Journal of Sports Sciences
ISSN: 2074 - 6032 ISSN-e: 2710 - 5016
Journal Homepage: https://pessj.uodiyala.edu.iq

Information Article

The Relationship Between Physical Activity and Mental Health

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ARTICLE INFO

Keywords:
Physical activity, Mental health, Well-being

ABSTRACT

This study aimed to investigate the relationship between physical activity levels and mental health outcomes among adults aged 18-65 years in an urban setting. Specifically, it sought to determine whether higher levels of physical activity are associated with lower psychological distress, as measured by the General Health Questionnaire (GHQ-12). Participants were recruited from community centers, gyms, and online platforms, resulting in an initial sample of 500 individuals. After applying inclusion (physically capable adults) and exclusion criteria (individuals with diagnosed mental health disorders), 450 participants completed the study. The final sample comprised 220 females (48.9%) and 230 males (51.1%), with a mean age of 34.5 years (SD = 12.3). Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ), while mental health was evaluated with the GHQ-12. Demographic and lifestyle variables, including age, gender, smoking status, and sleep quality, were collected via a structured questionnaire. Data were analyzed using SPSS version 26.0, employing descriptive statistics, Pearson correlation coefficients, and multiple regression analysis to explore the relationships among variables.

The mean total physical activity score was 1,200 MET-min/week (SD = 800), with leisure-time activities contributing the most (mean = 750 MET-min/week, SD = 600). The mean GHQ-12 score was 3.5 (SD = 2.5), indicating low psychological distress, though 25% of participants scored above the cutoff of 4. A significant negative correlation was observed between total physical activity and GHQ-12 scores ($r = -0.45$, $p < 0.001$), suggesting that higher physical activity levels are associated with lower psychological distress. Multiple regression analysis revealed that total physical activity ($\beta = -0.32$, $p < 0.001$) and sleep quality ($\beta = -0.25$, $p < 0.01$) were significant predictors of mental health, explaining 18% of the variance in GHQ-12 scores ($R^2 = 0.18$). Moderating effects of demographic and lifestyle variables were not significant. The calculated effect size for the relationship between physical activity and mental health was medium (Cohen's $d = 0.50$).

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DOI: https://doi.org/10.26400/sp/65/7

Journal of Sports Sciences
ISSN: 2074 - 6032 ISSN-e: 2710 - 5016
Journal Homepage: https://pessj.uodiyala.edu.iq

Introduction

It is also now well established that the risk of developing dementia is reduced by regular physical activity and possibly through participation in sports. There is also emerging evidence that the influence of physical activity on mental well-being may start at a young age (Faulkner, & Tamminen, 2016). The most recent Sport England Active People survey found a strong association between the prevalence of mental health problems and inactivity and social and economic factors. This survey also uncovered that the mentally ill are more likely to be inactive, thus forming a negative spiral where inactivity and mental illness are mutually reinforcing. This is an important finding as it suggests that physical activity interventions could reduce the prevalence of mental health problems and could be used to improve self-esteem and social and economic factors in the mentally ill (Kumar, et al, 2018).

A mental disorder is a major public health concern. It is estimated that in a given year, one in four adults of the population will experience a mental disorder (Kessler et al., 2005). It has also been shown that those of lower socioeconomic status are at an increased risk of developing mental illnesses as a result of social adversity and exposure to life events beyond their control (Dohrenwend, 1998).

Mental health is defined as the state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her community (WHO, 2021). Mental illness can have an enormous impact on an individual's quality of life, creating emotional, cognitive, and behavioral imbalances. There are also significant financial and social implications associated with mental illness. In 1998, the US Surgeon General stated that it is the number one cause of disability in the United States and Canada for people aged 15 to 44 (Vella, 2019).

Literature Review

The relationship between physical activity and mental health has garnered significant attention in recent years, as researchers and practitioners alike seek to understand the potential benefits of physical activity on psychological well-being. This literature review aims to synthesize existing research on the positive effects of physical activity on mental health.

Several theoretical frameworks have been proposed to explain the relationship between sport and mental health. The Biopsychosocial Model

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posits that biological, psychological, and social factors interact to influence an individual's health outcomes (Engel, 1977). This model is particularly relevant in understanding how sport can impact mental health, as it encompasses physiological benefits (e.g., endorphin release), psychological improvements (e.g., self-esteem), and social interactions (e.g., team dynamics). Additionally, the Stress-Buffering Hypothesis suggests that engaging in physical activity can mitigate the effects of stress by providing a coping mechanism and fostering resilience (Cohen & Wills, 1985). These frameworks provide a foundation for exploring the multifaceted relationship between physical activity and mental health.

