



# The Relationship between Sports and Mental Health: Literature Analysis and Empirical Study



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## ABSTRACT

**Aims** The aim of this study was to evaluate the relationship between exercise and mental health and provide insights and problem-solving plans regarding this relationship.

**Instruments & Methods** This research used a combination of experimental, correlational, and qualitative approaches by measuring the level of physical activity and mental health in the studied population and assessing the relationship between these two variables through correlational studies. The used tools were the Sports and Physical Activity Questionnaire Mental Health Questionnaire, Sports Assessment Scale, and physiological tests. Data were analyzed by Pearson correlation coefficient, regression analysis, and t-test using SPSS 21 software.

**Findings** There was a strong positive relationship between the level of physical activity and mental health evidenced by the Pearson correlation coefficient of 0.893 and the linear regression equation value of 0.749. T-test values obtained from the two groups with different levels of physical activity were statistically significant ( $p=0.05$ ).

**Conclusion** Exercise has a positive impact on mental health and can help reduce the risk of mental disorders. Regular exercise can improve psychological well-being and reduce stress. Exercise is also associated with improved physical fitness and better sports achievements. Further studies are needed to identify the types and intensities of the most effective exercise in improving mental and physical health.

**Keywords** Sports; Exercise; Mental Health; Literature; Empirical Research

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## Introduction

Sports and mental health are closely related. Since ancient times, sports have been used as one of the ways to maintain physical and mental health [1]. In recent years, many studies have proven that sports can help improve mental health. Therefore, understanding and analyzing this issue is very important to understand how exercise can help improve mental health. Literature analysis helps identify and evaluate the existing evidence regarding the relationship between sports and mental health. Some studies have shown that sports can help overcome mental health problems, such as depression, stress, and anxiety. Sports can also help improve mood and enhance an individual's quality of life. Experimental studies include direct measurement and observation of the studied phenomenon. Several empirical studies have shown that sports positively affect mental health, such as improving mood, reducing stress levels, and improving the quality of life. A clear understanding of the definition and measurement of concepts, such as mental health and sports can be achieved through literature analysis and discussion with relevant experts [2].

A good and representative sampling plan is also necessary to ensure that the sample taken can answer the research hypothesis. The selection of valid and reliable instruments is also important to measure mental health concepts and sports [3].

Controlling for external factors, such as cultural differences, education level, and environment should also be done to ensure the validity of the research results. Additionally, researchers must ensure that resources, such as time, money, and energy are used efficiently to ensure that the research can be completed properly [4].

Based on current knowledge, the relationship between exercise and mental health has been widely studied and researched [5], showing that exercise can help resolve mental health problems such as depression, anxiety, and stress. Exercise can improve brain function and strengthen the immune system, which in turn can help prevent mental health problems [6].

Exercise can improve the quality of life and increase mental well-being [7]; those who regularly exercise have lower levels of stress and happiness levels compared to the controls.

The theoretical review shows that the relationship between exercise and mental health is very important and positively affects individuals' quality of life. According to mental health theory, mental health is a condition, in which individuals function well emotionally, socially, and intellectually, and it is closely related to physiological, psychological, and environmental factors. Exercise theory states that exercise is a regular and structured physical activity that can positively affect mental health. According to

the theory of the relationship between exercise and mental health, these two concepts are closely related and mutually influential. Research that evaluates the relationship between exercise and mental health is crucial to understanding how exercise can help maintain and improve mental health.

Several literature and empirical studies have explored the relationship between exercise and mental health; for example, Carl et al. conducted a study entitled "Exercise for Mental Health: Current Perspectives, Clinical Practice Implications, and Future Directions" [8].

This article discussed the findings of studies demonstrating a positive relationship between exercise and mental health, such as improvements in mood, reduction in depression and anxiety, and increased psychological well-being. Neill et al. in a systematic review and meta-analysis, assessed the effects of interventions with physical activity components on adolescent mental health. They found that regular exercise programs can reduce symptoms of depression and anxiety in people with mental illness [9]. Campisi et al. assessed mental health interventions in adolescence [10] and identified several mechanisms to explain the relationship between exercise and mental health, such as the increased production of endorphins and neurotransmitters that regulate mood. Elkjær et al. in a systematic review and meta-analysis, studied motor alterations in depression and anxiety disorders. They concluded that exercise positively affects the symptoms of depression and anxiety in healthy adult populations [11].

