, 22*(1). https://doi.org/10.1186/s12887-022-03135-2
7. Förster, L. J., Vogel, M., Stein, R., Hilbert, A., Breinker, J. L., Böttcher, M., Kiess, W., & Poulain, T. (2023). Mental health in children and adolescents with overweight or obesity. *BMC Public Health, 23*(1). https://doi.org/10.1186/s12889-023-15032-z
8. Fu, L., Wang, Y., Leung, S. O., & Hu, W. L. (2023). The role of mental engagement between moderate or vigorous physical activity and academic achievement in adolescents. *Health Education Journal*. https://doi.org/10.1177/00178969221145804
9. Gallardo, L. O., Esteban-Torres, D., Rodríguez-Muñoz, S., Moreno-Doña, A., & Abarca-Sos, A. (2023). Is There Any Relationship between Physical Activity Levels and Academic Achievement? A Cross-Cultural Study among Spanish and Chilean Adolescents. *Behavioral Sciences, 13*(3), 238. https://doi.org/10.3390/bs13030238
10. García-Hermoso, A., López-Gil, J. F., Ezzatvar, Y., Ramírez-Vélez, R., & Izquierdo, M. (2022). Twenty-four-hour movement guidelines during middle adolescence and their association with glucose outcomes and type 2 diabetes mellitus in adulthood. *Journal of Sport and Health Science*. https://doi.org/10.1016/j.jshs.2022.08.001
11. Geng, Y., Trachuk, S., Ma, X. M., Shi, Y. J., & Zeng, X. (2023). Physiological Features of Musculoskeletal System Formation of Adolescents Under the Influence of Directed Physical Training. *Physical Activity and Health, 7*(1), 1–12. https://doi.org/10.5334/paah.217
12. Gilbert, L. M., Dring, K. J., Williams, R. A., Boat, R., Sunderland, C., Morris, J. G., Nevill, M. E., & Cooper, S. B. (2023). Effects of a games-based physical education lesson on cognitive function in adolescents. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1098861
13. Guimarães, J. P., Fuentes-García, J. P., González-Silva, J., & Martínez-Patiño, M. J. (2023). Physical Activity, Body Image, and Its Relationship with Academic Performance in Adolescents. *Healthcare (Switzerland), 11*(4). https://doi.org/10.3390/healthcare11040602
14. Hagströmer, M., Oja, P., & Sjöström, M. (2006). The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. *Public Health Nutrition, 9*(6), 755–762. https://doi.org/10.1079/phn2005898
15. Haverkamp, B. F., Oosterlaan, J., Königs, M., & Hartman, E. (2021). Physical fitness, cognitive functioning and academic achievement in healthy adolescents. *Psychology of Sport and Exercise, 57*. https://doi.org/10.1016/j.psychsport.2021.102060
16. Hökby, S., Westerlund, J., Alvarsson, J., Carli, V., & Hadlaczky, G. (2023). Longitudinal Effects of Screen Time on Depressive Symptoms among Swedish Adolescents: The Moderating and Mediating Role of Coping Engagement Behavior. *International Journal of Environmental Research and Public Health, 20*(4). https://doi.org/10.3390/ijerph20043771

17. Lang, J. J., Zhang, K., Agostinis-Sobrinho, C., Andersen, L. B., Basterfield, L., Berglind, D., Blain, D. O., Cadenas-Sanchez, C., Cameron, C., Carson, V., Colley, R. C., Csányi, T., Faigenbaum, A. D., García-Hermoso, A., Gomes, T. N. Q. F., Gribbon, A., Janssen, I., Jurak, G., Kaj, M., … Fraser, B. J. (2023). Top 10 International Priorities for Physical Fitness Research and Surveillance Among Children and Adolescents: A Twin-Panel Delphi Study. *Sports Medicine, 53*(2), 549–564. https://doi.org/10.1007/s40279-022-01752-6
18. Li, M., Yu, C., Zuo, X., Karp, C., Ramaiya, A., Blum, R., & Moreau, C. (2022). COVID-19 Experiences and Health-Related Implications: Results From a Mixed-Method Longitudinal Study of Urban Poor Adolescents in Shanghai. *Journal of Adolescent Health, 71*(1), 30–38. https://doi.org/10.1016/j.jadohealth.2022.03.016
19. Longobucco, Y., Ricci, M., Scrimaglia, S., Camedda, C., Dallolio, L., & Masini, A. (2023). Effects of School Nurse-Led Interventions in Collaboration with Kinesiologists in Promoting Physical Activity and Reducing Sedentary Behaviors in Children and Adolescents: A Systematic Review. *Healthcare (Switzerland), 11*(11). https://doi.org/10.3390/healthcare11111567
20. Ługowska, K., Kolanowski, W., & Trafialek, J. (2023). Increasing Physical Activity at School Improves Physical Fitness of Early Adolescents. *International Journal of Environmental Research and Public Health, 20*(3). https://doi.org/10.3390/ijerph20032348
21. Mello, G. T. de, Bertuol, C., Minatto, G., Barbosa Filho, V. C., Oldenburg, B., Leech, R. M., & Silva, K. S. (2023). A systematic review of the clustering and correlates of physical activity and sedentary behavior among boys and girls. *BMC Public Health, 23*(1). https://doi.org/10.1186/s12889-022-14869-0
22. Nery, M., Sequeira, I., Neto, C., & Rosado, A. (2023). Movement, Play, and Games—An Essay about Youth Sports and Its Benefits for Human Development. *Healthcare (Switzerland), 11*(4). https://doi.org/10.3390/healthcare11040493
23. Nobari, H., Gorouhi, A., Mallo, J., Lozano, D., Prieto-González, P., & Mainer-Pardos, E. (2023). Variations in cumulative workload and anaerobic power in adolescent elite male football players: associations with biological maturation. *BMC Sports Science, Medicine and Rehabilitation, 15*(1). https://doi.org/10.1186/s13102-023-00623-5
24. Ostermeier, E., Tucker, P., Clark, A., Seabrook, J. A., & Gilliland, J. (2021). Parents' report of canadian elementary school children's physical activity and screen time during the COVID-19 pandemic: A longitudinal study. *International Journal of Environmental Research and Public Health, 18*(23). https://doi.org/10.3390/ijerph182312352
25. Parpa, K., Michaelides, M., Petrov, D., Kyrillou, C., & Paludo, A. C. (2022). Relationship between Physical Performance, Anthropometric Measurements and Stroke Velocity in Youth Tennis Players. *Sports, 11*(1), 7. https://doi.org/10.3390/sports11010007
26. Pastor, D., Ballester-Ferrer, J. A., Carbonell-Hernández, L., Baladzhaeva, S., & Cervello, E. (2022). Physical Exercise and Cognitive Function. *International Journal of Environmental Research and Public Health, 19*(15). https://doi.org/10.3390/ijerph19159564
27. Przybylski, A. K., Orben, A., & Weinstein, N. (2020). How Much Is Too Much? Examining the Relationship Between Digital Screen Engagement and Psychosocial Functioning in a Confirmatory Cohort Study. I*n J Am Acad Child Adolesc Psychiatry, 59*(9). www.jaacap.org
28. Schirmer, T., Bailey, A., Kerr, N., Walton, A., Ferrington, L., & Cecilio, M. E. (2023). Start small and let it build; a mixed-method evaluation of a school-based physical activity program, Kilometre Club. *BMC Public Health, 23*(1). https://doi.org/10.1186/s12889-022-14927-7
29. Smout, S., Gardner, L. A., Newton, N., & Champion, K. E. (2023). Dose-response associations between modifiable lifestyle behaviours and anxiety, depression and psychological distress symptoms in early adolescence. *Australian and New Zealand Journal of Public Health, 47*(1), 100010. https://doi.org/10.1016/j.anzjph.2022.100010
30. Soares, A. A. L., Lima, A. B., Miguel, C. G., Galvão, L. G., Leonardi, T. J., Paes, R. R., Gonçalves, C. E., & Carvalho, H. M. (2023). Does early specialization provide an advantage in physical fitness development in youth basketball? *Frontiers in Sports and Active Living, 4*. https://doi.org/10.3389/fspor.2022.1042494
31. Sudikno, S., Mubasyiroh, R., Rachmalina, R., Arfines, P. P., & Puspita, T. (2023). Prevalence and associated factors for prehypertension and hypertension among Indonesian adolescents: a cross-sectional community survey. *BMJ Open, 13*(3), e065056. https://doi.org/10.1136/bmjopen-2022-065056

32. Tapia-Serrano, M. Á., López-Gil, J. F., Sevil-Serrano, J., García-Hermoso, A., & Sánchez-Miguel, P. A. (2023). What is the role of adherence to 24-hour movement guidelines in relation to physical fitness components among adolescents? *Scandinavian Journal of Medicine & Science in Sports*. https://doi.org/10.1111/sms.14357
33. Taylor, A., Kong, C., Zhang, Z., Herold, F., Ludyga, S., Healy, S., Gerber, M., Cheval, B., Pontifex, M., Kramer, A. F., Chen, S., Zhang, Y., Müller, N. G., Tremblay, M. S., & Zou, L. (2023). Associations of meeting 24-h movement behavior guidelines with cognitive difficulty and social relationships in children and adolescents with attention deficit/hyperactive disorder. *Child and Adolescent Psychiatry and Mental Health, 17*(1). https://doi.org/10.1186/s13034-023-00588-w
34. Telford, R. M., Telford, R. D., Cochrane, T., Cunningham, R. B., Olive, L. S., & Davey, R. (2016). The influence of sport club participation on physical activity, fitness and body fat during childhood and adolescence: The LOOK Longitudinal Study. *Journal of Science and Medicine in Sport, 19*(5), 400–406. https://doi.org/10.1016/j.jsams.2015.04.008
35. True, L., Martin, E. M., Pfeiffer, K. A., Siegel, S. R., Branta, C. F., Haubenstricker, J., & Seefeldt, V. (2021). Tracking of Physical Fitness Components from Childhood to Adolescence: A Longitudinal Study. *Measurement in Physical Education and Exercise Science, 25*(1), 22–34. https://doi.org/10.1080/1091367X.2020.1729767
36. Wang, H., Abbey, C., Kennedy, T., Feng, E., Li, R., Liu, F., Zhu, A., Shen, S., Wadhavkar, P., Rozelle, S., & Singh, M. K. (2023). The Association Between Screen Time and Outdoor Time on Adolescent Mental Health and Academic Performance: Evidence from Rural China. *Risk Management and Healthcare Policy, 16*, 369–381. https://doi.org/10.2147/rmhp.s384997
37. Wilhite, K., Booker, B., Huang, B. H., Antczak, D., Corbett, L., Parker, P., Noetel, M., Rissel, C., Lonsdale, C., Del Pozo Cruz, B., & Sanders, T. (2023). Combinations of Physical Activity, Sedentary Behavior, and Sleep Duration and Their Associations With Physical, Psychological, and Educational Outcomes in Children and Adolescents: A Systematic Review. *American Journal of Epidemiology, 192*(4), 665–679. https://doi.org/10.1093/aje/kwac212
38. Wirth, K., Keiner, M., Fuhrmann, S., Nimmerichter, A., & Haff, G. G. (2022). Strength Training in Swimming. *International Journal of Environmental Research and Public Health, 19*(9). https://doi.org/10.3390/ijerph19095369
39. Yman, J., Helgadóttir, B., Kjellenberg, K., & Nyberg, G. (2023). Associations between organised sports participation, general health, stress, screen-time and sleep duration in adolescents. *Acta Paediatrica, International Journal of Paediatrics, 112*(3), 452–459. https://doi.org/10.1111/apa.16556

SPORT - Science & Practice, Vol. 13, №1, 2023, pp. 21-28.

