

The impact of running on the mental health of recreational runners

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Summary

Background: One of the fundamental postulates in medicine, expressed in an old Latin proverb, is: “A healthy mind in a healthy body” (“Mens sana in corpore sano”), and it undoubtedly speaks of the significant and inseparable connection between body and soul. Numerous studies show that appropriate and regular exercise is positively associated with good health. Physical activity contributes to improving health status.

Aim: To examine the impact of running on the mental health of recreational runners.

Subjects and methods: The research was conducted in Mostar, at the Sanus Motus running school, from March 1, 2024 to July 1, 2024. A total of 80 respondents were surveyed, divided into two groups. The first group included 40 recreational runners, members of the Sanus Motus running school in Mostar, and the other 40 respondents from the general population. The subjects completed two questionnaires: the RSES (Rosenberg Self-Esteem Scale) and the SCL-90 (Self-Rating Psychiatric Symptoms Scale). The variables studied were the results of the RSES scale and the results of the nine categories into which the questions from the SCL-90 were divided. The SCL-90 categories are: somatization, obsessive-compulsive reactions, interpersonal sensitivity, depression, anxiety, aggression, phobias, paranoia, and psychotic features.

Results: Recreational runners scored significantly higher on the RSES scale. Recreational runners scored significantly higher on all domains of the SCL-90 questionnaire. There were no statistically significant gender differences in scores on the RSES scale, and on the SCL-90, male respondents scored significantly lower on the Interpersonal Vulnerability, Depression, Anxiety, Phobias, PSDI, GSI, and PST domains, while there were no statistically significant gender differences in the other domains of the SCL-90 questionnaire.

Conclusion: Results of this research indicate that recreational running has a positive impact on the mental health of recreational runners.

Keywords: running, mental health, recreational runners

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INTRODUCTION

One of the fundamental postulates in medicine, expressed in an old Latin proverb, is: “A healthy mind in a healthy body” (“Mens sana in corpore sano”), and it undoubtedly speaks of the significant and inseparable connection between body and soul. Numerous studies show that appropriate and regular exercise is positively associated with good health. Physical activity contributes to improving health status. Increased energy expenditure through exercise results in a reduced risk of many diseases. Appropriate physical activity is an effective means of improving and protecting health. The negative consequences of inactivity are hypokinesia, overweight, nervous tension (Babić et al., 2018). Regular physical activity has a positive effect on central nervous system

functions, contributes to improving mood and cognitive abilities (including memory and learning) and is associated with increased expression of neurotrophic factors and markers of synaptic plasticity, as well as a reduction in inflammatory factors (Nowacka-Chmielewska et al., 2022). Exercise increases oxygen supply to the brain and improves the functioning of the circulatory system. It increases frustration tolerance, improves psychological stability, stimulates motivation, and improves self-control. Involvement in sports or any form of exercise can have a positive impact on anxiety, depression, self-esteem, and psychosocial stress. People with higher levels of self-esteem have more confidence in their abilities, skills, and abilities, cope better with everyday situations, and are better prepared for the challenges life throws at them (Babić et al., 2018). Studies focusing on the positive

effects of running report that a consistent running routine improves physical fitness and mental well-being and can be an effective tool for stress management (Greist et al., 1979).

According to research by Basso and Suzuki, a single bout of intense exercise, such as running, leads to changes in mood and cognitive functioning in several key ways. In terms of mood, intense exercise improves mood and reduces the psychological and physiological response to acute stress. These effects have been shown to persist for up to 24 hours after exercise cessation. In terms of cognitive functioning, intense exercise primarily improves executive functions dependent on the prefrontal cortex, including attention, working memory, problem solving, cognitive flexibility, verbal fluency, decision making, and inhibitory control. These positive changes have been shown to occur with very low to very high exercise intensities, with effects lasting up to two hours after the end of the exercise cycle (Basso & Suzuki, 2017).