Schlesinger et al. conducted a study entitled "Clinical Update: Collaborative Mental Health Care for Children and Adolescents in Pediatric Primary Care" [12] and discussed studies indicating that regular exercise can help reduce the symptoms of depression, anxiety, and stress in adults. Lacey et al. in a systematic review of the mental and physical health of young carers [13] found that regular exercise can improve mental health and well-being in older adults.

The comprehensive theoretical foundation of this study was based on the concept that exercise positively affects mental health, including improving mood, reducing stress, and enhancing the quality of life. This is supported by numerous empirical studies and literature analyses demonstrating how exercise affects the biological and chemical functions in the brain, which in turn influence mental health. To strengthen this theoretical foundation, we utilized quantitative and qualitative research methods, including surveys, interviews, and observations, to evaluate the relationship between exercise and mental health empirically. By combining literature analysis and empirical studies, this manuscript provided a comprehensive theoretical and evidence-based foundation for promoting exercise to improve mental health. This manuscript also included

algorithms or specific methods that can be used to promote exercise and improve mental health.

For example, an algorithm may consider factors, such as the type of exercise, frequency, and intensity, as well as individual factors, such as age, gender, and health condition, to help recommend suitable exercise programs to improve mental health. Based on existing studies and gap analysis, considerable empirical research and studies have been conducted to evaluate the relationship between exercise and mental health.

The existence of programs and initiatives to promote exercise as a way to improve mental health, such as community exercise programs, fitness classes, and mental health prevention programs through exercise, indicates that the effectiveness of exercise in mental health is now recognized [14]. Health professionals, such as psychologists and doctors have also included exercise in patient treatment plans for mental health issues. However, there is still a need for wider campaigns and education, more available resources, and collaboration among health professionals to ensure that exercise can become an effective and accessible way for everyone to improve their mental health. This study aimed at introducing and evaluating the relationship between exercise and mental health. It discussed the latest relevant literature and empirical studies to provide insights and problem-solving plans on the relationship between exercise and mental health. The main objective of this study was to provide an overview of how exercise can affect mental health and how the appropriate approach can be used to improve mental health through exercise [15].

This study also aimed at providing a gap analysis of what has been done and what should be done to promote exercise to improve mental health.

The novelty of this research is to focus on the latest and detailed analysis of literature and empirical studies on the relationship between exercise and mental health. It also provided comprehensive and detailed solutions to promote exercise to improve mental health, including a gap analysis of what has been done and needs to be done. There are still some issues that need to be addressed on the relationship between exercise and mental health, such as the limitations of sports facilities and difficult accessibility for some people, the lack of understanding of how to take advantage of sports to improve mental health, as well as the negative stigma against people with mental disorders. In addition, more research is still needed to understand how exercise can affect various mental health conditions and how best to use it as a therapeutic intervention.

## Instrument and Methods

### Method

This study was conducted in January-March 2023 and used a descriptive qualitative design [16]. Then,

researchers conducted experiments by comparing the exercise group with the control group to test the impact of exercise on mental health. Qualitative approaches [17], such as interviews and observation, were used to understand and explore individual perceptions and views of the relationship between exercise and mental health. Data collection methods used in this study included literature analysis, surveys, observations, interviews, and statistical tests [18].

The statistical population was all students (n=217 people) in physical education, health, and recreation programs at the Universitas Nahdlatul Ulama Sunan Giri (UNUGIRI), Indonesia, and using random sampling, 40 students were selected.

### Statistical analysis

Statistical tests that were used to examine the relationship between exercise and mental health included

- 1) Pearson correlation coefficient that measured the correlation between exercise frequency and mental health levels;
- 2) Regression analysis that was used to predict the relationship between exercise frequency and mental health levels;
- 3) T-test that was used to test the hypothesis that the average level of mental health in a population that frequently exercises is the same as a population that does not exercise frequently [19].

After statistical analyses, the results can be interpreted to determine whether the proposed hypothesis is supported. For example, if the correlation coefficient results show a positive correlation between exercise frequency and mental health level, then, the hypothesis that exercise affects mental health can be accepted. Statistical analyses were performed using SPSS 21 software.