Original scientific paper **CC BY**

RESEARCHING PERSONALITY CHARACTERISTICS – HOW ESPORTS PLAYERS COMPARE TO ATHLETES [1] [2]

UDK: 796.01:159.928
796.077.5-056.45
DOI: 10.5937/snp13-1-44824

Haris Šunje[3] [4]
Teacher Education Faculty, University „Džemal Bijedić“, Mostar, Bosnia and Herzegovina

Elvis Vardo
Faculty of Philosophy, University of Tuzla, Bosnia and Herzegovina

Abstract: The primary aim of the paper is to conduct research on the personality traits in esport players and athletes, in addition to confirming differences in personality between the two examined groups. The research has been conducted on 67 (N=67) examinees, 30 of whom are semi-professional or professional esports players who participate in state-level and regional-level competitions. The remaining 37 examinees are the highest-ranked athletes in Bosnia and Herzegovina. T-test, a type of inferential statistic, has been used to determine statistical differences in disposition between the arithmetic means of the two groups, using the BFI-44 (α=0.78) measuring instrument. It has been anticipated that esports players would be ranked lower on Extraversion (E), Agreeableness (A), and Conscientiousness (C), but higher on the Neuroticism (N) and Openness (O) dimensions compared to athletes. The research indicates that four of the five hypotheses have been confirmed – on the scale of Extraversion (E) with significance levels of p=.000 ($p<0.0001$); Agreeableness (A) showing p=.002 ($p<0.01$); Neuroticism (N) showing p=.042 ($p<0.05$); and Conscientiousness (C) showing significance levels of p=.004 ($p<0.01$) The fifth hypothesis was not confirmed on this sample. The results gathered on this sample could significantly contribute to understanding the differences between esports players and athletes.

Keywords: *personality psychology, esports, sports, athletes, big five model*

INTRODUCTION

Esports have blossomed into a global phenomenon as a result of the widespread use of the Internet, and technological advancements, specifically computers and computer equipment required to play video games. Investors from all over the world strive to direct a portion of their investments into the ever-increasing trend of playing video games because the esports market is an economically promising market.

Market analysis predicts that this sector will be worth 3.82 billion US dollars by 2027 (MarketWatch, 2023). To put esports' popularity and viewership into perspective, we will only mention that the *League of Legends World Championship 2019* finals attracted more than 100 million viewers, while the *LIII American Super*

[1] The paper was received on June 1, 2023, edited on June 25, 2023, accepted for publication on June 26, 2023.
[2] The paper was presented under the same title at the 5th International Scientific Conference “Sport, Recreation, Health”, organized by the College of Sports and Health from Belgrade on May 19, 2023.
[3] Haris Šunje is currently attending Master's studies at the Teacher Education Faculty in Mostar, department of Psychology
[4] ✉ haris.sunje@gmail.com

Bowl finals drew 100.7 million viewers (Roundhill Team, 2020). Esports competitions are held at all levels of education in the United States, including elementary, high school, and college.

Esports is mostly played on computers, consoles, or even mobile devices. Players compete against opponents on the other side of the virtual world where everything takes place, either individually or in teams of two to ten people. The computer games generally connected with esports are: *League of Legends, Dota 2, Overwatch, CS:GO, Paladins, Smite, Fortnite, PUBG, Call of Duty* (EsportSource, 2021). For many of the moves in esports video games, which require years of hard training and playing, a set of specific rules and muscle memory are required (Himmelstein et al., 2017). Most people think that physical activity is the biggest difference between esports and regular sports. The esports industry argues, among other things, that if chess and poker can be considered sports, then esports should receive the same status, too (EsportsMention, 2019). Esports players also face a lot of pressure, and are expected to have perfect fine motor skills, emotional stability, a high level of vigilance, and a developed capacity for fast communication and exchange of information (Witkowski, 2012).

There has been a global initiative to grant esport the title of a sport in its traditional sense, and nations like the USA, Finland, Germany, South Korea, China, South Africa, Russia, Iceland, Denmark, and Ukraine have previously acknowledged esport as a sport. The Olympic Committee of Asia has confirmed that esports will also be included in the upcoming Asian Games in 2022, with medals awarded in eight video games. Esports has had a special category in the Asian Olympic Games for a few years (Olympics, 2021). Additionally, the League of Legends World Championship in 2022 set a new gaming record with 5.1 million concurrent viewers at one peak point (Garcia, 2022). All of this demonstrates that the time is right to investigate the distinctions between athletes and esports players, gather as much information as possible, and learn more about the coming, financially robust industry.

Esports and sports

When it comes to connecting psychology to sports and Esports, support and accomplishment in conventional games positively correlate with extraversion. One study demonstrated that only Conscientiousness can be a reliable predictor of traditional sports success (Mirzaei et al., 2013), while two other studies showed that higher levels of Conscientiousness and low levels of Neuroticism act as indicators of sports accomplishment and participation in national or international competitions. The fact that Emotional Stability is generally beneficial and necessary for player performance in sports as well as in non-sporting activities such as poker can be exploited in the context of video games. Video game genres within esports are also competitive, fast-paced, and intense - Emotional stability can therefore be crucial for reaching an optimal level of performance.

A study by Matuszewski et al. (2020) examined the connection between personality traits and esports performance. The focal point of this study is the exceptionally famous esports computer game *League of Legends*. It was observed that there is a connection between personality traits as per the *Big Five model* (in terms of Extraversion, Agreeableness, Openness) and achievement or accomplishment in *League of Legends*. In traditional sports, Extraversion (Eagleton et al., 2007) and Agreeableness (Nia & Besharat, 2010) have a positive correlation with top performance, so it was expected that the same thing would happen in esports. However, this was not the case, highlighting the distinction between esports and conventional sports. To be specific, players who positioned lower showed fundamentally higher levels of Extraversion and Agreeableness, and lower levels of Openness. It's possible that success being measured by individual performance is the cause of the lower levels of Agreeableness and Extraversion that are associated with superior performance. To increase their ranking and skill, high-ranked players must spend more time playing alone.

Openness is also different between highly ranked and unsuccessful players (Matuszewski et al., 2020). The reason could be that with over 140 fictional characters (champions) to choose from, *League of Legends* requires flexibility, training more of those champions, adapting to the opponent, and keeping up with new game trends that change monthly.

No significant difference was found in terms of Neuroticism and Conscientiousness, albeit a massive distinction would presumably have been found there as well if, on one side, the respondents were amateurs, and on the other, expert players (Matuszewski et al., 2020). Although psychology as such is applicable to every individual, we see that some models of ideal personality characteristics differ from traditional sports to esports.

According to the genetic, or tendency inclination hypothesis, individuals who are basically extroverted and emotionally stable are inclined to sporting experiences. Only those who possess the highest level of extro-

version and emotional stability remain at the top level, thus defeating all competition that is not fundamentally extraverted or emotionally stable (Cox, 2005). In comparison, we could say that individuals also have predispositions for esports, i.e. there is a tendency inclination hypothesis toward esports. This hypothesis would differ only in the Extroversion-Introversion dimension. Individuals who are fundamentally more introverted might be inclined towards video games and esports experiences.

Additionally, athletes are generally extroverted, experience less anxiety, and are more social than non-athletes, resulting in a higher level of emotional stability. People with stable, outgoing personalities are more likely to participate in sporting events. According to Cox (2005), the so-called sports Darwinism occurs when, as a competition progresses, all but the most enthusiastic competitors, those with the highest levels of extraversion and stability, withdraw. Based on personality characteristics, we cannot conclude which competitor is more disposed to a specific game, however contrasts in the characters of competitors of various games classifications can be noticed - for instance individual versus group activities.

According to certain findings, athletes who play team sports are more extroverted and experience less anxiety, which may be related to the need and desire to cooperate and be surrounded by people, as well as to the fact that team sports include a diffusion of responsibility (Raharjo et al., 2018).

We should emphasize that some of these factors, primarily physical and tactical preparation, do not play as significant a role in esports as they do in traditional sport, which is significantly more complex than esports. In addition, the amount of time spent playing video games on a computer is crucial in esports, which has a significantly lower success threshold. In s ports, in addition to talent, physical preparation must be present, due to the very nature of the sport, and often this physical preparation is a decisive factor. Any talent and technical/tactical or psychological preparation cannot help if the athlete does not have the predisposition to play sports at a high level.

METHOD

This research is of empirical, quantitative type, and in it, the authors used the method of surveying esports players and athletes who are actively involved in sports, at the highest level in Bosnia and Herzegovina. Basic statistics, the T-test, was used to examine differences in personality, testing statistical significance between two arithmetic means.

Research problems

The research problems can be defined as an examination of the personality characteristics of Esports players and athletes and determining the difference in the dimensions of Extraversion, Neuroticism (N), Agreeableness (A), Conscientiousness (C) and Openness (O).

Research goals

The main goal is to examine the personality characteristics of esports players and traditional athletes, and the specific goals are to determine personality differences in the dimensions of Extraversion (E), Neuroticism (N) and Agreeableness (A), Conscientiousness (C) and Openness (O) between esports players and athletes. The social goal of the research is to contribute to scientific knowledge by studying a topic that is not frequently considered, especially in this region, so that it can initiate other research, from some other psychological aspects of human life.

Sample

The sample of this research is represented by respondents gathered in different ways, through the organization "Tiltproof.gg", the Esports Association of Bosnia and Herzegovina, and through contact with the Futsal Club "Mostar SG Staklorad", HCVogošća, YBC Sloboda and FC Velež. It involved 67 respondents, 30 of which are those categorized as esports players, who compete semi-professionally or professionally at the state or regional level, (N=30), and 37 athletes who play top-level football, basketball and handball in Bosnia and Herzegovina (N=37). The average age of the respondents is 23 years and 4 months, and the age ranges from 17 years to 36 years. When we look at the athletes' age parameters, we can point out M=25.90 (SD=5.32), with the minimum age being 17 and maximum 36. Esports players' age parameters are M=20.53 (SD=3.20), with the minimum age being 17 and maximum 26. The athletes' data was collected in October 2021, during the active season, in between competitive matches (BH Futsal

League – Futsal Club „Mostar SG Staklorad“, BH Premier League – HC Vogošća, BH Division I – YBC Sloboda, and BH Premier League – FC Velež). On the other hand, the data for esports players was collected in May 2021, during the A1 Adria League Season 7 (CS:GO and League of Legends) and Esport Adria Championship Season 5 (CS:GO) competitions, randomly in the pool of esports players.

Research hypotheses

H1. Since we assumed the existence of the *tendency inclination hypothesis* towards esports, we assume that there is a statistically significant difference between esports players and athletes in the Extraversion (E) dimension, i.e. that athletes achieve higher results than esports players.

H2. Due to the very nature of computers and the influence of information technologies on mental health and emotional stability, we assume that there is a statistically significant difference between esports players and athletes in the dimension of Neuroticism (N), that is, that athletes achieve lower results than esports players.

H3. Previously mentioned studies by other authors showed a lower than average level of cooperation among esports players/gamers, and therefore we assume that there is a statistically significant difference between esports players and athletes in the dimension of Agreeableness (A), i.e. that athletes achieve higher results than esports players.

H4. The previously mentioned studies examined Conscientiousness (C) among esports players/gamers, so we also assume that there is a statistically significant difference between esports players and athletes in the Conscientiousness (C) dimension.

H5. According to some findings (Matuszewski et al., 2020) and the fact that we have highly ranked esports players in this sample, we assume that there is a statistically significant difference between esports players and athletes in the dimension of Openness (O).

Measuring instruments

The measuring instruments that were used for the purpose of the research, in order to collect the appropriate data for analysis were the following:

1. *The questionnaire for collecting data on sociodemographic characteristics*, which was constructed for the purposes of this research, and which contains questions about characteristics such as gender, age, country of residence, cohabitants, place of residence, number of household members, level of monthly income in the family, per family member, the respondent's level of education as well as the education level of their pcants, whether they are active athletes, which sport, the time they have been actively playing sports, how long they have been competing, whether they have achieved any notable results (entity, national, regional, international), whether they play *League of Legends*, how long they have been playing *League of Legends*, their average ranking in the past year, and how much they have earned from playing.
2. *The Big Five Personality Inventory* - The BFI (the Big Five Inventory) is an instrument that enables the (self) assessment of the big five personality dimensions: Extraversion (E), Agreeableness (A), Conscientiousness (C), Neuroticism (N), and Openness (O). The inventory contains 44 items obtained by factor analysis on a large number of respondents. The particles within the BFI are conceived in the form of short sentences based on the already mentioned, prototypic markers of the Big Five, presented by John (1990). The evaluation is done on a Likert-type scale, i.e. from 1 to 5, and each of the selected values expresses the degree of agreement or disagreement with a certain statement, ranging from "completely disagree" (1) to "completely agree" (5), where respondents give answers that describe personality dimensions such as "I see myself as a person who is talkative" (Extraversion), "I do my work thoroughly" (Conscientiousness), "I see myself as a person who is depressed, sad" (Neuroticism), "I am selfless and ready to help" (Agreeableness) and "I am a curious person and I am interested in many different things" (Openness), in such a way that the respondent writes/circles the degree of agreement with this statement (Larsen & Buss, 2008). The measured reliability was α=0.78.