A substantial body of literature supports the notion that participation in physical activity can lead to improvements in mood and overall emotional well-being. Research has consistently shown that physical activity is associated with reductions in symptoms of depression and anxiety (Craft & Perna, 2004; Rebar et al., 2015). For instance, a meta-analysis conducted by Rebar et al. (2015) found that exercise interventions significantly reduced depressive symptoms across various populations, including clinical and non-clinical samples. Furthermore, the release of endorphins during physical activity is often cited as a biological mechanism underlying mood enhancement (Boecker et al., 2008). In addition to biochemical changes, psychological factors such as increased self-efficacy and mastery can contribute to improved mood. Research by McAuley et al. (2000) demonstrated that individuals who engage in regular physical activity report higher levels of self-esteem and self-worth, which are closely linked to positive emotional states. Moreover, the sense of achievement derived from participating in sports can foster a positive self-image, further enhancing mood (Scully et al., 1998).

Stress Reduction

The role of physical activity in stress reduction has been extensively documented. Engaging in physical activity has been shown to lower levels of cortisol, a hormone associated with stress (Dhabhar, 2009). A study by Tsatsoulis and Fountoulakis (2006) highlighted that regular exercise can lead to a significant decrease in perceived stress levels, suggesting that sport serves as an effective coping strategy. Furthermore, the rhythmic and repetitive nature of many sports can promote a meditative state, allowing individuals to focus on the present moment and alleviate stress (Thompson et al., 2010).

The social context of physical activity also plays a crucial role in stress reduction. Team sports, in particular, provide opportunities for social support, which has been shown to buffer against stress (Cohen & Wills,

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ISSN: 2074 - 6032 ISSN-e: 2710 - 5016
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1985). Research by Carron et al. (2002) indicated that individuals who participate in team sports report lower levels of stress and higher levels of social connectedness compared to those who engage in solitary activities. This social aspect of sport not only enhances the enjoyment of physical activity but also contributes to overall mental well-being.

Social Interaction and Support

The social benefits of sport are well-documented, with numerous studies highlighting the importance of social interaction in promoting mental health. Participation in team sports fosters a sense of belonging and community, which can be particularly beneficial for individuals experiencing social isolation or loneliness (Eime et al., 2013). A study by Holt et al. (2017) found that individuals who engaged in team sports reported higher levels of social support and lower levels of loneliness compared to those who participated in individual sports.

Moreover, the development of social skills through sport can enhance interpersonal relationships and improve overall mental health. Research by Weiss and Chaumeton (1992) suggests that participation in sports can lead to improved communication skills, conflict resolution abilities, and teamwork, all of which are essential for building and maintaining healthy relationships. These social skills can translate into various aspects of life, including personal and professional relationships, further contributing to an individual's mental well-being.

Mechanisms of Action

Understanding the mechanisms through which physical activity influences mental health is crucial for developing effective interventions. Several pathways have been proposed, including physiological, psychological, and social mechanisms. Physiologically, the release of neurotransmitters such as serotonin and dopamine during physical activity is believed to play a significant role in mood regulation (Dishman & Buckworth, 1996). Additionally, regular exercise can lead to structural changes in the brain, such as increased neurogenesis and improved synaptic plasticity, which are associated with enhanced cognitive function and emotional regulation (Erickson et al., 2011).

Psychologically, the act of setting and achieving goals in physical activity can foster a sense of accomplishment and self-efficacy, which are critical for mental health (Bandura, 1997). The process of overcoming challenges in sport can also build resilience, equipping individuals with coping strategies that can be applied to other areas of life (Gould & Udry, 1994). Socially, the connections formed through physical activity can provide a support network that enhances mental health. The shared

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experiences and camaraderie associated with team sports can create a sense of belonging, which is essential for emotional well-being (Eime et al., 2013). Furthermore, the encouragement and motivation derived from teammates can enhance an individual's commitment to physical activity, creating a positive feedback loop that reinforces mental health benefits. Consequently, this study assumes that physical activity improved mental health outcomes

Method

Study Design

A cross-sectional design was employed to investigate the relationship between physical activity and mental health. This design provides a snapshot of the associations between these variables at a single point in time, allowing for the examination of potential correlations without the constraints of longitudinal tracking. It is particularly useful in exploring the prevalence and strength of relationships in a population, making it suitable for the research question.