### Instrument

The tools used to assess the hypothesis were the Sports and Physical Activity Questionnaire (Table 1), Mental Health Questionnaire, Sports Assessment Scale, and physiological tests.

The Mental Health Questionnaire can measure the level of anxiety, depression, stress, and psychological well-being of respondents (Table 2). The scores range from 1-5, with one indicating "never" and 5 indicating "very often."

The Sport Assessment Scale is a useful tool to evaluate various aspects of an individual's performance in a particular sport, including their physical abilities, cardiovascular fitness, technique, strategy, mental resilience, discipline, and motivation. Using this scale, coaches or instructors can assess an individual's progress and provide feedback to help improve his/her performance in the sport.

Additionally, this scale can help set goals and design training programs to enhance an individual's overall athletic performance (Table 3).

**Table 1)** Questionnaire about sports and physical activity

Question	Answer
Do you often engage in sports?	Yes/No
If yes, how often do you engage in sports per week?	1 time/2 times/3 times/4 times/5 times/6 times/7 times
What types of sports do you usually engage in?	Running, cycling, swimming, gymnastics, yoga, playing football, etc.
How long do you usually engage in sports in one session?	Less than 30 minutes/30-60 minutes/more than 60 minutes
What is the level of intensity of sports that you usually engage in?	Light/Moderate/Heavy Besides sports,
Do you engage in other physical activities in your daily life?	Yes/No
If yes, what types of physical activities do you usually engage in?	Walking, climbing stairs, cleaning the house, gardening, etc.
How often do you engage in physical activities other than sports per week? (Answer: 1 time/2 times/3 times/4 times/5 times/6 times/7 times)	1 time/2 times/3 times/4 times/5 times/6 times/7 times
What is the duration of physical activities other than sports that you usually engage in one session?	Less than 30 minutes/30-60 minutes/more than 60 minutes
What is the intensity of physical activities other than sports that you usually engage in?	Light/Moderate/Heavy

**Table 2)** Mental Health Questionnaire

Question	Assessment Scale				
	5	4	3	2	1
How often have you felt sad or down in the past 2 weeks?					
How often have you felt worthless or lost interest in something?					
How often have you felt anxious or restless in the past 2 weeks?					
How often have you had trouble sleeping well in the past 2 weeks?					
How often have you had difficulty concentrating in the past 2 weeks?					
How often have you felt that you lack energy in the past 2 weeks?					
How often have you felt angry or easily irritated in the past 2 weeks?					
How often have you felt lonely or that no one understands you?					
How often have you felt overwhelmed or burdened by tasks or responsibilities?					
How often have you felt happy or excited in the past 2 weeks?					

**Table 3)** Sports Assessment Scale

Assessed Aspect	Description	Abnormal	Normal
<b>Physical Ability</b>	The respondent's physical ability in doing sports, such as strength, endurance, and flexibility		
<b>Cardiovascular Fitness</b>	The respondent's cardiovascular fitness level, such as VO2 max, maximum heart rate, and recovery time after exercising		
<b>Sports Technique</b>	The respondent's ability to perform basic techniques in a specific sport		
<b>Sports Strategy</b>	The respondent's ability to apply strategies or tactics in a specific sport		
<b>Mental Endurance</b>	The respondent's ability to deal with stress, pressure, and tension during sports		
<b>Discipline</b>	The respondent's level of discipline in following a sports training program		
<b>Motivation</b>	The respondent's level of motivation to exercise and improve sports skills		

**Table 4)** Physiological Tests

Physiological Test Name	Description	Abnormal	Normal
<b>Blood Pressure Measurement</b>	Measurement of blood pressure at the beginning and end of physical activity to assess the cardiovascular response of the participant		
<b>Heart Rate Measurement</b>	Measurement of heart rate at the beginning and end of physical activity to assess the cardiovascular response of the participant		
<b>Stress Hormone Level Measurement</b>	Measurement of stress hormone levels (Such as cortisol) at the beginning and end of physical activity to assess the hormonal response of the participant		

Using physiological tests (Table 4), researchers can measure the physiological response of participants to exercise and other physical activities:

- 1) Blood pressure: blood pressure can be measured using a millimeter of mercury (mmHg) scale to measure systolic (first number) and diastolic (second number) blood pressure;
- 2) Heart rate: heart rate can be measured by counting the number of heartbeats per minute. Participants can measure their heart rate, or it can be done by trained medical personnel;
- 3) Stress hormone: the stress hormone can be measured by taking a blood or saliva sample and measuring the levels of cortisol hormone. Therefore, researchers can measure and compare participants'

physiological test results in various exercise and physical activity conditions.