Research methods

The following methods were used in this research:

1. The statistical method was used to collect, select and determine statistical data, classification, and data processing and analysis with tabular presentation of the same.

2. The method of analysis was used, which represents the process of scientific research and explanation of reality by breaking down complex thought creations (concepts, judgments and conclusions) into their simpler constituent parts and elements, and studying each part (and element) by itself and in relation to other parts, i.e. the whole.
3. The survey research method was also used through the Google Forms online survey platform. It represents an empirical, non-experimental method that is used to examine different forms of thinking and behavior in accordance with research needs (Čolakhodžić, 2021).

RESULTS

The obtained result in analyzing the first hypothesis shows that the difference is statistically significant ($t(65)=4.09$, $p<.0001$) and that the first hypothesis is confirmed (Table 1). According to the results, athletes and esports players differ significantly on the dimension of Extraversion (E), which was also confirmed in one research (Behnke et al., 2023). The assumption at the core of this hypothesis was that esports players are more introverted and are inclined towards gaming and esports, i.e. that athletes are on average more extroverted, and that people who are more extroverted are inclined towards certain sports.

After processing the data, it was shown that in the second hypothesis, athletes were on average lower on the Neuroticism scale (N) than esports players, and this difference is also statistically significant ($t(65)=-2.07$, $p<.05$) (Table 1). Therefore, the second hypothesis was also confirmed - in this sample, athletes show lower levels of Neuroticism (N) than esports players.

Data analysis revealed that the difference in the third hypothesis is statistically significant ($t(65)=3.30$, $p<.01$), which confirms the third hypothesis (Table 1). Athletes score higher on the Agreeableness (A) dimension, which may not mean that esports athletes in this sample had a lower than average level of Agreeableness, but that compared to athletes, their level was significantly lower. Palanichamy et al. (2020) recorded similar results.

The obtained result in analyzing the fourth hypothesis shows that the difference is statistically significant ($t(65)=3.025$, $p<.005$) and that the fourth hypothesis is confirmed (Table 1). Once we processed the data regarding the fifth and final hypothesis, we found that it is not confirmed, as the difference between athletes and esports players is not statistically significant (Table 1).

Table 1. *Differences in Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness dimensions between athletes and esports players*

		Grupa	N	M	t	df	p
Extraversion	Equal var. assumed	Athlete	40	28.40	4.091	65	**.000**
	Equal var. not assumed	Esports player	27	23.85	4.033	53.162	**.000**
Agreeableness	Equal var. assumed	Athlete	40	33.40	3.301	65	**.002**
	Equal var. not assumed	Esports player	27	29.59	3.187	49.046	**.002**
Conscientiousness	Equal var. assumed	Athlete	40	34.48	3.025	65	**.004**
	Equal var. not assumed	Esports player	27	30.04	3.271	64.977	**.002**
Neuroticism	Equal var. assumed	Athlete	40	18.75	-2.074	65	**.042**
	Equal var. not assumed	Esports player	27	21.11	-2.118	59.818	**.038**
Openness	Equal var. assumed	Athlete	40	33.92	-1.295	65	.200
	Equal var. not assumed	Esports player	27	35.30	-1.321	59.621	.191

DISCUSSION

The primary objective of the study was to investigate the differences in personality traits between athletes and esports players in order to gain insight into a topic that is rarely studied today and to better understand the population of esports players since athletes have already been the subject of numerous studies.

The results introduced in this examination cannot be upheld by various other studies since the field of research itself has not been sufficiently studied. We are able to state that in this and one other study (Behnke et al., 2023), athletes showed a significantly higher level of Extraversion, which was presupposed considering the way that athletes commonly show higher levels of Extraversion than the average person, and that esports players show higher levels of Introversion than the average person (Cox, 2005; Landers & Lounsbury, 2006; Müller et al., 2014; Beate et al., 2016; Carlisle et al., 2019). According to Amichai-Hamburger et al., higher levels of Neuroticism were linked to internet use that was above average (Amichai-Hamburger et al., 2004; Mehroof & Griffiths, 2010), which was then compared between athletes and esports players in this sample. The athletes in this sample are lower on the scale of Neuroticism, as we can see. Looking at the study of Matuzevsky et al. (2020), esports players exhibit lower levels of Agreeableness, which was also tested in this sample, and athletes demonstrated statistically significant higher levels of Agreeableness, confirming the findings on this particular sample. One of the objectives was to initiate and contribute to scientific knowledge as well as possibly indicate the necessity of researching this trend, particularly in this region, as esports is gradually taking over the market and becoming a global trend.

Behnke et al. (2023) also pointed out that athletes show higher levels of extraversion than esports players do. Just as there is the hypothesis of inclination towards sports, in recent times young people show inclination tendency towards esports, where the main difference is on the Extraversion-Introversion dimension, and research has shown that esports players are indeed more introverted.

According to theoretical findings from a variety of studies in the field of sports psychology (Cox, 2005), athletes typically exhibit lower levels of Neuroticism (N) than the average person, whereas esports players exhibit higher levels of Neuroticism (N) than the general population (Landers & Lounsbury, 2006; Müller et al., 2014; Beate et al., 2016; Carlisle et al., 2019). We confirmed some of the earlier research (Behnke et al., 2023) indicating that esports players had lower levels of conscientiousness than athletes. It could be related to the fact that esports players do not need to adhere to the strict rules that athletes must frequently follow regarding training, diet, and recovery. Athletes need to deal with various elements influencing their performance, on top of the ones that they have in common with esports players, which requires more elevated levels of Conscientiousness and the aspects engaged with it. Additionally, athletes demonstrated average levels of Openness and high levels of Conscientiousness (Piepora, 2021; Mirzaei et al., 2013). As mentioned earlier, athletes generally exhibit average levels of openness, and more successful esports players exhibit higher levels of Openness (Matuszewski et al., 2020).

Taking into account that we had an example of highly ranked esports players, we can say that it is not suprising that we did not find any statistically significant difference between these two groups. However, psychology must follow contemporary trends and study them closely from the psychological aspect, taking into account their sociological aspects, in order to be able to collect information, analyze it and then predict further development, or its psychological consequences. Esports are slowly taking over the market, and seducing children and young people from an early age to engage in esports rather than in sports. That trend will only progress, taking into account the development of the IT industry and the general technologization of all aspects of human life.

CONCLUSIONS

The results obtained on this sample showed us several things. Athletes show higher levels of extraversion, agreeableness and conscientiousness, but lower levels of neuroticism than esports players. No statistically significant differences were found on the dimension of openness. Essentially, extraversion is a key component of any athlete, along with emotional stability. With esports players, these characteristics are not necessary for optimal performance, since they find themselves at the other end of the extraversion-introversion continuum. Neuroticism among Esports players may be related to their excessive use of computers and the Internet, which we know do not really have positive effect on any individual. Agreeableness and Conscientiousness represent the components that an athlete needs to possess, in terms of cooperation, compromise, sacrifice in sports, as well as order and discipline, while these are not key components for an esports player. An esports player can focus only on themself, rather than build understanding and relationships outside the virtual world, and replace the conscious effort for order and discipline with a somewhat unconscious and compulsive use of the computer. We can say that the profile of esports players is somewhat opposite to the profile of athletes, although further research needs to be done, and an attempt should be made to increase the sample size and include as many top level athletes and esports players as possible.

This study was conducted in the hope that it will boost research of this topic, and that we will get to know more precisely the things that are becoming dominant today, especially among young people, whose devices and technology are slowly taking over most of their free time. One of the shortcomings of this research is the sample size. Although there may not be a large number of elite ssports players in Bosnia and Herzegovina, we could probably find more esports players and athletes of this profile if we merged respondents from a few countries in the region. This would give us a broader picture, a larger sample, and yet we would be able to obtain results with more certainty, taking into account the origin and similarity of the peoples in the region. Also, in case of a larger sample, it would be good to make a comparison between elite esports players and athletes and those who do it at a lower level, or at least not at the level of professionals who make a living from it. On the other hand, observing these results, we could design and implement certain awareness programs, in the context of computer use, and make mostly young esports players aware of the importance of mental health. In that case, we would teach them different techniques and precautions when using computers intensively. True, perhaps it would be best to avoid the intensive use of computers, but our task is not to reeducate people, but to try to facilitate their daily functioning in accordance with the goals and values of esports players. Stimulating and encouraging them to engage in social interactions, strengthening their psychological readiness, which includes resilience and general improvement of mental health, and devising certain mechanisms of sufficient computer use, along with healthier compensatory activities in the real, physical world, is perhaps one of the ways of practical application of these results.

REFERENCES

1. Amichai-Hamburger, Y., Wainapel, G., & Fox, S. (2004). "On the Internet No One Knows I'm an Introvert": Extroversion, Neuroticism, and Internet Interaction. *CyberPsychology & Behavior, 5*(2), 125-128. https://doi.org/10.1089/109493102753770507
2. Beate, B., Stopfer, J. M., Muller, K. W., Beutel, M. E., & Egloff, B. (2016). Personality and video gaming: Comparing regular gamers, non-gamers, and gaming addicts and differentiating between game genres. *Computers in Human Behavior, 55*(A), 406-412. https://doi.org/10.1016/j.chb.2015.09.041
3. Behnke, M., Stefanczyk, M. M., Żurek, G., & Sorokowski, P. (2023). Esports Players Are Less Extroverted and Conscientious than Athletes. *Cyberpsychology, Behavior, and Social Networking, 26*(1), 50-56. http://doi.org/10.1089/cyber.2022.0067
4. Carlisle, K. L., Neukrug, E., Pribesh, S., & Krahwinkel, J. (2019). Personality, Motivation, and Internet Gaming Disorder: Conceptualizing the Gamer. *Journal of Addictions & Offender Counseling, 40*(2), 107-122. https://doi.org/10.1002/jaoc.12069
5. Cox, R. H. (2005). *Psihologija sporta – koncepti i primjene*. Zagreb: Naklada Slap.
6. Čolakhodžić, E. (2021). *Metodologija i tehnologija naučnoistraživačkog rada*. Mostar: Nastavnički fakultet Univerziteta „Džemal Bijedić".
7. Eagleton, J. R., McKelvie, S. J., & De Man, A. (2007). Extraversion and neuroticism in team sport participants, individual sport participants, and nonparticipants. Percept. *Mot. Skills, 105*, 265–275. https://doi.org/10.2466/PMS.105.5.265-275
8. EsportsMention. (2019). *Why Esports is a sport*. https://esportsmention.com/esports/insights/why-esports-is-a-sport/
9. EsportSource. (2021). *The most popular esports games in 2021*. https://www.esportsource.net/the-most-popular-esports-games/
10. Garcia, J. (November 7, 2022). *League Of Legends Worlds 2022 Finals Breaks Peak Viewership Record*. DualShockers. https://www.dualshockers.com/league-of-legends-worlds-2022-breaks-viewership-record/
11. Himmelstein, D., Liu, Y., & Shapiro, J. L. (2017). An exploration of mental skills among competitive league of legend players. *Intern. J. Gam. Comput. Med. Simul, 9*, 1–21.
12. Landers, R. N., & Lounsbury, J. W. (2006). An Investigation of Big Five and Narrow Personality Traits in Relation to Internet Usage. *Computers in Human Behavior, 22*, 283-293. https://doi.org/10.1016/j.chb.2004.06.001
13. Larsen, R., & Buss, D. (2008). *Psihologija ličnosti – područja znanja o ljudskoj prirodi*. Zagreb: Naklada Slap.
14. MarketWatch (2023). *Esports Market 2023 Size, Share, Current Developments, Growth Analysis Assessment, Market Strategies and Future Outlook 2027*. https://www.marketwatch.com/press-release/esports-market-