Most recreational runners notice mental and emotional well-being, including relief of tension, improved self-image, and improved mood. Some describe a state of euphoria, which is thought to be the result of self-hypnosis, increased noradrenaline concentration in the enteric nervous system and increased release of endorphins (Keneth, 1983).

A study by Chan & Grossman (1988) examined the psychological effects of taking a break from running on regular runners. They compared a group of 30 runners who were unable to run for at least two weeks with a group of 30 runners who ran continuously. They found that runners who took a break for two weeks showed significantly more psychological symptoms, including depression, anxiety, confusion, general mood disorders, and lower self-esteem than runners who continued running continuously (Chan & Grossman, 1988).

Neurobiological changes associated with exercise

The hippocampus is a brain structure that belongs to the limbic lobe and is fundamentally involved in memory processing, learning and emotions (Tatu & Vuillier, 2014). The beneficial effects of exercise are likely regulated by hippocampal neurogenesis. Moreover, exercise is one of the strongest positive physiological modulators of hippocampal structure and function (Nowacka-Chmielewska et al., 2022). Physical activity has been shown to induce

a range of neurobiological adaptations. In patients with depression, radiological imaging methods have shown structural changes in the hippocampus, amygdala, striatum and frontal cortex – areas that are interconnected. Loss of volume in the hippocampal formation is associated with depression. Antidepressants stimulate neurogenesis, and exercise is thought to similarly reduce symptoms of depression. Four molecular mechanisms of beneficial effects of exercise are proposed: B-endorphins, vascular endothelial growth factor, BDNF (brain-derived neurotrophic factor), and serotonin (Carek et al., 2011).

Verhoeven et al., conducted a study comparing the effects of antidepressant therapy and running on the mental and physical health of subjects suffering from depression and/or anxiety disorders. After 16 weeks, 45% of patients who used antidepressants and 43% of patients who underwent running therapy no longer had depression or anxiety disorders based on DSM-IV, confirming the effectiveness of running therapy in the treatment of depression and anxiety (Verhoeven et al., 2023). Considering the beneficial effects of running, running can be considered a low-cost therapeutic approach that, unlike some others, has positive physical effects. Individuals who engaged in running had better outcomes than those who accessed psychotherapy, and the positive effects of running lasted for at least a year (Markotić et al., 2020). Running can also be an effective method for combating anxiety symptoms as part of cognitive-behavioral therapy (Stewart & Watt, 2008). According to Kalak's study, running in the morning for three weeks positively affects sleep and psychological functioning in healthy adolescents. Moderate but regular exercise such as running should be promoted as a therapeutic and preventive measure for poor sleep and impaired psychological functioning (Kalak et al., 2012). Nineteen cross-sectional studies have described or compared motivations between groups of runners. Among the highest-ranking reported motivations were physical health, psychological motivations, health orientation, and personal achievement. Less common or lower-ranked motivations were competition, social motivations such as belonging or social comparison, and also entertainment (Pereira et al, 2021).

Aim

The aim of this study was to examine the impact of running on the mental health of recreational runners in comparison to the general population.

SUBJECTS AND METHODS

The research was conducted in Mostar, at the Sanus Motus running school, from March 1, 2024 to July 1, 2024.

The respondents were divided into two groups. The first group included 40 recreational runners, members of the Sanus Motus running school in Mostar, who practice recreational running at least three times a week for the past six months. The second group included 40 respondents from the general population. The exclusion criterion was a reported mental or physical illness under treatment.

With the approval of the Ethics Committee of the Faculty of Medicine in Mostar, a total of 80 subjects were examined. The subjects signed a participant information form, an application form for participation in the study, and filled out two questionnaires: RSES (Rosenberg Self-Esteem Scale) (Derogatis et al, 1973; Rosenberg, 2015) and SCL-90 (Psychological Symptom Self-Rating Scale) (Rosenberg, 2015). The investigated variables are the results of the RSES scale and the results of thirteen domains into which the questions from the SCL-90 are divided. The SCL-90 domains are: somatization, obsessive-compulsive symptoms, interpersonal vulnerability, depression, anxiety, aggression, phobias, paranoia, psychotic features, non-specific symptoms, Positive Stress Symptom Index (PSDI), Generalized Difficulty Index (GSI), total positive symptoms (PST).

