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Review article

THE IMPACT OF SPORT ON THE HEALTH AND IMPROVEMENT OF MENTAL HYGIENE AMONG THE STUDENT POPULATION – A SYSTEMATIC REVIEW

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Abstract. *Due to its appeal, sport has always been in the service of various social fields, both in a negative and a positive sense. A sedentary lifestyle has become noticeably dominant among students. The most frequent external barrier for taking part in physical activities among the student population is a lack of time due to their schedules or due to familial or other obligations. The aim of the research was to use a critical analysis of existing studies and a generalization of the results of all the analysed papers which studied the effectiveness of sport to show the effects of sport and physical activity (PA) on the improvement of the mental hygiene among the student population. The literature was compiled by searching the following databases: Medline, Google Scholar, Web of Science and PubMed. The database search resulted in 198 papers of which 15 were included in the systematic review. The participants included in the systematic review were adults who attended class and were university students. An awareness of health and the positive effects of PA can be a decisive factor for motivating people to become physically more active. PA can help in the prevention and continuation of psychological wellbeing.*

Key words: *sedentary lifestyle, depression, suicidal behavior, exercise*

1. INTRODUCTION

The World Health Organization [WHO] defined health in 2006 as an "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity". As a reminder, physical education (PE), sport and recreation are three segments of the system of PE (Živanović, Ranđelović, Stanković, & Pavlović, 2010). Živanović et al., (2010) define the division of sport based on the aim behind taking part in physical exercise and competition. Based on this criterion, sport can be divided into: school sport, registered sport (amateur, elite, professional), and recreational sport. Taking

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part in organized forms of sport can help shape a child's personality, and his or her moral and social characteristics. The sociology of sport studies the impact of society on sport, but also the reverse, the impact of sport on society, and thus the issue of context and social conditioning of sport (Radenović, 2015). Due to its appeal, sport has always been in the service of various social fields, both in a positive and in a negative sense. Sport is an influential means for the development of personality, which directly creates a positive effect on socialization, whereby each individual in interaction with the social environment learns, develops, and shapes socially relevant models of behaviour (Ban Vlahek, 2019). As such, with its educational impact it affects changes on an individual as a social being by realizing the process of socialization, which is why individuals who take part in some form of sports activities distance themselves from socially undesirable models of behaviour (Bjelajac, 2006; Busija, 2017). Even though it may be the most popular and most attractive, and occupies a central position in modern society, sport certainly does not include all the needs and potential of human PE, just like it does not attract the largest population in the domain of PE. This is why it should not be given an advantage over PE and recreation, as other equally important areas of physical culture (Radenović, 2015). The WHO states that regular physical activity (PA) requires almost daily exercise, at a minimum of three times a week, to achieve positive effects on health in the broadest sense of the word. Almost 2/3 of the population are insufficiently physically active (Trost, Owen, Bauman, Sallis, & Brown, 2002). Health habits during youth can be reflected on health status and risk factors for numerous illnesses during adulthood (Tirodimos, Georgouvia, Savvala, Karanika, & Noukari, 2009). Negative consequences can also be felt on the student population. Studies indicate an increase in the physical inactivity of the student population (Vuillemin et al., 2005, DeVahl et al., 2005, Fogelholm et al., 2006), and it was noted that the sedentary lifestyle has become dominant among students (Gošnik, Bunjevac, Sedar, Prot, & Bosnar, 2002). The most frequent external obstacle for taking part in physical activities among the student population is a lack of time due to scheduled lectures and a lack of time due to familial and social commitments (Arzu, Tuzun, & Eker, 2006). Various forms of PE have a positive effect not only from the physical aspect, but they also affect the mental health of an individual (Busija, 2017). Research shows that physical exercise and sports activities can be a protective factor against depression and deliberate suicide (Lacković – Grgin, 2006). These associations are interesting because depression has been increasingly more diagnosed among the American student population over the past few years (American College Health Association [ACHA], 2007), and numerous students experience symptoms of depression which remain undiagnosed and untreated (Suicide Prevention Resource Center [SPRC], 2004). This trend is all the more unsettling due to the established association between depression, the idea of suicide, and suicidal behaviour (Kisch, Leino, & Silverman, 2005). Miller & Hoffman (2009) concluded that exercise is linked to a decrease in depression, and it would seem that there is an association between the level (medium or high intensity exercise) and type of exercise (strength training or aerobic training). Also, Simon, Powell & Swann (2004) reached the same conclusion, where among a sample of Americans aged 13 to 34, those who attempted suicide had been a lot less physically active in the past month.