2023-size-share-current-developments-growth-analysis-assessment-market-strategies-and-future-outlook-2027-2023-01-17
15. Matuszewski, P., Dobrowolski, P., & Zawadzki, B. (2020). The Association Between Personality Traits and eSports Performance. *Front. Psychol, 11*, 1490. https://doi.org/10.3389/fpsyg.2020.01490
16. Mehroof, M., & Griffiths, M. D. (June 17, 2010). Online Gaming Addiction: The Role of Sensation Seeking, Self-Control, Neuroticism, Aggression, State Anxiety, and Trait Anxiety. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 313-316. http://doi.org/10.1089/cyber.2009.0229
17. Mirzaei, A., Nikbakhsh, R., & Sharififar, F. (2013). The relationship between personality traits and sport performance. *Eur. J. Exper. Biol. 3*, 439–442. https://www.semanticscholar.org/paper/The-relationship-between-personality-traits-and-Mirzaei-Nikbakhsh/e370700d191d9f02199a0f1c314f15d9a021fe8b
18. Muller, K. W., Beutel, M. E., Egloff, B., & Wolfling, K. (April 2014). Investigating Risk Factors for Internet Gaming Disorder: A Comparison of Patients with Addictive Gaming, Pathological Gamblers and Healthy Controls regarding the Big Five Personality Traits. *Eur Addict Res, 20*(3), 129-136. https://doi.org/10.1159/000355832
19. Nia, M. E., & Besharat, M. A. (2010). Comparison of athletes' personality characteristics in individual and team sports. *Proc. Soc. Behav. Sci, 5*, 808–812. https://doi.org/10.1016/J.SBSPRO.2010.07.189
20. Olympics. (2021). *Esports in Asian Games 2022: Eight games to feature as medal events*. https://olympics.com/en/news/fifa-pubg-dota-2-esports-medal-events-asian-games-2022/
21. Palanichamy, T., Sharma, M. K., Sahu, M., & Kanchana, D. M. (2020). Influence of Esports on stress: A systematic review. *Ind Psychiatry J., 29*(2), 191-199. https://doi.org/10.4103/ipj.ipj_195_20
22. Piepiora, P. (2021). Personality profile of individual sports champions. *Brain Behav., 11*(6). https://pubmed.ncbi.nlm.nih.gov/33951345/
23. Raharjo, H., Kusuma D. W. Y., & Hartono, M. (2018). Personality Characteristics In Individual And Team Sports. *Advances in Health Science Research, 12*, 92-95. https://doi.org/10.2991/ISPHE-18.2018.20
24. Roundhill Team. (September 25, 2020). *Esports Viewership vs. Sports in 2020*. https://www.roundhillinvestments.com/research/esports/esports-viewership-vs-sports
25. Witkowski, E. (2012). On the digital playing field: how we "do sport" with networked computer games. *Games Cult, 7,* 349–374. https://doi.org/10.1177/155541201245422

SPORT - Science & Practice, Vol. 13, №1, 2023, pp. 29-42.

Scientific review **CC BY**

ROLE OF SPORT IN PROMOTION OF EDUCATION AT CATHOLIC UNIVERSITY OF NOTRE DAME IN SOUTH BEND, USA [1] [2]

UDK: 796.333.7(73)
378.4(73)
DOI: 10.5937/snp13-1-45418

Dragica Luković Jablanović[3]
College of Sports and Health, Belgrade, Serbia

Abstract: This paper investigates the value of the Notre Dame University football[4] program for its educational marketing and finances. A strong interdependence between economy, politics, mass media, and sport caused an exceptional popularity of football in the USA. The University of Notre Dame, Indiana was one of the first to adjust to this trend by revitalising its football program which was established as a part of its developmental strategy as early as in 1887. A hypothesis that the popularity of football was successfully used not just for the promotion of education, but also for the further development of the University of Notre Dame has been analysed through the case study methodology. This analysis concludes that the University of Notre Dame boosted its prestige by using its football program as a promotional tool to become one of the highest-ranking research institutions on the national level. On the other hand, this case study confirms that there is no conflict between religious dogma and evidence-based science if they walk together toward the progress, i.e. if their common goal is to set people free.

Keywords: *education, sport, Catholic Church, University of Notre Dame, football*

INTRODUCTION

Intellectual and spiritual freedoms have always varied among people, but in general, they have historically increased with higher levels of education. Education through an institution that is primarily spiritual frees a person from extreme materialism. As in other areas of life, the quote "You will go most safely by the middle course" (lat. *Medio tutissimus ibis*) is applicable in this case[5]. Over time, the University of Notre Dame has grown into a crossroad of spirituality and practical experimental science. The inclusion of football in the development strategy of the University of Notre Dame (ND) has greatly contributed to its academic and religious recognition.

The relationship between religion (spiritual) and science (secular) has traditionally been delicate in various historical circumstances. On the other hand, the beginnings of modern education appeared precisely in church schools of the Middle Ages. In the 18th and 19th centuries, religion and science were still seen as opposing spheres. In the 20th and 21st centuries, a significant change took place, when enough space was created for religion and science to coexist successfully. Over time, the Catholic University of Notre Dame has managed to pro-

[1] The paper was received on July 10, 2023, edited on July 17, 2023, accepted for publication on July 19, 2023.
[2] The paper was presented under the same title at the 5th International Scientific Conference "Sport, Recreation, Health", organized by the College of Sports and Health from Belgrade on May 19, 2023.
[3] ✉ dragica.lukovic@vss.edu.rs
[4] Throughout the following text, the term "football" refers to American football.
[5] Roman poet Ovid.

mote education and experimental science through the values of the Catholic religion and thus bring them closer to both local and federal economy and politics, which has contributed to the overall development of the society.

The current scientific interest of the investigated topic of the paper is, on the one hand, the observation of the cause-and-effect relationship between football as the most successful segment of the university sports program of Notre Dame and the promotion of holistic education at this institution. On the other hand, the paper looks into the impact of the development of the economy of the city of South Bend in the 19th century on the development of university education at ND, as well as the contribution of the University's football program to the economic development of the city.

METHOD

Using a comparative analysis, the paper addresses the importance of the football team "Fighting Irish" not only for the holistic development of the University of ND, but also for the economic development of the city of South Bend. Using the method of case study and content analysis, it was shown how, due to the interaction of religion, sports, economics, and politics, the University grew into a highly ranked national educational institution.

On the other hand, the paper analyses how much the establishment of the football program contributed to the growth of this private, Catholic University. Through its football team "Fighting Irish", among other things, this institution was promoted, its income grew, the infrastructure was expanded mainly through private donations, its political ties were strengthened especially during the term of President John Kennedy, a Catholic and of Irish descent, and the city of South Bend benefited economically.

Research questions

The most important results in the study were achieved by simultaneously following these three research questions:

1. What was the impact of the economy of the city of South Bend on the development of the University of Notre Dame and vice versa?
2. What enabled the Catholic Church to develop an efficient system of higher education in South Bend, Indiana, on the long run?
3. What was the contribution of football to the development of the University of Notre Dame?

RESULTS

1. The impact of the economy of the city of South Bend on the development of the University of Notre Dame and vice versa

The roots of the economic history of the city of South Bend go back a long way. More than 2000 years before Europeans came to that area, it was inhabited by natives (*Potawatomi* and *Sauk*). They used several regional waterways through which they traded with tribes from the Mississippi River Basin to the Gulf of Mexico. As the white people arrived, "many native Americans welcomed the new trading partners, but distrust and anger developed when the new arrivals soon began to claim the land as their own" (Palmer, 2003, p. 19). In the 19th century, the economy of South Bend developed rapidly thanks to, among other things, the abundance of raw materials and new technologies that the families of the first industrialists, mostly immigrants from Europe, applied in America.

For example, in 1835, a group of investors from New York obtained permission to dam the river, which made it possible to build an industrial-scale grain mill and sawmill. Then, the enterprising German Baptist Studebaker Family founded a factory of pioneer wagons in South Bend in 1852, as shown Figure 1[6].

Thanks to the exceptional craftsmanship, they received the first military contracts after the outbreak of the Civil War in 1861, and later began the production of Studebaker cars and military trucks. Immediately after the great Chicago fire of 1871, the *Oliver Company* of South Bend bought up all the steel poles in the burned part of the city,

[6] Pioneer wagons were initially used by the pioneers traveling westward seeking to settle on the native Indian land.

to manufacture ploughs and stands for *Singer* sewing machines (Palmer, 2003). In 1870, South Bend had a population of 7,209, as well as 237 businesses and industries and 5 railroads and 3 banks (Idem). The Studebaker company transformed itself in 1902 when it began producing automobiles. It was the only carriage manufacturer that managed to transition into the new automobile industry. Studebaker's success and prosperity led to the sponsorship of several building programs in South Bend and surrounding areas for commercial, residential, and religious purposes among others ("Studebaker Family", 2023).

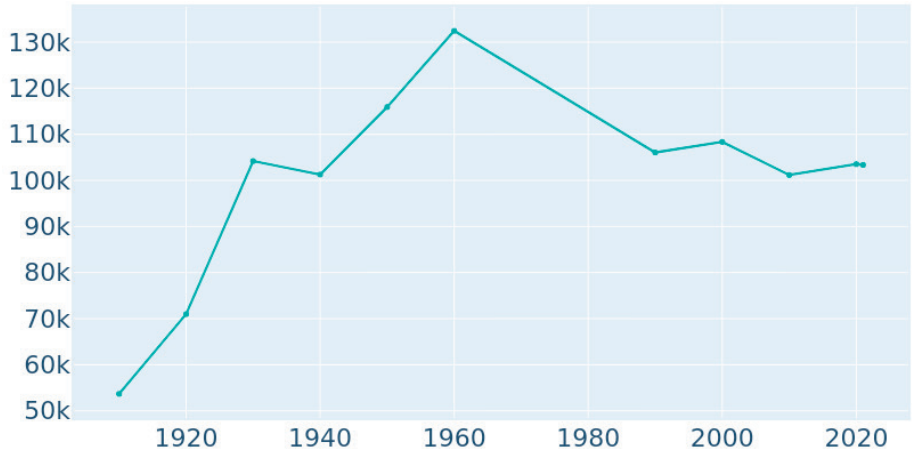
Figure 1. *Studebaker: The Car that Made South Bend*


American Wagons in British Army Service.

Source: Dunlop Richter, 2022.

On the other hand, the ND football team boosted the economy of the city of South Bend. Hundreds of thousands of fans flocked to the city every football season. Special trains arrived from Chicago with hundreds of fans for Notre Dame football games. In 1921, there were 21 hotels in South Bend, while by 1931 the number went up to 31. "Every restaurant, cigar store, clothing store, barber shop, beauty shop, peanut store, bank, and other business in South Bend has prospered thanks to Rockne's successful teams" (Palmer, 2003, p. 122). Every home game beginning with the last two games in 1964 was a sell-out except for one - the 1973 Thanksgiving game against Air Force One. Notre Dame has played 449 games at Notre Dame Stadium ("Notre Dame Stadium", 2023).

Graph 1. *South Bend Population by Year*



Source: "South Bend, Indiana Population History 1910–2021", 2023

In 1939, the city of South Bend received more federal contracts ($12,984,846 in value) than any other city in Indiana (Palmer, 2003). Studebaker and Bendix Aviation Co. have switched to the production of aircraft parts. Oliver

continued the production of tractors and ploughs because agriculture was of national importance to victory. It should be mentioned that during World War II, ND offered its facilities to the US armed forces. Despite everything, the city's economy developed rapidly, which led to the growth of the population, which reached its peak in 1960 with 132,445 inhabitants (Graph 1). At that time however, there was a decline in the production of the entire American auto industry. In December 1963, Studebaker closed its South Bend plant, ending production of its cars and trucks in America (History.com Editors, 2021). The shutdown of this company in the 1960s left 7% of the city's workforce on the street.