The results of the statistical analysis are expressed as mean \pm standard deviation. The results of the statistical tests were interpreted at a significance level of 0.05. P values that could not be expressed to three decimal places were presented as $p < 0.001$. Statistical analysis of the collected data was performed in IBM SPSS Statistics (version 25.0, SPSS Inc, Chicago, Illinois, USA) and Microsoft Excel 2019 (Microsoft Corporation, Redmond, WA, USA).

RESULTS

This cross-sectional study included a total of 80 respondents. Half of the respondents were members of the Sanus Motus running school in Mostar, while the other half of the respondents were from the general population. All respondents were over 18 years of age. The study was conducted in the period from March 1, 2024 to July 1, 2024.

In the research sample, there were more female respondents, however, the observed difference was not statistically significant (Figure 1).

Recreational runners achieved significantly better results on the RSES scale (Figure 2).

Table 1. Differences on the psychological symptoms scale between groups

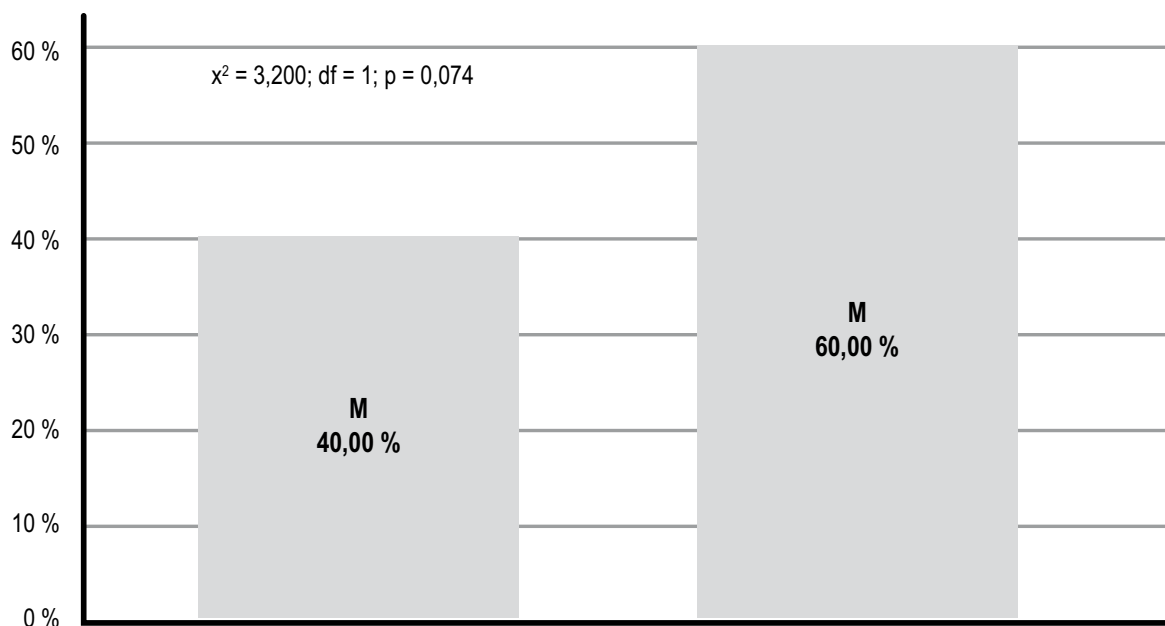


Figure 1. Distribution of respondents by gender

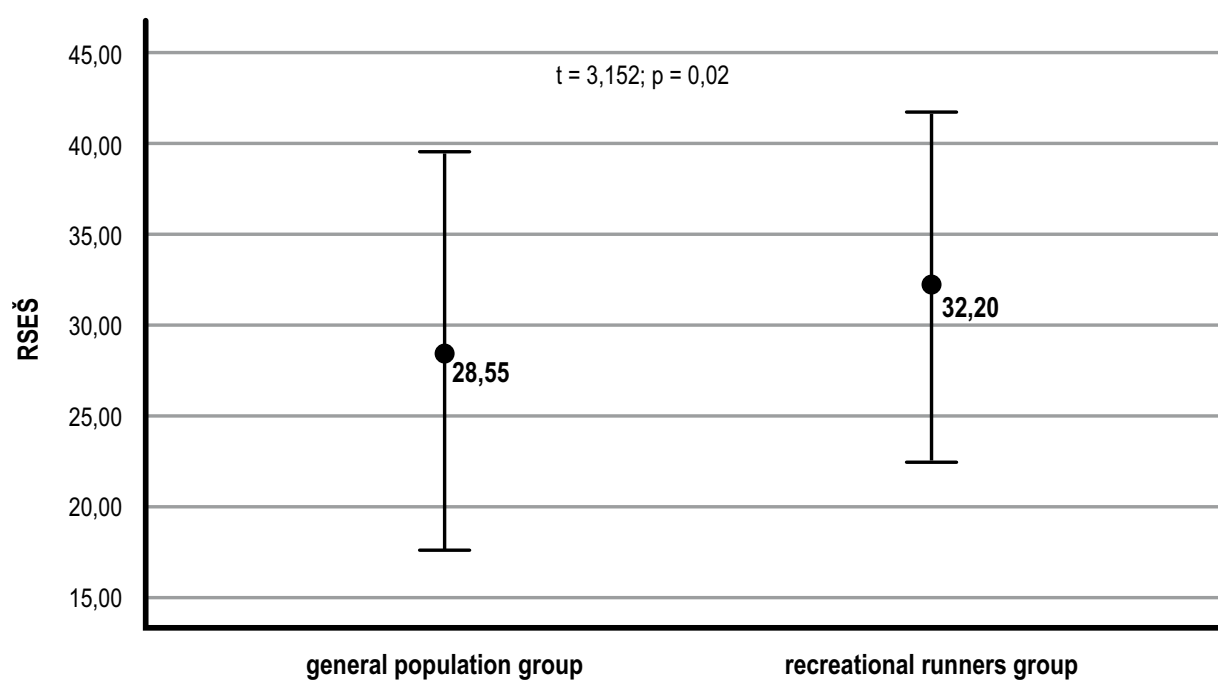


Figure 2. Differences in scores on the self-esteem scale between groups

Table 1. Differences on the psychological symptoms scale between groups

	Group				t	p
	General population		Recreational runners			
	mean	SD	mean	SD		
Somatization	1,042	0,769	0,571	0,476	3,293	0,002
Obsessive-compulsive symptoms	1,445	0,815	0,978	0,546	3,015	0,004
Interpersonal vulnerability	1,214	0,884	0,533	0,576	4,080	<0,001
Depression	1,200	0,762	0,585	0,586	4,049	<0,001
Anxiety	1,147	0,823	0,603	0,543	3,496	0,001
Aggressiveness	0,938	0,785	0,533	0,550	2,667	0,009
Phobias	0,664	0,803	0,186	0,321	3,502	0,001
Paranoia	1,262	0,783	0,858	0,564	2,647	0,010
Psychotic features	0,920	0,822	0,407	0,462	3,437	0,001
Non-specific symptoms	1,132	0,804	0,671	0,601	2,903	0,005
Positive Stress Symptoms Index (PSDI)	10,964	7,286	5,925	4,522	3,717	<0,001
General Difficulty Index (GSI)	1,106	0,727	0,593	0,455	3,786	<0,001
Total Positive Symptoms (PST)	1,752	0,554	1,462	0,343	2,788	0,007