The aim of this study was to use a critical analysis of existing research and a generalization of the results of all the analysed studies which focused on the effectiveness of sport to show the effects of sport and (PA) on the improvement of mental hygiene among the student population.

2. METHOD

The literature was compiled by a search of the following scientific databases: Medline, Google Scholar, Web of Science and PubMed. The databases were searched using the following key words in Serbian and English (independently or in combination): behavior, habits, university sport, depression, anxiety. The search strategy was modified for each electronic database, where possible, with the aim of increasing sensitivity. All the titles and abstracts were reviewed for the potential inclusion of papers in the systemic review. In addition, the lists of references of previous review and original research papers were also analysed.

The selection of papers was carried out based on certain criteria. The analysis included papers which met the defined criteria found in Table 1. Furthermore, Figure 1 shows a schematic image of the process of compilation, analysis, and elimination of papers (Moher, 2009).

Table 1 The inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
1. Longitudinal and transversal studies.	1. Abstracts without complete papers.
2. The student population.	2. Studies written in languages other than English, Serbian or Croatian.
3. Studies published between 2000 and 2017.	3. A sample of participants not of the student population.
	4. Studies which included professional athletes in the sample of participants.

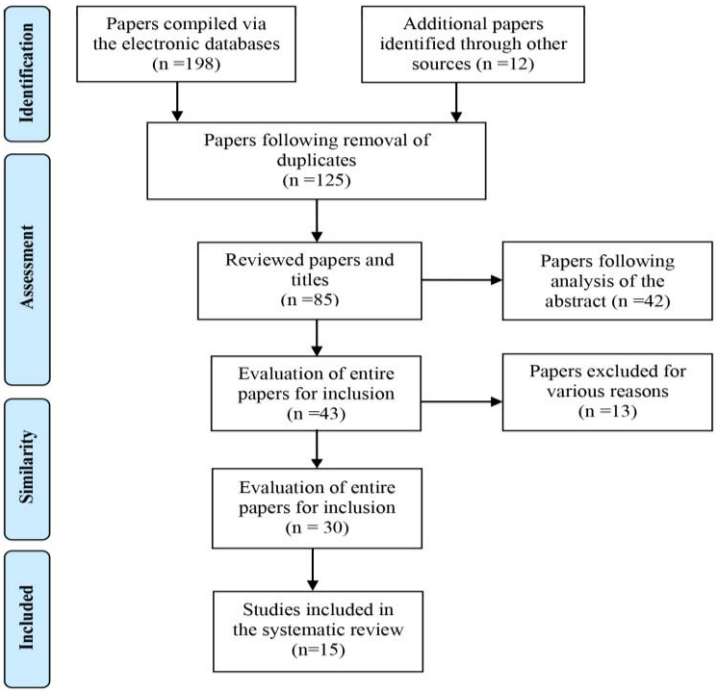

Fig. 1 PRISMA flow chart showing number of records collected and umber of eligible records after the screening process.

Table 2 An overview of existing research

Name of first author, year of publication	Participants			Questionnaire	Variables	Results	Conclusion
	No. of participants	Age	Gender				
Wallace et al. (2000)	937	22 ± 5.6	M-F	Stage of Change questionnaire, CARDIA Physical Activity History questionnaire	Evaluation of self-efficacy for physical activity, the history of physical activity, The stage of change in behavior during exercise.	Among the female participants, the self-efficacy for exercise and social and family support were significant ($p<.001$) predictors and they were the best at presenting the phases and changes which occur during physical activity. Among the male participants, the history of physical activity, support of the environment, and the self-efficacy for physical activity were significant predictors of the stage of change in behavior during exercise ($p<.001$).	The self-efficacy for exercise was connected to social support both from the family and from friends and the environment.
El Ansari et al. (2011)	3706	25.2 ± 7.7	M-F	Self-rated health status, Body image perception, Depressive symptoms (modified - Beck's Depression Inventory), Strengthening or toning muscles, Moderate exercise, Vigorous exercise	Depression and physical activity	Moderate physical activity ($r=0.64$) and a high level of physical activity ($r=0.59$) were inversely related to the results of the evaluation of depression (M-BDI).	The authors concluded that there is an association between the level of physical activity and depression. Moderate and high levels of physical activity can lead to a decrease in the occurrence of depression.