In 1849, there were only 56 students at Notre Dame, while in 1865 there were 505. Then, in 1920, the number of students soared to 2,075. In 1930, two years after the founding of the Fighting Irish football team, the number of students increased to 3,176. The positive trend was interrupted by the Great Depression and the Second World War. Since the 1950s, the number of students has been growing again (Table 1):

Table 1. *Increase in the number of students at the University of Notre Dame 1950-2021*

Year	Number of students
1950	5,052
1960	6,467
1970	8,156
1980	8,925
1990	10,132
2000	10,899
2011	12,004
2021	13,139

Adapted according to: Hickey, 2014

To this day, Notre Dame football events bring high revenues to the local economy, as they are generators of visitor spending in many ways. For example, in 2015, the average number of flights from South Bend Regional Airport increased by 41.8% during the month in which football games were played. Also, in the same period, the number of nights spent in hotels increased by 26.0% (Appleseed, 2017).

On the other hand, the economy of South Bend has always had an impact on the development of ND. One example is that "in September 2015, ND and the city announced that they are joining a partnership called the MetroLab Network, a national consortium of 34 university-city partnerships aimed at using technology and data analytics to develop innovative solutions to improve infrastructure, city services and other priorities of the public sector. ND and the city of South Bend have established four projects for the first year of the partnership" (Appleseed, 2017, p. 34).

2. What enabled the Catholic Church to develop a long-term effective system of higher education in South Bend?

One of the confirmations of the successful coexistence of religion and science, as two significant spheres of human existence, came through the University of Notre Dame du Lac which was built about 2 miles away from the city of South Bend (Indiana). In 1842, several missionaries of the Congregation of the Holy Cross (lat. *Congregatio a Sancta Cruce* - CSC) arrived in the city, headed by Father Edward F. Sorin, with the aim of establishing a school[7]. "This college will be one of the most powerful means for doing good in this country" — declared Rev. Edward Sorin, C.S.C., founder of the University of Notre Dame du Lac (Congregation of Holy Cross, 2023). In the first few years, the future of the University was uncertain. Money was scarce, "typhoid fever killed many students and priests, and several fires almost destroyed the University" (Palmer, 2003, p. 61; "Hot Havoc", 1879). The expansion

[7] Only in 1857 did Rome accept the first constitutions of the Congregation of the Holy Cross. It was during the pontificate of Pope Pius IX, the last ruler of the so-called Papal States that disintegrated after the fall of Napoleon and became part of united Italy. After 1870, the political power of the Holy See (lat. *Sancta Sedes*) declined drastically and it functions as the governing body of the Catholic Church without its own territory. Since then, the so-called *Roman Question*: 1870-1929, remains unresolved. The Vatican did not recognize Italy as a country for six decades. Pius IX declared himself a "prisoner" in the Vatican Apostolic Palace, de facto - a ruler without a state. Also, he proclaimed the dogma on the infallibility of the Pope (Luković Jablanović, 2022).

of the University was hindered by the Civil War and the economic crisis. Father Sorin was the first president of the University of ND between 1842 and 1865. "He often gave free tuition for students who would help construct buildings" (Palmer, 2003, p. 72).

The presidents of ND are traditionally members of the Congregation of the Holy Cross. Their job description includes attracting new students, then donations from prominent business leaders as well as soliciting endorsements from top national politicians[8]. As the presidents of the University were not only responsible for finances, for the promotion of the institution and for academic leadership, they were also tirelessly uniting Catholic dogma with the progress of modern science. In a word, they involved Notre Dame in many important events of religious, educational, economic, political, or cultural nature. German American social psychologist and psychoanalyst Erich Fromm suggests that we should evaluate the fruits of any religious teaching by its outcome: "If religious teaching contributes to the growth, strength, freedom and happiness of believers, we see the fruits of love. If it contributes to the narrowing of human possibilities, dissatisfaction, and lack of productivity, they could not be the fruits of love, regardless of what dogma intends to convey to them" (From, 2015, p. 58).

The United States of America is often described as a *melting pot* of numerous nationalities, their cultures, and religions. Although the confessional Evangelicalism and Protestantism dominate the religious scene in the USA, the liberal branch of Catholicism has traditionally had its firm foothold there[9]. Thanks to this branch, the University of Notre Dame developed its specific ideological and academic program, within which, since 1887, the football program was also formed. A few decades later, the University permanently included experimental research in its scientific programs.

In the period 1919 - 1922, the president of the University was Father James Aloysius Burns. As a chemistry professor with a keen sense for research science, this Catholic leader was instrumental in transforming Notre Dame into a national research university and founding the Catholic Education Association. Some of the presidents of Notre Dame have publicly expressed their political views as well as their Christian values during difficult times. For example, Father Walsh (Matthew J. Walsh), president of the University from 1922 to 1928 was arrested in 1924, along with his 8 students and the mayor, during the "Notre Dame Riot". University students took to the streets that day and dispersed a parade of Ku Klux Clan members[10].

Catholic priest and academic Theodore M. Hesburgh presided over the University for thirty-five years (1952–1987). At that time, ND (then long known for its football program) broke out into the top of the respective American Catholic universities and achieved rapid development. Hesburgh was very socially and politically engaged and held positions on various government commissions, including the National Science Board and the Commission on Immigration Reform. Then, he was a permanent representative of the Holy See at the International Atomic Energy Agency in Vienna, as well as a member of the Pontifical Council for Culture in 1983. Pope Paul VI appointed Hesburgh as head of the Vatican delegation attending the twentieth anniversary of the United Nations Declaration on Human Rights in Tehran, Iran, and as a member of the Holy See's delegation to the UN in 1974 (The Catholic Sun, 2013). Prestigious recognition of the University of ND - Laetare Medal was awarded to President Kennedy in 1961 (Figure 2), and the award was presented to him by the President of the University, Father Theodore Hesburgh[11]. Although the Presidents of the University are still elected from the Congregation of the Holy Cross (CHC), since 1967 the management of Notre Dame has included lay people in the Board of Directors (The Editors of Encyclopaedia Britannica, 2023).

There is no doubt that the Catholic Church developed an effective long-term system of higher education at the University of Notre Dame (which attracted more Catholic students than any other American university). This development was made possible especially in the period of industrialization, due to the increased need for highly educated personnel capable of applying their knowledge and skills in practice, as well as to increase the efficiency of production through innovation. Finally, the accelerated development of modern science at Notre Dame fit well with the ideology of the liberal fraction of North American Catholicism.

---

[8] Inviting the current president of the United States to speak at the graduation ceremony is a tradition at the University of ND.

[9] Although Protestantism as a religious trend originated in Europe, today its main stronghold is in the USA, spread under different denominations (Lutherans, Baptists, Anglicans, and others).

[10] In 1924, the Ku Klux Clan gained control of the Indiana Republican Party. Klan members had anti-Catholic, anti-African American, anti-immigrant, anti-Jewish sentiment.

[11] Each year, the University of Notre Dame awards the Laetare Medal to the most outstanding American Catholic layperson. Since 1883, it has been generally accepted that in that category this award is considered "traditional and generally accepted, the most honorable and most distinguished in the USA".

Figure 2. *President Kennedy receiving the Laetare Medal in 1961*

Source: Abramson, 2015

An important link in the promotion of Notre Dame, which ushered it into the national scene as an educational and sports giant, was - football. It is important to note that it was mainly through college football that Americans of Catholic origin became equal to the majority Protestant population in the field of education. In that process, for many, especially for Americans of Irish origin, football became "more than a game"[12]. The discrimination faced by Irish immigrants in America in the mid-19th century is illustrated by the message that ended many job advertisements at the time: No Irish need apply (Bulik, 2015).

On the other hand, these circumstances, that is, the needs of the time, gave rise to the enthusiastic and visionary involvement of the University President. Part of their engagement was the introduction of the sports program into the University's development strategy. It can be concluded that all the above-mentioned factors complemented each other and as a result of their synergy, a long-term successful system of Catholic higher education at the national level was created.

3. What was the contribution of football to the development of the University of Notre Dame?

There is no doubt that experimental science and sports helped the development of the Catholic University of ND. The University of Notre Dame has expanded its athletic program over the years. However, the most premeditated investment was made in one of the most popular sports in the USA - football, in which the University achieved the most success. The football team of the University of ND, nicknamed the "Fighting Irish", which was formed in 1928, was composed of players of 17 different nationalities, mostly Europeans[13]. The Notre Dame team built its national reputation in intercollegiate football in the 1920s, led by legendary coach Knute Rockne (Figure 3). In the period 1918-1930 he had 105 wins (88.1% winning percentage), 12 losses and 5 draws. On the other hand, the popular Notre Dame football coach was employed part-time as a sales promotion manager for the Studebaker Corporation, until his tragic death in 1931 (Palmer, 2003) [14].

[12] In Ireland, in the middle of the 19th century, due to a fungal infection of potatoes, there was a period of the Great Hunger. This social-economic crisis caused that in the period 1845-1855. about 1 million people died of hunger, and about 2 million emigrated, mostly to England and America. The Irish, as economic emigrants, were exposed to almost the same kind of discrimination as African-Americans upon their arrival to America. Already in the first decade of the 20th century, there was a gradual cessation of the segregation of the Irish, mainly due to their economic strengthening. Starting from Boston on the East Coast to the West, the Irish began to occupy significant positions in the economic and political milieu of the United States. As early as 1914, the mayor of Boston, James Michael Curley, was of Irish descent. Gradually, the Irish begin to educate their children in prestigious universities, preferring the best Catholic university - Notre Dame.

[13] The nickname "Fighting Irish" came from the time of the American Civil War when Irish immigrants fought on the Union side as part of the Irish Brigade.

[14] In 1940, Warner Brothers began showing the film "Knute Rockne, All American" (Pat O'Brien, Ronald Reagan). The three-day official premiere was seen by 150,000 people, and the euphoria in the city lasted for several months. About 1 million dollars of the money of that time was spent.

Figure 3. *Knute Rockne - the most famous Notre Dame football coach*

Source: Studebaker National Museum, n.d.

Most presidents of the University of ND (of the Roman Catholic denomination by the rule) in addition to obtaining financial resources, expanding capacities, and organizing new departments, also consciously invested in experimental science, thus working to reconcile the old, dogmatic Catholicism with the new achievements of modern science. The presidents of this institution were actively involved in all important events not only of an educational and religious origin, but also of a social, cultural, and political nature. Every historical challenge that the University has faced since its founding required different responses from its presidents, who raised the reputation of the University and increased the number of students.

The football program was founded by Father Thomas E. Walsh, who presided over the University from 1881 to 1893. On the other hand, the climate of the local economy was favourable at the time. Namely, the city of South Bend had the most products per capita in the USA in 1890. There were the largest factories in the world for: ploughs, carriages, sewing machines, for separating clover, as well as a steel plant for ploughs. The first tram also arrived (Palmer, 2003). Circumstances were quite different when Father John W. Cavanaugh led Notre Dame, during the difficult times just before and during World War I (Cavanaugh, n.d.). He managed to attract renowned scientists to the University, including numerous war refugees. Football, in particular, was developing strongly during that period, but not without a certain amount of apprehension on Cavanaugh's part that Notre Dame would become primarily known as a football school (Figure 4). Additionally, by 1913 the University's football program was operating at a loss.