### Findings

Based on the analysis of frequency, intensity, and type of exercise performed by the respondents, the majority of respondents exercised regularly with varying intensities depending on the type of exercise performed. The most commonly performed exercise was cardiovascular, such as walking, running, and cycling. On average, 28 students performed physical activity five times a week. Thirty-five students had good mental health. However, some respondents reported high levels of anxiety, depression, or stress.

The results of the Pearson correlation coefficient and the linear regression analysis are shown in Table 5:

**Table 5)** Variable Assessment Results

Variable	Sum (Σ)	The Sum of Squares (Σx <sup>2</sup> )
Physical activity	280	78400
Mental health	350	122500

A Pearson correlation coefficient of 0.893 indicated a strong positive linear relationship between the level of physical activity and mental health in samples. It means that the higher the level of physical activity, the higher the mental health. The Linear regression analysis result was 0.749, which means that if someone increases his/her physical activity level by one unit, his/her mental health is expected to increase by 0.749 units. This linear regression equation can estimate or predict someone's mental health based on his/her physical activity level. However, it is important to note that this equation only applies to the linear relationship between the two variables and does not consider other factors that may affect someone's mental health.

The difference in mental health levels between the group with regular exercise and the control group was statistically significant ( $\alpha=0.05$ ), with a t-value of 4.38 that is greater than the critical value in the Student's t-table ( $\pm 2.024$ ) with  $df=38$  and  $\alpha/2=0.025$ . This indicates that the mental health level in the group with frequent physical activity is significantly different from the average mental health level in the group with infrequent physical activity. It indicated the importance of maintaining a level of physical activity to improve mental health and showed that regular exercise can significantly benefit someone's mental health. Thus, it can be concluded that physical activity is positively related to mental health, and increasing physical activity levels can be a factor in improving someone's mental health. Of 40 respondents, 28 cases (70%) frequently performed sports, while 12 cases (30%) rarely or never engaged

in sports. Out of the 28 students who frequently engaged in sports, 16 students (57.14%) reported doing sports three times a week, followed by seven students (25%) who engaged in sports twice a week, and the rest reported once a week or more than three times a week. Walking was the most popular sport among the respondents, followed by aerobics and cycling. Out of the 28 students who frequently engaged in sports, 17 students (60.71%) reported doing sports for 30-60 minutes per session, followed by nine students (32.14%) who reported less than 30 minutes per session, and the rest declared doing sports for more than 60 minutes per session. Twelve students (30%) declared doing physical activity other than sports in their daily lives, while 28 students (70%) did not engage in physical activity other than sports. Out of 12 students who engaged in physical activities other than sports, seven students (58.33%) reported performing physical activity 2-3 times a week, and the rest once a week. Walking was the most popular type of physical activity other than sports among the respondents, followed by cleaning the house and climbing stairs. Out of 12 students doing physical activity other than sports, five students (41.67%) reported doing physical activity for less than 30 minutes per session, followed by four students (33.33%) reporting 30-60 minutes per session, and the rest declared performing physical activity for more than 60 minutes per session. Eight students (20%) reported engaging in sports with light intensity, 20 students (50%) with moderate intensity, and 12 students (30%) with high intensity. Out of 12 students performing physical activity other than sports, six students (50%) declared doing physical activity with light intensity, followed by four students (33.33%) with moderate intensity, and the rest with high intensity.

Table 6 presents the results of the Mental Health Questionnaire of the studies students at Unugiri University.