Miller et al. (2009)	791	20.02	M-F	Depression – Center for Epidemiologic Studies Depression Scale Suicide attempt Sport-related identities Perceptions of sport-related identities Individual and team sports participation Sociodemographic measures	The association between sport and depression	Taking part in team and individual sports was associated with lower results for depression ($p<.001$). In addition, athletes have indicated a lower tendency towards suicide.	Sport and physical activity have a positive effect on the level of depression.
Poobalan et al. (2012)	1313	18-25	M-F		Level of physical activity, motivation and barriers.	Positive attitudes towards physical activity have a negative correlation to a sedentary lifestyle.	For participants of this age traditional messages regarding the promotion of health were not the main motive for taking part in a physical activity; instead "feeling good", and "enjoying oneself" were the main reasons for participation.
Brown et al. (2002)	4728	18-25	M-F	NCHRBS questionnaire Youth Risk Behavior Surveillance System (YRBSS)	Physical activity and suicidal behavior.	Men with low levels of physical activity were half as likely (OR=0.54; $P< 0.015$) to report suicidal behavior compared to non-active participants. Women who were not active in sport had 1, 67 times greater odds of reporting suicidal behavior compared to female participants who took part in moderate or high intensity training.	The authors confirmed that there is an association between physical activity and suicide. Taking part in physical activity decreases suicidal behavior.

Alkerwi et al. (2015)	3133	18-69	M-F	IPAQ questionnaire	Age, gender, country of birth, marital status, level of education, employment status, personal anamnesis and intake of medication, self-rated state of health and the importance of physical activity for health.	There is a statistically significant difference ($p<.001$) between participants who perceived their health as good, and who were also physically more active, compared to participants who evaluated their health as poor.	Awareness of positive health and the effects of physical activity could be a deciding factor for motivating individuals to become more physically active.
Stojmenović et al. (2017)	403	Students	M-F	IPAQ questionnaire	Prevalence of attitudes towards physical activity.	What motivates most of the participants (60, 3%) to take part in physical activity is the knowledge of its importance for human health.	Most of the surveyed students are aware of the importance of physical activity for human health, but they still do not devote enough time to it.
Asztalos et al. (2010)	6803	25-64	M-F	Belgian Health Interview Survey (B-HIS) IPAQ questionnaire	Level of physical activity and mental health.	The results indicate that among the men intense physical activity is inversely related depression (OR=0.580), anxiety (OR=0.547), and symptoms of somatization (OR=0.590). Among the women there is an association between physical activity and emotional wellbeing (OR=1.202), while moderate intensity exercise is inversely related to symptoms of somatization (OR=0.737).	The authors concluded that there is a connection between physical activity and mental health. Physical activity can have a positive impact on mental health.

Sabiston et al. (2016)	860	20.4	M-F	Major Depression Inventory (MDI)	Taking part in team and individual sports and symptoms of depression.	Participants who took part in team sports reported lower levels of depression (β = –.09, p = .02).	Based on these findings, participation in team sports can prevent an individual from experiencing symptoms of depression at a young adult age.
Pauline (2013)	871	19.73±1.27	M-F	Godin Leisure-Time Exercise Questionnaire (GLTEQ) Exercise Motivation Inventory-2 (EMI-2)	Physical activity and motivation.	The women, were more motivated to participate in physical activity due to regulation of body weight, appearance, the positive impact on stress, and health benefits (P< .001). The motive of men to take part in some physical activity was the challenge, the development of strength and endurance, competition, belonging, and societal recognition (P< .001).	The results indicate that there are different motives between men and women when it comes to taking part in physical activity. These data should be taken into consideration when designing programs and offers of physical activity to young people.
Kilpatrick et al. (2005)	233	22.2 ± 4.8	M-F	Exercise Motivation Inventory-2 (EMI-2)	Sport, physical activity, and motivation.	The results indicate that taking part in sports events is more motivated by internal motives such as enjoyment and challenge, while motivation for physical activity focused on body weight, physical appearance, and decrease in stress.	There is a difference in the motives behind taking part in sport and physical activity among the student population.
Ebben et al. (2008)	1044	20.53 ± 5.77	M-F		Physical activity and motivation.	Shared motives for those participants for were physically active included: general health, maintaining fitness levels, decreasing stress, and enjoyment. The motives provided by the participants who were not activity included: a lack of time, laziness and fatigue. The circumstances which would lead to an improvement in their engagement included: the proximity of the exercise facility, group training sessions, more free time.	The authors conclude that we need to understand the different motives young people have and use them to create and offer recommendations with the aim of optimizing physical activity.