Table 2. Differences on the psychological symptoms scale between genders

	Gender				t	p
	M		F			
	mean	SD	mean	SD		
Somatization	0,659	0,446	0,905	0,785	1,779	0,079
Obsessive-compulsive symptoms	1,056	0,521	1,315	0,828	1,713	0,091
Interpersonal vulnerability	0,597	0,570	1,058	0,905	2,792	0,007
Depression	0,635	0,620	1,064	0,774	2,625	0,010
Anxiety	0,656	0,502	1,021	0,844	2,419	0,018
Aggressiveness	0,594	0,574	0,830	0,769	1,482	0,142
Phobias	0,196	0,290	0,577	0,776	3,092	0,003
Paranoia	0,958	0,535	1,128	0,801	1,138	0,258
Psychotic features	0,516	0,416	0,763	0,843	1,736	0,087
Non-specific symptoms	0,741	0,591	1,009	0,816	1,701	0,093
Positive Stress Symptoms Index (PSDI)	6,608	4,241	9,669	7,492	2,326	0,023
General Difficulty Index (GSI)	0,662	0,426	0,975	0,750	2,375	0,020
Total Positive Symptoms (PST)	1,463	0,302	1,703	0,552	2,485	0,015

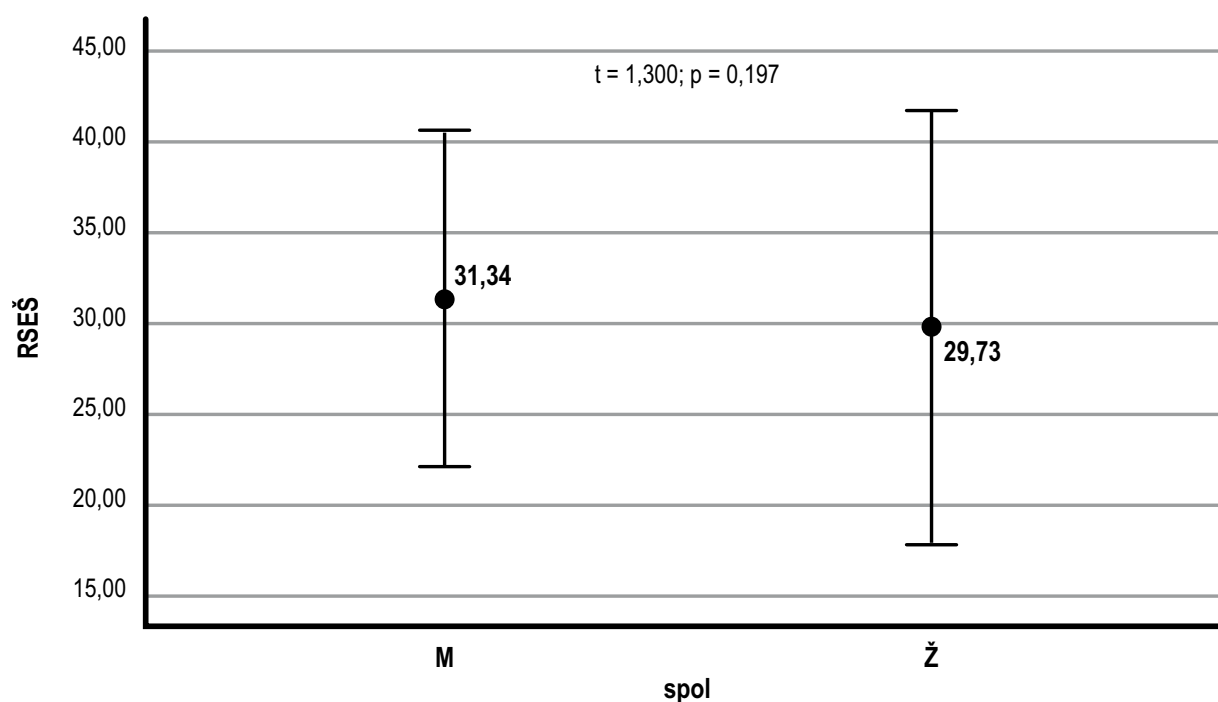


Figure 3. Gender differences in self-esteem scores.