Figure 4. *Notre Dame's 1909 football team*

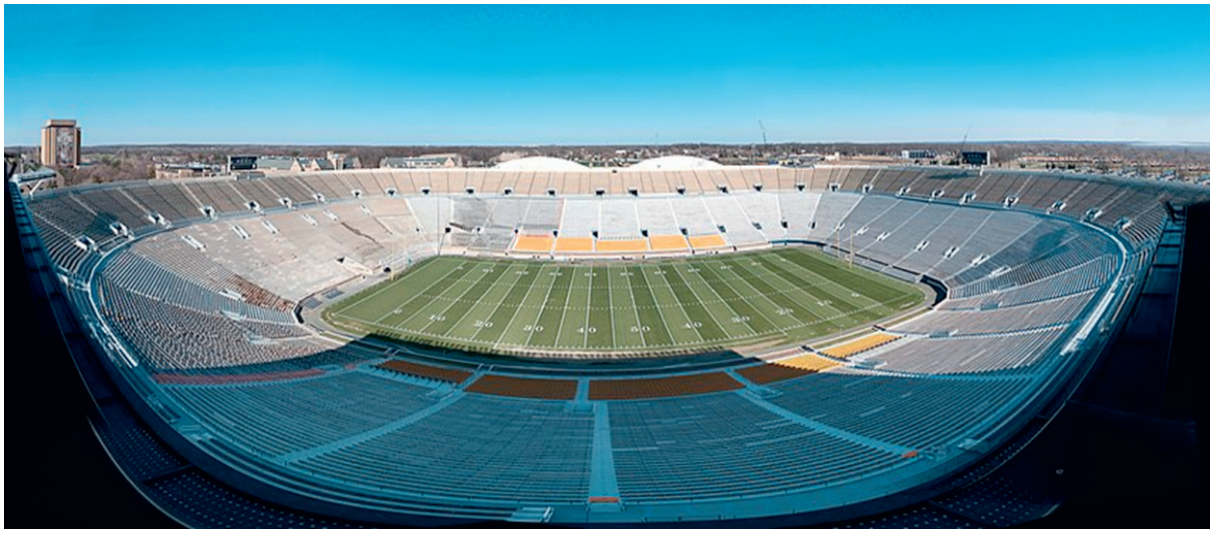
Source: O'Shaughnessy, 2023

Notre Dame's academic inventiveness was also reflected in sports. A turning point in the history and popularization of college football occurred in 1913 while Rockne was a player (Bohn, 2013). Although the ND team did not invent the forward pass, their attack was characterized by an attractiveness of play based on accurate and fast running and passing, which had never been seen before in a big team game ("Notre Dame Football 1913", 2013).

The popularity of this sport kept growing. Another significant year in the history of football at the University is 1914, when Knute Rockne was hired as an assistant coach and became the head coach in 1918. During the Great Depression, he promoted the idea of building a bigger Notre Dame stadium, believing that people from all over America would come to watch the games, that is, that sports in a time of crisis can replace what people don't have. A revolutionary concept at the time. His idea of building a stadium was supported and implemented in 1929 by the then president of Notre Dame, Father Charles L. O'Donnell.

At a time when games were played before just a few hundred fans, Rockne passionately advocated for the 60,000-seat Notre Dame Stadium to be built ("Notre Dame Stadium", 2023)[15]. "Never mind that Notre Dame had 3,000 students and that the community had a population of less than 80,000, Rockne's concern was that 60,000 seats wouldn't be nearly big enough and had plans to cantilever the stadium to seat 100,000. Visionary or romantic – or both?" (Stephen & Krause, 1993, p. 3). Notre Dame Stadium (Figure 5) is today a very impressive building in the world of sports.

Figure 5. *The Notre Dame Stadium 2009*



Source: "Notre Dame Stadium Panorama.jpg", 2016

On the other hand, trying to capture a wider market with a lower price and avoid the negative effects of the Great Depression, Studebaker introduced a smaller companion car called the *Rockne*, named after the legendary University of Notre Dame football coach. The economic crisis was so great, that even cheap cars like "the Rockne" were not sold. It was only produced for two years in 1932 and 1933 (Rothermel, 2023). The perception of Father John Francis O'Hara, who led the University from 1934 to 1939, is interesting. He saw in the "Fighting Irish" football team (Figure 6) the potential to introduce the public to the ideals that dominate Notre Dame. In a word, that even when playing the most difficult games, the football team should provide an inspiring example of spiritual life ("John Cardinal O'Hara", 2023).

Thanks to philanthropists, the University received two impressive sports centres in the first decade of the 21st century: Guglielmino Athletics Complex and The LaBar Practice Complex - includes a project worth 2.5 million dollars. The 95,000 SF Guglielmino Athletic Complex ("Goog") is home to the legendary Fighting Irish football team and represents the University of Notre Dame's continued commitment to elite sports (The University of Notre Dame, 2023). The complex is designed to serve about 800 Notre Dame student-athletes. Estimated number of total non-local visitors to ND home football games by type of visitors, 2015-16 football season is 314,363. On the other hand, in the fall of 2015, a total of 12,292 students were enrolled at Notre Dame (Appleseed, 2017).

[15] Until the 1996 season, Notre Dame Stadium held 59,075 fans. After its expansion it holds 80,795 seats.

Figure 6. *The helmets of the "Fighting Irish" and the Golden Dome of the Basilica*

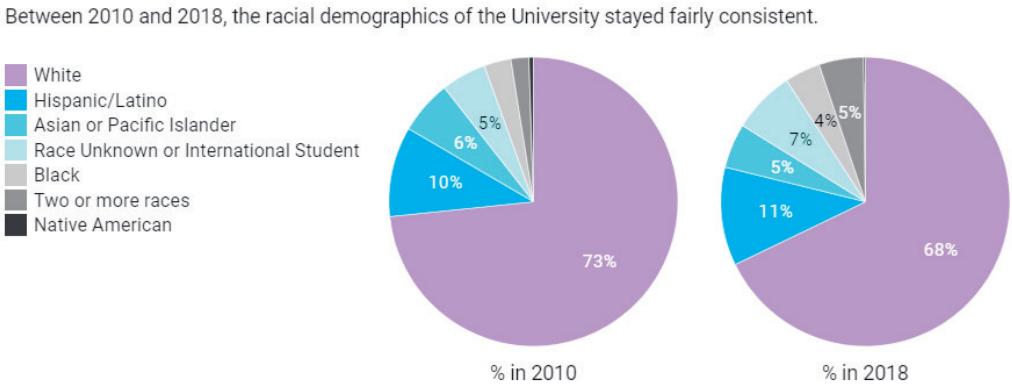
Source: adapted by author

According to the edition of Best Colleges and National Universities for 2022-2023, the University of ND is ranked 18th out of 443 national universities (U.S. News & World Report, 2023)[16]. This premiership can thank in part to its most successful sports program - men's football. The quality of Notre Dame's football team is illustrated by the fact that it won 11 - *NCAA football championships* and had the best players in seven championships - *Heisman trophy* (College Weekends, 2022).

DISCUSSION

The primary objective of the study was to investigate the differences in personality traits between athletes and There is no doubt that ND is a place where different traditions meet and are respected. Its students come from all 50 US states, as well as from over 100 countries around the world. It is present on all continents through its programs, projects and established relationships. About 10% of the University's students and scientists come from outside the USA. The policy of admitting students exclusively based on academic criteria has its roots since the founding of Notre Dame, when Father Sorin opened the doors of that institution to Protestants and Jews. Although the number of non-Catholics never exceeded 20% of students, their attendance contributed financially to the school and built positive religious relations in the region. This kind of ecumenical approach (atypical for many Catholic institutions) later enabled Knute Rockne the Protestant, their football coach with the most trophies, to be educated there (Sperber, 2002). Racial and ethnic diversity within the University is its additional quality (Graph 2).

Graph 2. *Student Racial and Ethnic Diversity at Notre Dame 2010-2018*



Source: Smith et al., 2020

[16] The first three places are taken by: Princeton University, Massachusetts Institute of Technology, and Harvard University.

The total number of students enrolled in the fall of 2021 is 13,139. According to *The Insider's Guide to the Colleges*, in 2010, about 80% of ND students identified themselves as Catholic. In the generation of students in 2023, there were 81.5% Catholics (The Observer, 2023).

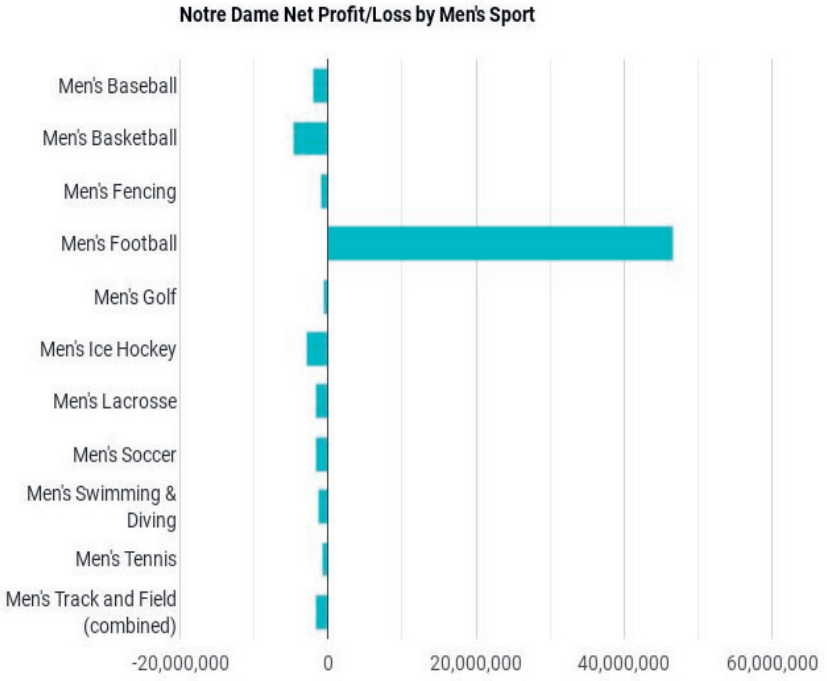
Notre Dame is one of the most prestigious and demanding academic institutions in the US. It has eight different faculties, departments, and programs for undergraduate and graduate students. It is ranked 11th by the U.S. News for best undergraduate teaching, with a graduation rate of 96.9% (U.S. News & World Report, 2023). The University of Notre Dame is not only one of the top general education institutions, but one of the leaders in national research and financial aid to its students. Aerodynamics of glider flight, wireless message transmission, and formulas for synthetic rubber were pioneered at the University. Today, researchers are making advances in astrophysics, radiation chemistry, and environmental science, research of tropical disease transmission, peace studies, cancer research, robotics, and nanoelectronics. Notre Dame believes that commitment to religion and science is not only compatible, but even complementary and mutually beneficial.

This University has grown into a recognized research institution—outpacing others in research expenditures by 160% since 1990 and achieving the University's all-time high in research awards. Research spending nearly doubled from 2010 to 2018; it grew from $110,360,000 to $220,000,000. External research funding increased by 52% from $118,845,047 in 2010 to $180,628,753 in 2019 (Smith et al., 2020). Since 2007, research funds received from the University have increased by 194%. In recent years, Notre Dame has received tens of millions of dollars to research mosquito-borne diseases, improve educational outcomes globally, and establish the Labs for Industry Futures and Transformation (LIFT Network) in the South Bend-Elkhart region (The Observer, 2023). The Association of American Universities (AAU) announced in May 2023 that the University of Notre Dame was one of six newly selected to join the AAU. This is a very prestigious organization of leading research universities that was founded in 1900. Membership of the AAU (71 institutions in total) is by invitation only and is based on an extensive set of quantitative indicators that assess the breadth and quality of research and education at universities (Association of American Universities, 2023). ”Our mission at Notre Dame is to be a preeminent research university, provide an unsurpassed undergraduate education and to have all we do informed by our Catholic mission”, said Notre Dame University President Rev. John I. Jenkins, C.S.C. (Nietzel, 2023).

The paper used a comparative analysis of the development of the city of South Bend and the University of Notre Dame - which was methodologically treated as a case study. The economic development of the city of South Bend began with the appropriation of native territory and the use of hydropower and an abundance of other natural resources. That development was then accelerated through the use of electricity, technological innovations, especially in transportation, contracts with the US government during the Civil War and both world wars; then, through using secondary raw materials after the great Chicago fire, and by stimulating immigration to South Bend to obtain cheap labour force. On the other hand, such an influx of population and the economy of the city were prerequisites for a significant development of higher education, which was already organized earlier by the Roman Catholic Church within the University of Notre Dame. A further stimulus to its development came from within - from a liberal form of Catholicism that reconciled Christian dogma with experimental science and in this sense, they were pioneers. European lecturers-immigrants hired during the world wars brought a special quality to this institution.