Feng et al. (2014)	1106	18.9 ±0.9	M-F	Pittsburgh Sleep Quality Index (PSQI) Self-rating Depression Scale (SDS) Self-rating Anxiety Scale (SAS)	Physical activity, depression, anxiety and quality of sleep.	A high level of physical activity is linked to significantly lower risk of poor quality of sleep (OR=0.48) and depression (OR=0.67). No association was found between physical activity and anxiety.	The level of physical activity decreases the prevalence of symptoms of depression and has a favorable impact on quality of sleep.
Taliaferro et al. (2009)	43499	18-25	M-F		Physical activity, depression, a feeling of powerlessness, suicide.	Men and women who took part in some form of physical activity displayed a decreased risk of powerlessness, depression, and suicidal behavior compared to their non-active colleagues.	The results indicate that there is an association between levels of physical activity and a decrease in risk of depression, powerlessness, and suicide.
Elliot et al. (2012)	61011	20-24	M-F		Physical activity, depression, suicidal behavior.	Physical activity is more often related to lower symptoms of depression and contemplation of suicide, but not attempted suicide. Men more infrequently reported symptoms of depression than women.	Universities should provide a broader approach to and knowledge of the emotional health of students and the psychological benefit of physical activity.

Legend: M – males; F – females

3. RESULTS

Following the search of the available databases, initially 198 papers were compiled. Once insight into the papers was obtained, due to the topic and aim of certain papers, which do not align with the topic and aim of our study, based on the exclusion criteria 85 papers were excluded for not dealing with the problem of the impact of PA or sport on mental hygiene among the student population. The total number of papers which were included in the systematic review was 15, where both female and male population were included, and which refer to the effects of physical exercise on the parameters which include the mental hygiene of the students. The participants included in the systematic review were adults who attended classes and were university students. The analysis of the association between PA and sport, as components of PE, and depression, was one of the main aims of the papers (El Ansari et al., 2011; Miller & Hoffman, 2009; Sabiston et al., 2016; Feng et al., 2014; Taliaferro et al., 2009; Elliot et al., 2012). The studies of (Poobalan et al., 2012; Pauline, 2013; Kilpatrick et al., 2005; Ebben & Brudzynski, 2008) studied the association between PA and motivation. A certain number of authors (Brown & Blanton, 2002; Taliaferro et al., 2009; Elliot et al., 2012) focused on the association between the level PA and suicidal behaviour among the student population.

4. DISCUSSION

In contemporary society the emergence of depression, anxiety, suicidal behaviour, or any other form of destructive behaviour is increasingly more frequent. For that reason, the need emerged for studies which could help prevent and protect human mental hygiene. El Ansari et al. (2011) obtained results which indicate that PA and depression are inversely related. The same authors indicate an association between moderate PA and depression ($r = 0.64$), and a high level of PA and depression ($r = 0.59$). A high level of PA is linked to a significantly lower risks of depression (OR = 0.67) (Feng et al., 2014). These findings were confirmed by Miller & Hoffman (2009) who pointed out that participation in team and individual sports is linked to lower scores for depression. The authors conclude that sport and PA have a positive effect on levels of depression. Sabiston et al. (2016) claim that participants who took part in team sports reported lower levels of depression ($\beta = -.09$). Men and women who took part in some form of PA showed a reduced risk of powerlessness, depression, and suicidal behaviour compared to their peers who were not sufficiently physically active (Taliaferro et al., 2009). However, somewhat different results were obtained by Elliot et al. (2012) who concluded that PA is more often linked to lower symptoms of depression and contemplating suicide, but not attempted suicide. PA and suicidal behaviour were also studied by Brown & Blanton (2002) who reached the conclusion that there is an association between PA and suicide (OR = 0.54). The inclusion of PA decreases suicidal behavior. Asztalos et al. (2010) agree that PA and the parameters which determine mental hygiene are inversely related, and that the inclusion of students in some form of PA can have a positive effect on mental health. Their research results indicate that, among men, intense PA and depression (OR = 0.580), anxiety (OR = 0.547), and symptoms of somatization (OR = 0.590) are inversely related. In the case of women, there is a positive association between PA and emotional wellbeing (OR = 1.202), while moderate intensity exercise and symptoms of somatization (OR = 0.737) are inversely related. There are certain sociological aspects of