Recreational runners achieved better results in all domains of the SCL-90 questionnaire, the difference was statistically significant (Table 1).

Table 2. Differences on the psychological symptoms scale between genders

Male respondents achieved significantly lower scores on the domains Interpersonal Vulnerability, Depression, Anxiety, Phobias, PSDI, GSI and PST; in the other domains of the SCL-90 questionnaire, there were no statistically significant differences between genders (Table 2).

There were no statistically significant gender differences in RSES scores (Figure 3).

DISCUSSION

In this research, we have observed more female respondents, but there had been no difference statistically significant (Figure 1). Also, we have observed that recreational runners achieved significantly better results on the RSES scale (Figure 2), they have also achieved better results in all domains on SCL-90 questionnaire (Table 1). Male respondents achieved significantly lower scores on the domains Interpersonal Vulnerability, Depression, Anxiety, Phobias, PSDI, GSI and PST; in the other domains of the SCL-90 questionnaire, there were no statistically significant differences between genders (Table 2).

Numerous studies show that adequate and regular physical activity is positively associated with good health. Physical activity has a positive effect on anxiety, depression, self-esteem and psychosocial stress (Babic et al., 2018).

This cross-sectional study, which included a total of 80 respondents, 40 recreational runners-members of the SanusMotus running school in Mostar, and 40 respondents from the general population, conducted in the period from March 1, 2024 to July 1, 2024, found that recreational runners achieved better results on the Rosenberg Self-Esteem Scale (RSES) (Derogatis et al, 1973; Rosenberg, 2015) and the Self-Assessment of Psychological Symptoms Scale (SCL-90) (Rosenberg, 2015), thus confirming the hypothesis of this thesis.

Greist et al., in their review report that a consistent running routine improves physical fitness and mental well-being and can be an effective stress management tool (Greist et al., 1979). Most recreational runners also notice emotional benefits, including relief of tension, improved self-image, and improved mood, as confirmed by this study (Kenneth, 1983).

There were no statistically significant gender differences in scores on the Rosenberg Self-Esteem Scale (RSES), and on the Self-Reported Psychological Symptoms Scale (SCL-90), male respondents achieved significantly lower scores on the domains of Interpersonal Vulnerability, Depression, Anxiety, Phobias, PSDI, GSI and PST.

Numerous studies investigating the impact of physical activity on mental health cite gender as an undefined factor.

Halliday et al., in their study claim that gender does not have a significant impact on the mental health of the

research sample and that the type of physical activity that the respondents practice may have a greater impact on psychological well-being (Halliday et al., 2019). This research has its limitations, such as the territorial limitation of the research to the City of Mostar area. Also, this study did not monitor the long-term impact of running on mental health. There is a significant room to improve, make a national study and observe the long-term effects of running on mental health.

The research provides valuable insights into the connection between running and mental health. There is little research investigating the impact of running on mental health, especially in this area, so this study, with all its strengths and limitations, can serve as a guide for future research on this topic. Next research on this subject should be elevating this study on a national level and making it even more valuable tool in assessing the positive impact of running on mental health, thus providing professionals to advise recreational running as a positive means of addressing various mental health issues.

CONCLUSIONS

1. Recreational runners have higher self esteem than general population;
2. Recreational runners achieve better results on Psychological Symptoms Self-Rating Scale;
3. Recreational running is a physical activity that positively affects mental health.

Conflict of interest: None to declare.

Ethics compliance: The research had been conducted in accordance to standards of ethical compliance.

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Authors contributions: Vedran Markotić – design of the study, literature searches and analyses, statistical analyses, interpretation of data, manuscript writing. Marija Kožul – design of the study, literature searches and analyses, statistical analyses, data collection, interpretation of data, manuscript writing. Vladimir Pokrajčić – data collection, statistical analyses, interpretation of data. Mario Babić – data collection, statistical analyses, interpretation of data. Goran Šimić – statistical analyses, interpretation of data.

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