The analysis of the content of the available literature confirmed that the progressive, liberal faction of the Roman Catholic Church was successfully involved in the economic (helped by the elite business of the time, especially the forerunners of the automobile and metal industry), political (especially through the Irish-Catholic Kennedy family) and scientific-educational life (judging by the ranking and national prestige of the University of Notre Dame). The introduction of the football program in 1887 significantly contributed to the promotion of both the educational and ideological basis of the University of ND as an institution of higher education. From the beginning, the football program was profiled in proportion to its popularity with the American public. Notre Dame's success came largely from its commitment to excellence on and off the athletic field. Accordingly, the football team has had several legendary coaches, then plenty of good players, and its particular strength is a passionate and loyal fan base.

Graph 3. *ND Net profit/loss by men`s Sport in $ U.S., 2023*



Source: College Data Analyitcs Team, 2023

The popularity of football in the US is still many times higher than the popularity of other sports. The football program turned a profit, i.e. making $46,557,448 for the school (Graph 3). However, both the football program and the academic-research status of the institution are still important for the University's reputation. This is evidenced by recent capital investments in the sports program, as well as in the development of new academic programs and research. Between the fall of 2005 and the fall of 2015, total enrolment at Notre Dame grew by 7.7 percent. In fiscal year 2016, research spending at Notre Dame totalled $202.2 million - an increase of nearly 157 percent in ten years (Appleseed, 2017).

In the modern stage of the University's development, when ND represents a recognized scientific and research institution and at the same time has a high-quality football program, their parallel development serves further promotion of the University. To confirm this claim, most of the income from football flows into research and development, as well as into grants for students. In addition, for major projects and the development of new programs, the University relies on donations[17]. An illustration of the financial power, but also the discipline of this Catholic University, is the fact that its leaders do not start a single capital investment, or a single large project, without securing 100% of the funds. Television rights to the "Fighting Irish" games are a significant part of that financial security ("2023 Blue-Gold Game: Full Broadcast", 2023). "Notre Dame signed a multi-year agreement with NBC in 1991 to nationally broadcast all of its home games, the only such deal at the time. That deal, which now runs through 2025, has brought millions of dollars of revenue to the institution and ensures the financial stability of its athletics program for years to come" (Belzer, n.d.).

Over time, the university became so prestigious that it no longer had to spend as much money on attracting students any more. Thus, all income from football (TV rights, advertisements, tickets, sales items with the logo of the football team, etc.) could be directed to academic activities and research, including the awarding of scholarships. At the end of the 19th and the beginning of the 20th century, the situation was reversed, the football program even brought losses, but it was kept in order to attract new students.

[17] The Nanovic Foundation financed the construction of the building that houses the newly founded Nanovic Institute for European Studies, whose mission is to explore the ideas of culture, tradition, religion, moral challenges, and institutions that formed Europe. That is the whole program of Mr. Nanovic's philanthropic vision of connecting Europe and America. Notre Dame was chosen for its academic reputation and status as an open, liberal private educational institution (Nanovic Institute for European Studies, 2023).

At any rate, the management of the University was ahead of its time in realizing that it had to make a conscious and systematic effort to ensure that the school was constantly in the focus of the nation's attention. Thus, ND built one of the most famous brands in the world, relying on three pillars that have largely remained intact for almost a century:

1) *Markets have no borders*. For decades, the Notre Dame team organized games across the country and became "America's Team".
2) *Differentiation through Independence*. "The more clearly defined and unique the brand, the greater the passions associated with it" – says current Notre Dame athletics director Jack Swarbrick.
3) *Stay True To Your Culture At All Costs*. The "Fighting Irish" are a popular brand; therefore, their popularity inevitably brings pressure and criticism from the media and the masses, which the University successfully resists.

In continuously adapting sports to the demands of the audience, Notre Dame has always remained itself and, among other things - faithful to its Catholic tradition.

CONCLUSIONS

Due to the strong interconnection of mass media, politics, economics and sports, football has become one of the most popular pastimes in the United States of America. As an indispensable part of the entertainment industry and popular culture, sport is subject to all the laws of the global economy, including the laws of mass production and mass consumption. Even though the football of the University of Notre Dame is part of that modern sports matrix, it is necessary to make a distinction and point out the exceptional way of distributing the profits of this educational institution, which does not neglect spiritual values.

The University of Notre Dame football team, worth $101 million, is the most valuable team in college football. Unlike programs at other universities, Notre Dame's athletic department is not run as a separate entity, but it operates under the umbrella of the University. As a result, most of the profits are retained for academic use. This is precisely the greatest value of the sports program, and at the same time, what sets it apart from others. Therefore, the auxiliary hypothesis (which supplements the primary) was that the main goal of founding the University of Notre Dame Fighting Irish was no t profit *per se*, but to popularize and qualitatively improve academic education and sports. This was verified based on an analysis of the total revenue distribution of the "Fighting Irish" football team for the 2006-2007 season, when $21.1 million went to the academic programs of the university based on the Catholic tradition[18]. By way of comparison, the next 5 most profitable teams, belonging to institutions with a secular orientation, gave their universities the same amount of money combined (Schwartz, 2007). The pedagogical dimension of religion and sports is a thread that runs through the educational strategy of the University of Notre Dame. The product of their mutual encouragement is the common good. Pope Francis, the current Pontiff of the Roman Catholic Church, has great respect for sports (he played soccer as a youth in his homeland Argentina). In an interview with "La Gazzetta dello Sport" in 2021, he emphasized, among other things, that "sacrifice is an expression that connects sport and religion". He underlines: "Yes, simply dreaming of success isn't enough; you have to wake up and work hard. That's why sport is full of people who, with sweat dripping from their brow, have competed with those who were born with natural talent" (Informativna Katolička Agencija, 2021).

The summarized data of this multidisciplinary paper show that the implementation of football as the most popular sports program significantly contributed to the promotion of the University and its overall development. In a word, Notre Dame is an example that the mass can still carry quality with it. On the other hand, this university successfully combined science, economics, politics, religion, and sports. The practical needs of the city of South Bend amid the industrial revolution in America and the process of liberalization of the Catholic religion expressed in this case through holistic education were the key factors that enabled the convergence of the spiritual and secular spheres at the University of Notre Dame. For the city of South Bend, Notre Dame games remain the most attractive events ("Full Game: Notre Dame's Double Overtime Thriller vs Clemson", 2020). At the same time, they confirm that the "Fighting Irish" football team is a part of the social and cultural national history. Finally, the establishment of specifically profiled sports programs and university teams can be a recommendation for other institutions of higher education.

[18] The largest part of the income was generated from the rights to TV broadcasts of their matches.

REFERENCES

1. *2023 Blue-Gold Game: Full Broadcast*. (2023, May 8). Fighting Irish.com. https://und.com/2023-blue-gold-game-full-broadcast/
2. Abramson, K. (2015, March 31). *Remembering Fr. Theodore M. "Ted" Hesburgh and the 1961 Notre Dame Laetare Medal*. Archivally Speaking: An Inside Look at the JFK Library Archive. https://archiveblog.jfklibrary.org/2015/03/remembering-fr-theodore-m-ted-hesburgh-and-the-1961-notre-dame-laetare-medal/
3. Appleseed. (July 2017). *The Economic Impact of the University of Notre Dame*. https://publicaffairs.nd.edu/assets/243633/2016_economic_impact_report.pdf
4. Association of American Universities. (2023, May 31). *Six Leading Research Universities Join the Association of American Universities*. https://www.aau.edu/newsroom/press-releases/six-leading-research-universities-join-association-american-universities
5. Belzer, J. (n.d.). *What Notre Dame Athletics Teaches Us About Creating Enduring Brands*. ADU. https://athleticdirectoru.com/articles/what-notre-dame-athletics-teaches-us-about-creating-enduring-brands/
6. Bohn, M. K. (2013, October 30). *Notre Dame vs. Army: The game that changed college football 100 years ago*. Indystar. https://www.indystar.com/story/sports/college/2013/10/30/notre-dame-vs-army-the-game-that-changed-college-football-100-years-ago/3313083/
7. Bulik, M. (2015, September 8). 1854: *No Irish Need Apply*. The New York Times. https://www.nytimes.com/2015/09/08/insider/1854-no-irish-need-apply.html
8. Cavanaugh, J. W. (n.d.). *John W. Cavanaugh Papers, 1865-1955*. University of Notre Dame Archives. https://archives.nd.edu/findaids/ead/xml/jwc.xml
9. College Data Analytics Team. (2023). *University of Notre Dame Sports Information*. College Factual. https://www.collegefactual.com/colleges/university-of-notre-dame/student-life/sports/
10. College Weekends. (2022, November 11). *Exploring South Bend and Notre Dame*. https://collegeweekends.com/exploring-south-bend-and-notre-dame/#/
11. Congregation of Holy Cross. (2023). *A Family Serving Families*. https://www.holycrossusa.org/about-us/history-spirituality/
12. Dunlop Richter, E. (2022, January 29). *Studebaker: The Car that Made South Bend*. Classic Chicago Magazine. https://classicchicagomagazine.com/studebaker-the-car-that-made-south-bend/
13. From, E. (2015). *Psihoanaliza i religija*. Beograd – Podgorica: Nova knjiga.
14. *Full Game: Notre Dame's Double Overtime Thriller vs Clemson*. (2020). Notre Dame Fighting Irish. YouTube. https://www.youtube.com/watch?app=desktop&v=JQff-434kyM&feature=youtu.be
15. Hickey, J. P. (2014, November 11). *University of Notre Dame student enrollment 1849-2011*. Looking back: Notre Dame and South Bend. http://notredamestoriesandstuff.blogspot.com/2014/11/university-of-notre-dame-student.html
16. History.com Editors. (2021, March 16). *Studebaker goes bankrupt*. History. https://www.history.com/this-day-in-history/studebaker-goes-bankrupt
17. *Hot Havoc*. (1879, May 10). Notre Dame Scholastic, XII(35), 539-547. https://archives.nd.edu/Scholastic/VOL_0012/VOL_0012_ISSUE_0035.pdf
18. Informativna Katolička Agencija. (3. januar 2021). Papa Franjo: *Žrtva je izraz koji povezuje sport i religiju*. https://ika.hkm.hr/papa-franjo/papa-franjo-zrtva-je-izraz-koji-sport-povezuje-s-religijom/
19. *John Cardinal O'Hara*. (2023). University of Notre Dame de Nicola Center for Ethics and Culture. https://ethicscenter.nd.edu/about/inspire/great-figures/john-cardinal-ohara-1888-1960/
20. Luković Jablanović, D. (2022). *Papa Franja i Latinska Amerika: Nove dimenzije socijalno-ekonomskog i religijskog dijaloga*. Beograd: Institut za međunarodnu politiku i privredu.
21. Nanovic Institute for European Studies. (2023). University of Notre Dame. https://nanovic.nd.edu/about/
22. Nietzel, M. T. (2023, June 1). *Six Institutions Invited To Join Association Of American Universities*. Forbes. https://www.forbes.com/sites/michaeltnietzel/2023/06/01/six-institutions-invited-to-join-association-of-american-universities/?sh=b3a50b04e6d2
23. *Notre Dame Football 1913*. (2013, November 1). University of Notre Dame Archives. https://sites.nd.edu/ndarchives/tag/sports/
24. *Notre Dame Stadium*. (2023). Fighting Irish.com. https://fightingirish.com/facilities-3/notre-dame-stadium/

