

# Sport as a means of coping with negative feelings for young people

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## Abstract

**Objective of the study** was to examine the impact of physical activity on anxiety, depression, and stress in young individuals through a meta-analysis.

**Methods and structure of the study.** A comprehensive literature review was conducted through a systematic search of electronic bibliographic databases, including PubMed, Web of Science Core Collection, MEDLINE, and Google Scholar. The PICOS method was employed for the systematic review, while the meta-analysis method was utilized for the quantitative synthesis of the collected data. The impact of physical activity on depression and anxiety was quantified, and a synthesis analysis was performed using a random effects model. The meta-analysis employed statistical indicators such as Tau<sup>2</sup>, Chi<sup>2</sup>, I<sup>2</sup>, and Z.

**Results and conclusions.** The results of the analysis showed a significant reduction in levels of depression and stress with the use of exercise. Physiologically, exercise promotes the release of neurotransmitters (endorphins and dopamine), which help improve mood and relieve depression [3]. Physical education classes have a positive effect not only on a persons psychological state, but also allow them to improve many functions of the body, increase a persons immunity, and improve the organization of work and rest.

**Keywords:** *exercise, sport, young people, negative emotions, anxiety, depression, stress, meta-analysis*

Introduction. In modern society, mental health problems of young people are attracting increasing attention. In the era of information technology development and fierce competition, high school and university students are faced with negative emotions. These problems have begun to have a significant impact on their growth and development processes [1]. If these problems are ignored, it can lead to even worse consequences, such as smoking, alcohol abuse, violence, drug use, and suicidal behavior [4].

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In meta-analysis, Tau<sup>2</sup>, Chi<sup>2</sup>, I<sup>2</sup>, and Z are important statistics used to evaluate and present the results of studies. Tau<sup>2</sup> is a measure of heterogeneity, which is the amount of variance between studies. It reflects the true differences between study results, rather than the variance due to sampling error. A larger Tau<sup>2</sup> value indicates greater variance between studies, which implies greater heterogeneity. A high Tau<sup>2</sup> value suggests that the differences between study results are substantial,

possibly due to differences in study design, participants, treatments, and other factors.

Chi<sup>2</sup> is a statistic used to test for heterogeneity, assessing whether there are significant differences between study results. When the Chi<sup>2</sup> value is large and the corresponding p-value is small, it indicates significant heterogeneity between studies.

I<sup>2</sup> is a measure of heterogeneity, indicating the percentage of total variation that is due to heterogeneity rather than chance. It quantifies the degree of heterogeneity. I<sup>2</sup> values range from 0% to 100%, with higher values indicating greater heterogeneity.

The Z statistic is commonly used to test the overall effect, determining whether the pooled effect size is significant. Larger Z values indicate a larger combined effect.

Results of the study and discussion. The search strategy yielded a total of 384 results. Ten studies [2–14] met the inclusion criteria for this meta-analysis (see Table). The 10 included studies involved 879 participants with a mean age of 18,13±2,67 years.

Anxiety. The effect size for anxiety was -5.78 with a 95% confidence interval of [-13,88, 2,32]. This suggests that exercise has some effect on reducing anxiety, but the exact effect size is unclear. Heterogeneity analysis showed differences in anxiety levels across studies. The overall effect test yielded a Z value of 1,40 with a p value of 0,16, which is not statistically significant. Therefore, the overall effect of exercise on reducing anxiety is not significant.

Depression. The synthesized effect size of exercise on depression was -6,59 with a 95% confidence interval of [-10,22, -2,96]. Heterogeneity analysis showed differences in depression levels across studies. The overall effect test yielded a Z value of 3,56 with a p value of 0,0004, indicating that the overall effect of exercise on reducing depressive mood is significant.

Stress. The synthesized effect size of physical exercise on stress was -6,70 with a 95% confidence interval of [-12,77, -0,62]. The heterogeneity analysis showed differences in stress levels across studies. The overall effect test showed a Z value of 2,16 with a p value of 0,03, indicating statistical significance of the synthesized effect. This means that exercise can reduce stress to some extent. The results of the analysis showed a significant decrease in depression and stress levels with the use of physical exercise. From a physiological point of view, exercise promotes the release of neurotransmitters (endorphins and dopamine), which improve mood and relieve depression [3]. The use of physical exercise reduces the level of the stress hormone (cortisol) [5]. From a psychological and sociological point of view, participation in sports activities helps adolescents gain self-confidence. Sports provide adolescents with an opportunity to increase their social recognition among peers, which ensures safety. Sports help teenagers discipline themselves, develop organizational and leadership skills, which help them better cope with life's difficulties, thereby reducing anxiety and depression.

#### Data included in the studies

Research (Author, Year)	Sample size	Physical activity	The impact of physical activity	Scale
Papp 2019	44	Yoga	Anxiety, depression, stress	HAD, PSS
Chung 2021	228	Adventure-based training	Depression	RS-14
Yan 2023	52	Physical activity	Anxiety	N-QOL
Noggle 2012	51	Yoga	Anxiety, depression, stress	POMS-SF, PSS
Saltan & Ankarali 2021	92	Pilates	Depression	BDI
Xiao 2021	97	Basketball, Qigong Baduanjin	Anxiety, stress	SAS, PSS
McGale 2011	104	Physical activity	Depression	BDI
Philippot 2022	52	Physical activity	Anxiety, depression	HAD
Zhao 2023	86	Aerobic exercise	Depression	SDS
Zhang & Jiang 2023	73	Qigong Baduanjin	Anxiety, depression	SCL-90

Note: HAD–Hospital Anxiety and Depression Scale; PSS–Perceived Stress Scale; RS-14–Resilience Scale 14; N-QOL–Nocturia Quality of Life Inventory; POMS-SF–Profile of Mood States–Short Form; BDI–Beck Depression Inventory; SAS–Self-Rating Anxiety Scale; SDS–Self-Rating Depression Scale; SCL-90–Symptom Checklist 90



**Conclusions.** The results of the study show that physical exercise has a positive effect on the psychological state of young people, especially in reducing depression and stress. However, there is some uncertainty about its effect on reducing anxiety, which indicates the need for further research. Physical exercise has a positive effect not only on a person's psychological state, but also helps improve many functions of the body, increase human immunity, and improve the organization of work and rest. Physical exercise helps relieve muscle and psychological tension accumulated during the day. Physical exercise is a preventive measure against many diseases. Regular physical exercise also helps improve human cognitive functions and increase brain performance. Thus, physical activity plays an important role in maintaining a person's psychological and somatic health, and can be an effective means of combating stress and depression.

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