the association between and importance of PA for human health, primarily human mental hygiene. Wallace et al. (2000) concluded that the support of the environment, of friends, and family has a significant impact on taking part in some form of PA ($p < .001$). Significant results were also published by Poobalan et al. (2012) who stated that traditional messages for the promotion of health were not the main motives for participation in sports activities. What was most alluring and motivating for the student population was the "enjoyment" of sport and "feeling good". However, the fact is that the positive effects of PA are not negligible. Alkerwi et al. (2015) indicate that there is a statistically significant difference between participants who were more PA compared to non-active participants ($p < .001$). Physically more active students perceived their health as much better and were more satisfied compared to sedentary participants. Awareness of positive health and the effects of PA can be a decisive factor for motivating people to become more PA. Stojmenović, & Milosavljević (2017) agree with these results. Most of their surveyed students (60.3%) were aware of the importance of PA for human health. Students who were physically more active stated that health aspects were their main "motivator", but that fatigue and a lack of time were also barriers that prevented people from becoming more PA (Ebben et al., 2008). When it comes to motives, consideration must be given to the different motives of men and women. Pauline (2013) pointed out that women were more motivated to regulate their body weight, appearance, and health aspects ($p < .001$), while for men the motivation for taking part in PA was the challenge, the development of strength and endurance, competition, and social recognition ($p < .001$). There is also a difference in the motivation behind taking part in sport and in PA. Kilpatrick et al. (2005) point out that taking part in sports events is more motivated by "enjoyment" and "the challenge", while motivation for taking part in PA was more focused on body weight, physical appearance, and a decrease in stress.

5. CONCLUSION

The aim of this systematic review was to study whether sport and PA have any impact on the improvement of mental hygiene among the student population. The results are the following:

Based on the reviewed papers which focused on the effects of PA on the emergence of depression, anxiety, suicidal behavior or some other form of destructive behavior, it was noted that PA has a positive effect on the mental hygiene of students. PA can have a positive effect on the mental health of people.

Awareness of health and the positive effects of PA can be a decisive factor for motivating people to become more PA. Regular PA can assist in the prevention and preservation of psychological health.

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UTICAJ SPORTA NA ZDRAVLJE I UNAPREĐENJE MENTALNE HIGIJENE STUDENTSKE POPULACIJE - SISTEMATSKO PREGLEDNO ISTRAŽIVANJE

Sport je zbog svoje atraktivnosti uvek bio u službi raznih društvenih područja kako u pozitivnom tako i u negativnom smislu. Zapaža se da je sedentarni način života postao dominantan među studentima. Najčešća spoljašnja barijera za bavljenje fizičkim aktivnostima kod studenata je nedostatak vremena zbog rasporeda predavanja i nedostatak vremena zbog porodičnih i društvenih obaveza. Cilj istraživanja je da se kritičkom analizom dosadašnjih istraživanja i generalizacijom rezultata svih analiziranih istraživanja koja su proučavala efikasnost sporta, prikažu efekti sporta i fizičke aktivnosti na unapređenje mentalne higijene studentske populacije. Literatura je sakupljena pretraživanjem sledećih naučnih baza podataka: Medline, Google Scholar, Web of Science i PubMed. Pretraživanjem naučnih baza prikupljeno je 198 radova od kojih je 15 radova uključeno u sistematski pregled. Ispitanici koji su uključeni u pregledno istraživanje bile su punoletne osobe koje su pohađale nastavu i pripadale nekom Univerzitetu. Svest o zdravlju i pozitivnim efektima fizičke aktivnosti mogu biti presudni za motivisanje ljudi i tako postati fizički aktivniji. Redovna fizička aktivnost može pomoći u prevenciji i očuvanju psihičkog zdravlja.

Ključne reči: *sedeterni način života, depresija, suicidno ponašanje, vežbanje*