25. *Notre Dame Stadium Panorama. jpg.* (2009, April 19). Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Notre_Dame_Stadium_Panorama.jpg
26. O'Shaughnessy, B. (2023). *What's in a Name: How Notre Dame became the Fighting Irish*. University of Notre Dame Stories. https://www.nd.edu/stories/whats-in-a-name/
27. Palmer, J. (2003). *South Bend: Crossroads of commerce*. Charleston: Arcadia Publishing.
28. Rothermel, B. (2023). *Studebaker – an Historical Retrospective 1852-1966*. Classic Car Club of America. https://www.classiccarclub.org/info-garage/studebaker
29. Schwartz, P. J. (2007, November 19). *The Most Valuable College Football Teams*. Notre Dame News. https://news.nd.edu/news/the-most-valuable-college-football-teams/
30. Smith, K., Weber, N., Bernard, M., & Steurer, M. (2020, January 15). *A decade of data: Notre Dame's 2010s by the numbers*. The Observer. https://ndsmcobserver.com/2020/01/a-decade-of-data-notre-dames-2010s-by-the-numbers/
31. *South Bend, Indiana Population History 1910 – 2021.* (2023). https://www.biggestuscities.com/city/south-bend-indiana
32. Sperber, M. A. (2002). *Shake Down the Thunder: The Creation of Notre Dame Football*. Indiana University Press.
33. Stephen, E., & Krause, M. (1993). *Notre Dame's Greatest Coaches: Rockne, Leahy, Parseghian, Holtz*. Pocket Books.
34. *Studebaker Family*. (2023). Building South Bend: Past, Present and Future. University of Notre Dame. https://buildingsouthbend.nd.edu/history/studebaker-family/
35. Studebaker National Museum. (n.d.). https://www.studebakermuseum.org/archives-and-education/the-studebaker-history/
36. The Catholic Sun. (2013, May 24). *World record holder celebrates 70 years of priestly ministry*. https://www.catholicsun.org/2013/05/24/world-record-holder-celebrates-70-years-of-priestly-ministry/
37. The Editors of Encyclopaedia Britannica. (2023). *University of Notre Dame*. Britannica. Preuzeto 4. juna 2023. sa https://www.britannica.com/topic/University-of-Notre-Dame
38. The Observer. (2023, June 2). *Notre Dame added to national consortium of research universities*. https://ndsmcobserver.com/2023/06/notre-dame-added-to-national-consortium-of-research-universities/
39. U.S. News & World Report. (2023). *Best National University Rankings*. https://www.usnews.com/best-colleges/rankings/national-universities

SPORT – SCIENCE AND PRACTICE

INSTRUCTIONS FOR THE AUTHORS

The scientific journal SPORTS – SCIENCE AND PRACTICE is an official publication of the College of Sports and Health from Belgrade. It was established in 2009, and it publishes original scientific, review and professional papers from areas analogous with sports and health (http://sportnaukaipraksa.vss.edu.rs/snp-en.asp).

The journal is published online twice a year, in June and December, in Serbian and English. On the list of the Ministry of Education, Science and Technological Development of the Republic of Serbia, it is in the category of **National journals - M53** (https://mpn.gov.rs/nauka/nauka-i-istrazivanje-u-srbiji/kategorizacija-naucnih-casopisa/).

The journal is indexed by the Serbian Citation Index (SCIndeks), in the **B2 category – Journal of transnational / regional importance in Social sciences research area** (https://scindeks.ceon.rs/journaldetails.aspx?issn=1821-2077&lang=en).

When writing and publishing papers, the authors are obliged to respect scientific and ethical principles, in accordance with international and academic standards. The journal's publication policy is described in detail at the link https://scindeks.ceon.rs/PublicationPolicy.aspx?issn=1821-2077&lang=en.

All manuscripts are to be submitted electronically, via a system for online editing and publishing of journals - ASEESTANT (https://aseestant.ceon.rs/index.php/snp/). In exceptional cases, a manuscript can be submitted to the following email address: redakcija@vss.edu.rs.

The manuscripts must be previously unpublished (the exceptions are abstracts from scientific conferences, lectures and academic theses), and not undergoing editing in another journal. When the manuscript is accepted for publication, it must not be published in another journal in Serbian, English or any other language. **All manuscripts are screened for plagiarism immediately after submission**.

A cover letter is sent with the manuscript, its aim being to present the authors and point to the essence, significance and original scientific and professional contribution of the paper. The letter is to include the first and last names of the authors, date of birth, the affiliation, academic title and position, email address (business email, if possible) and a phone number. **A paper can have a maximum of three co-authors**, and in case of original scientific papers that involve collective research on field, five co-authors are allowed.

After reading the manuscript, the editor makes a decision regarding further proceedings. The manuscript is sent to the reviewers or back to the author with appropriate comments, or rejected. A paper is not accepted for publication if it does not comply with the standards of the journal, if the topic of the paper is not relevant, or if a paper with a similar topic has already been published in the journal.

All manuscripts undergo editing. The identity of the reviewer and author is anonymous (*double-blind review*). There are two reviewers for each manuscript, from the relevant scientific area. After the review, the manuscripts are accepted for publication or refused, or returned to the authors for changes according to reviewers' suggestions. **The manuscript needs both reviews to be positive to be accepted for publication**. In cases of completely opposing views of the reviewers, a third reviewer may be hired.

After receiving a positive review and formatting the final version of the paper in Serbian, the authors are obliged to submit the English version, which must be true to the original. Therefore, it is necessary to submit **quality and professionally translated papers**; otherwise, the translation will be returned for revision.

The papers are sent in *MS Word*, using the *Times New Roman 12pt* font. The papers should not exceed 15 A4 pages, including all tables, diagrams, charts, graphs and references. The texts are usually monospaced, and all four margins (upper, lower, left and right) are 2.54 cm.

THE STYLE AND STRUCTURE OF THE TEXTS

The following format is used for writing original scientific papers: INTRODUCTION, METHOD, RESULTS, DISCUSSION, CONCLUSIONS, REFERENCES.

The bibliographical-speculative method is used and deviations from the suggested structure for original research papers are allowed, while the author will adapt the structure to the contents of the prepared material, taking into account the proper marking of chapters and subsections. The numbering is the same as with the original papers (1. XXXX, 2. YYYY, 2.1. Yyyy, 2.2. Yyyy, etc.). Every claim, new classification, or synthesis of knowledge, should be based on the results of previous researches.

THE TITLE OF THE PAPER

The title should contain the following information:

- a precise and informative title which does not contain abbreviations
- in the case of empirical scientific papers, it is necessary to specify the variables and the nature of their links with the title
- the first and last names of all authors, without their titles
- the institution where the author works, as well as the city and state, should be noted underneath the name of every author
- a footnote notes the email address of the author for possible correspondence

ABSTRACT AND KEYWORDS

The abstract should include a general review of the topic. It must contain a defined aim and objective of the paper, a short description of the applied research proceedings, the most relevant results and conclusion. The abstract should be from 150-250 words.

Up to 5 keywords are given below the abstract.

INTRODUCTION

The introduction should contain a short review of the relevant research. **All the used bibliographical sources are to be mentioned in the references at the end of the article**, as well as in the text, noting the last names of the author and the year of publishing in parentheses. For example: (Lazarević and Havelka, 1981). Bibliographical sources SHOULD NOT be mentioned in the text in a footnote.

The topic and aim of research should be precisely defined, as well as the scientific validity and professional relevance of the researched topic.

In order for the paper to be more understandable to less informed readers, the editorial staff recommends that a short explanation of the basic concepts is given in this segment of the paper.

METHOD

This part should give a detailed description of the methodological procedure which would enable other researchers to repeat the testing.

It should contain the following subtitles: Samples, Variables, Techniques for data collecting, Testing procedures, Statistical analysis.

Every instrument used (survey, interview, scale, test etc.) must be shown in its integral form or illustrated in a shortened version.

RESULTS

In this part, it is necessary to concisely show the most important results, with short and clear instructions. It is possible to separate several parts, depending on the nature and complexity of the data. If shorter parts are used, it is necessary to label them precisely.

The results need to be presented and statistically processed (avoiding raw data). In the aim of a better assessment of results, it is optimal to use tables, graphs and images, and not repeat the data analyzed in the text. **Each table, graph, or image must be clearly numbered and mentioned in the text**. For example: Image 1, Graph 1, Table 1, Table 2, etc.

Tables, diagrams and images are always numbered precisely and consistently. They are an integral part of the text, and not an addendum. The numbering and labeling of the tables, diagrams and images (the name explains the contents), are given **above the diagrams**.

DISCUSSION

The discussion should comment on the results of the research in regards to the initial expectations and hypotheses set in the paper. It should also be professional and based on data obtained in the research.

CONCLUSION

The conclusion contains a short description of the research and a concise revealing of the main results, as well as the possible further line of research and the potential of a practical application of the obtained results.

REFERENCES

A reference list of the used bibliographical units mentioned in the text is given at the end of the paper, according to the APA referencing model: https://apastyle.apa.org/style-grammar-guidelines/references/examples

- The bibliographical sources are quoted according to alphabetical order, using the last name of the author.
- Every bibliographical source is numbered.
- Bibliographic sources that are not mentioned anywhere in the paper cannot be included in the list of references.

Examples of papers in periodical publications (journals, bulletins, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). Title of paper. *Title of journal*, volume(number), pages.

Amanović, Đ., Milošević, M., Dopsaj, M., & Peric, D. (2006). Modeling variability of the assigned level of force during isometric contractions of the arms extensor muscles in untrained males. *Facta universitatis – Series: Physical education and sport*, 4(1), 35-48.

Examples of non-periodical publications (textbooks, monographs, scripts, books, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). *Title of research paper*. Edited by: Editor.

Cohen, M., & Nagel, E. (1982). *An Introduction to Logic and Scientific Method*. Beograd: Zavod za udžbenike i nastavna sredstva.

Examples of chapters in non-periodical publications (textbooks, monographs, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). Title of chapter. U: A. Editor, B. Editor, C. Editor, *Book title*. Edited by: Editor (pp. xxx-yyy).

Puczkó, L., & Rátz, T. (2007). Trailing Goethe, Humbert, and Ulysses – Cultural Routes in Tourism. In: G. Richards, *Cultural Tourism – Global and Local Perspectives*. New York: The Haworth press, Binghamton (pp. 131-148).

Examples of references published in proceedings books from congresses and symposia

Author, A.A., Author, B.B., & Author, C.C. (year). Title of chapter. In: A. Editor, B. Editor, C. Editor (Eds.), *Name of conference, congress or symposium* (pp. xxx-yyy). Published by: Editor.

Perić, D. (2003). Factorial structure of modern basketball. In: A. Naumovski (Ed.), *International conference of sport and physical education* (pp. 256-260). Skopje: Faculty of physical culture.

Example of quoting sources from the Internet

Vujičić, I. (2020, July 21). *Kako pokreti ruku utiču na efikasnost trčanja?* Trčanje.rs. https://www.trcanje.rs/trening/uticaj-kretanja-ruku-na-trcanje/

****

Designing and marking tables

- The tables must be simple and easy to understand.
- The data analyzed in the text should not be repeated in the tables.
- Refer the data mentioned in the tables to the text in the paper.
- Number the tables (for example: Table 1, Table 2).
- While marking the tables, after their numbering, make a mention of the data in the tables.
- The number and title of table are written above it.
- The tables are always marked and numbered in the same way.
- The tables are an integral part of the text.

Designing and marking diagrams

- It is desirable to include diagrams, charts, graphs, etc. in the paper.
- The data analyzed in the text should not be repeated in the diagrams.
- Refer the data in the diagrams to the text in the paper.
- Diagrams are to be listed by number (e.g.: Diagram 1, Graph 1).
- After their listing, mention the data they contain.
- The numbering and titles are noted under the diagram, chart, graph, etc.
- Diagrams are always numbered and marked in the same way.
- Diagrams are an integral part of the text.

****

THE REVIEW OF THE BOOK

The journal can also publish a review of the relevant professional literature from the area corresponding to sports and health recently published. The review in a clear and fundamental way points to the significance and current validity of the book, as well as a review of the most important parts and contents. The title of the review must contain information references according to APA standards, these being the last name and initials of the author, the year of publication, the title (*italics*), the publisher, place of issue. Also included are the page number, the ISBN and COBISS number. The author of the book review signs it, along with a mandatory mentioning of the affiliation.

Example of the title of a book review:

Book review
Havelka N. and Lazarević Lj. (2011). *Psychology of sports management.*
Publisher: College of Sports and Health, Belgrade, Serbia; 384 pages;
ISBN 978-83687-14-5; COBISS.SR-ID 184385036