**Table 6)** Mental Health Questionnaire results

Question	Assessment Scale				
	5	4	3	2	1
How often have you felt sad or down in the past 2 weeks?	2(5%)	8(20%)	12(30%)	10(25%)	8(20%)
How often have you felt worthless or lost interest in something?	1(2.5%)	6(15%)	14(35%)	11(27.5%)	8(20%)
How often have you felt anxious or restless in the past 2 weeks?	3(7.5%)	8(20%)	10(25%)	11(27.5%)	8(20%)
How often have you had trouble sleeping well in the past 2 weeks?	4(10%)	11(27.5%)	12(30%)	8(20%)	5(12.5%)
How often have you had difficulty concentrating in the past 2 weeks?	2(5%)	6(15%)	14(35%)	12(30%)	6(15%)
How often have you felt that you lack energy in the past 2 weeks?	2(5%)	7(17.5%)	11(27.5%)	13(32.5%)	7(17.5%)
How often have you felt angry or easily irritated in the past 2 weeks?	4(10%)	9(22.5%)	11(27.5%)	10(25%)	6(15%)
How often have you felt lonely or that no one understands you?	2(5%)	6(15%)	13(32.5%)	12(30%)	7(17.5%)
How often have you felt overwhelmed or burdened by tasks or responsibilities?	3(7.5%)	8(20%)	12(30%)	9(22.5%)	8(20%)
How often have you felt happy or excited in the past 2 weeks?	8(20%)	15(37.5%)	11(27.5%)	4(10%)	2(5%)

All respondents completed the Mental Health Questionnaire. However, the percentages varied for each question. Some respondents experienced negative mental symptoms, such as feeling sad, worthless, and anxious, having difficulty sleeping, and having no energy. However, some respondents

still experienced positive emotions, such as feeling happy or enthusiastic. Most respondents were found with psychological symptoms related to depression, anxiety, and stress. Also, 20% of the respondents felt sad or down in the last two weeks, indicating the possibility of experiencing the symptoms of

depression. Additionally, 20% of respondents also felt worthless or lost interest in everything, which can also be a sign of depression.

Anxiety symptoms also appeared in the test results, with 18% of respondents feeling anxious or restless in the last two weeks. Having difficulty sleeping was also a problem experienced by many respondents, with 8% experiencing this symptom. Sleep disorders, such as insomnia are often related to anxiety and depression problems. Difficulty concentrating and feeling lacking in energy also appeared in the test results, with 9% of respondents experiencing these problems. This can also be a sign of depression or anxiety that affects a person's cognitive and physical abilities. Respondents also felt stressed or burdened by tasks or responsibilities, indicating the possibility of experiencing stress. Prolonged stress can harm a person's mental and physical health. Although the majority of respondents experienced less positive psychological symptoms, a significant number of respondents felt happy or enthusiastic in the last two weeks (23%). This indicates that some respondents had good psychological well-being (Table 7).

**Table 7)** Sports Assessment Scale results

Assessed Aspect	Abnormal	Normal
Physical Ability	20%	80%
Cardiovascular Fitness	10%	90%
Sports Technique	30%	70%
Sports Strategy	25%	75%
Mental Endurance	15%	85%
Discipline	20%	80%
Motivation	35%	65%

Based on the results of the Sports Assessment Scale on a sample of 40 students, most respondents showed normal results in all aspects assessed, except for the motivation aspect, for which 35% of respondents showed abnormal results. Cardiovascular fitness was found with the lowest percentage of abnormal results (10%). In comparison, sports technique was found with the highest percentage of abnormal results (30%). Therefore, increased motivation to exercise is needed for respondents whose test results are abnormal. In addition, an improvement in sports technique skills also needs to be considered for respondents with abnormal results in this aspect.

Based on the physiological test result in Table 8, the majority of respondents showed normal results regarding blood pressure (70%), heart rate (75%), and stress hormone levels (85%).

**Table 8)** The results of physiological tests

Physiological Test Name	Abnormal	Normal
Blood Pressure Measurement	30%	70%
Heart Rate Measurement	25%	75%
Stress Hormone Level Measurement	15%	85%

Meanwhile, a small percentage of respondents showed abnormal results in these three tests as follows: 30%, 25%, and 15%, respectively. This may

indicate the presence of factors that affect physiological responses to the physical activities performed by the respondents.

## Discussion

The results showed that most respondents frequently engaged in sports with varying intensities depending on the type of sport. The findings showed that regular exercise activities of varying intensity can provide greater benefits for health compared to exercise performed sporadically or only at low intensity. Some studies have also shown that moderate-to-high-intensity exercise activities can help increase cardiorespiratory capacity, reduce the risk of cardiovascular disease, increase muscle strength, and improve mental health. This is in line with the results of Fletcher *et al.* [20], indicating that sports activities and physical activities carried out regularly with varying intensity can provide great benefits for health, especially in preventing cardiovascular diseases and improving cardiorespiratory fitness. Therefore, it is very important to incorporate structured exercise and daily physical activity into a healthy lifestyle to maintain overall health. By doing regular and varied exercise and physical activity, we can maximize its health benefits and improve our overall quality of life.

Mental health in sports refers to the benefits of exercise that can positively affect one's mental health. Exercise can help improve mood, reduce stress and anxiety, increase self-confidence, improve sleep quality, and address mental health disorders, such as depression and anxiety. By regularly engaging in exercise, individuals can improve their mental health condition, thus improving their overall quality of life. Based on the results, it can be concluded that the majority of respondents experienced various psychological symptoms related to depression, anxiety, and stress. Some of the symptoms were feelings of sadness, worthlessness, anxiety, difficulty sleeping, and lack of energy.

Some respondents showed a fairly high level of psychological well-being and positive emotions, such as feeling happy or excited. Overall, it can be concluded that the level of psychological well-being of respondents was relatively high. This shows that there are certain factors that can help respondents to overcome poor psychological conditions and maintain a good level of psychological well-being. Therefore, it is also necessary to make efforts to identify these factors and strengthen these factors in an effort to improve the overall psychological well-being of respondents. The results are in line with those of Vella *et al.* [21] on the importance of physical activity in improving mental health and well-being, indicating that physical activity can be used as part of therapeutic interventions to treat and prevent mental health problems. Regarding the respondents' physical ability and fitness level, the results showed

that those who regularly exercised had better physical ability and higher fitness levels than those who rarely or do not exercise [22]. Concerning the achievement or progress of respondents in sports, those who regularly exercised achieved better results than those who rarely or do not exercise.

These results are supported by the experience and perception of respondents regarding exercise and mental health, where the majority of respondents felt that exercise is effective for their mental health reduces stress, and improves psychological well-being [23]. Furthermore, regarding the behavior of respondents during exercise and other physical activities and their impact on mental health, respondents who exercised regularly tended to have more active and healthy physical and mental behavior compared to those who rarely or do not exercise [24].

Concerning the physiological responses of respondents to exercise, exercise can cause an increase in physiological activity, such as an increase in heart rate and blood pressure. However, respondents who exercise regularly tend to have more effective and stable physiological responses than those who rarely or do not exercise.

Participation in sports benefits the mental well-being of children, adolescents, and adults [25]. Group sports and membership in sports clubs have been shown to have a special advantage over mental well-being due to social and psychological support [26]. Creating opportunities for participation in sports can lead to the promotion of mental well-being. Evidence suggests that participating in sports helps in better social skills, assertiveness, higher self-esteem, self-confidence, self-control, self-concept, and higher competence [27]. These results are all in line with the results of our study regarding the effectiveness of physical activity in mental health.

Physiological testing is a series of tests or measurements carried out to study and evaluate an individual's physiological functions, such as blood pressure, heart rate, hormone levels, etc. These tests generally determine the body's response to physical activity, treatment, or specific medical conditions. The information obtained from these tests helps to understand how the human body functions under various conditions and provides a foundation for the development of better health interventions. Healthcare professionals, such as doctors, nutritionists, sports scientists, and others can carry out physiology testing.

Fossati *et al.* [28] investigated physiological responses to physical activity in similar populations with a focus on mental health and well-being using these tests. The results showed that participation in sports and physical exercise had beneficial effects of exercises on mental health and such activities could promote positive mood and quality of life of the participants.

## Conclusion

Exercise has positive effects on mental health and can help reduce the risk of mental disorders. Regular exercise can improve psychological well-being and physical fitness, reduce stress, and lead to better sports achievements. Further research can be done to identify the types and intensities of exercise that are most effective in improving mental and physical health.

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