Participants

Participants were recruited from various community centers, gyms, and online platforms within an urban setting. The target population included adults aged 18-65 years, reflecting a diverse demographic in terms of age, gender, socioeconomic status, and ethnicity. Inclusion criteria required participants to be physically capable of engaging in physical activity, while exclusion criteria involved individuals with diagnosed mental health disorders that may significantly influence physical activity levels or mental health status, such as severe depression, anxiety disorders.

A total of 500 participants were initially approached, and after applying the inclusion and exclusion criteria, 450 individuals completed the study. The final sample (Table 1) consisted of 220 females (48.9%) and 230 males (51.1%), with a mean age of 34.5 years (SD = 12.3). Participants were informed about the study's purpose, and written informed consent was obtained prior to data collection. Ethical approval was granted by the Institutional Review Board (IRB) of the affiliated university.

Table 1: Demographic Characteristics of Participants

Gender	N	%
Male	230	48.9%
Female	220	51.1%
Total	450	100%

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Measures

Physical Activity Assessment

Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ), a widely recognized tool for assessing physical activity in adults. The IPAQ includes questions regarding the frequency and duration of various types of physical activities, categorized into three domains: leisure-time physical activity, work-related physical activity, and transportation-related physical activity. Participants were instructed to report their activities over the past week. The IPAQ provides a total physical activity score expressed in metabolic equivalent minutes per week (MET-min/week). This scoring system allows for a comprehensive assessment of an individual's overall physical activity level, facilitating comparisons across different activity types and intensities.

Mental Health Assessment

Mental health was evaluated using the General Health Questionnaire (GHQ-12), a screening tool designed to detect psychological distress in the general population. The GHQ-12 consists of 12 items that assess symptoms related to anxiety, depression, and social dysfunction over the past few weeks. Participants responded to each item on a four-point Likert scale, indicating the extent to which each symptom was experienced. Scores were calculated by summing the responses, with higher scores indicating greater levels of psychological distress. A cutoff score of 4 was used to identify participants at risk for mental health issues, allowing for a dichotomous classification of mental health status.

Demographic and Lifestyle Variables

Demographic data, including age, gender, ethnicity, education level, and income, were collected through a structured questionnaire. Additionally, lifestyle factors such as smoking status and sleep quality were assessed, as these variables can influence both physical activity and mental health outcomes. Participants were asked to report their smoking habits (current smoker, former smoker, or non-smoker) and self-rated sleep quality on a scale from 1 (poor) to 5 (excellent).

Data Collection Procedure

Data collection occurred over a three-month period. Trained research assistants administered the questionnaires in a controlled environment to ensure consistency and minimize distractions. Participants completed the IPAQ and GHQ-12 questionnaires, followed by the demographic and lifestyle questionnaire. Each participant was allotted approximately 30 minutes to complete the assessment. To enhance data reliability,

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participants were encouraged to ask questions if any confusion regarding the items arose. Additionally, to ensure the accuracy of self-reported physical activity levels, participants were provided with examples of various activities and their corresponding MET values.

Statistical Analysis

Data analysis was conducted using SPSS version 26.0. Descriptive statistics were calculated for all variables, including means, standard deviations, and frequencies, to provide an overview of the sample characteristics. To assess the relationship between physical activity and mental health, Pearson correlation coefficients were computed to explore the strength and direction of the association between total physical activity scores and GHQ-12 scores. Subsequently, multiple regression analysis was employed to examine the predictive relationship between physical activity and mental health while controlling for potential confounding variables such as age, gender, socioeconomic status, smoking status, and sleep quality. The regression model was specified with GHQ-12 scores as the dependent variable and total physical activity scores as the independent variable, along with the demographic and lifestyle variables as covariates.

Results

Physical Activity Levels

Physical activity levels, as measured by the International Physical Activity Questionnaire (IPAQ), revealed a wide range of activity among participants. The mean total physical activity score was 1,200 MET-min/week (SD = 800), indicating varying engagement in leisure-time, work-related, and transportation-related physical activities. Specifically, leisure-time physical activity accounted for the largest proportion of total activity, with a mean score of 750 MET-min/week (SD = 600), followed by work-related activity (mean = 300 MET-min/week, SD = 200) and transportation-related activity (mean = 150 MET-min/week, SD = 100).

Table 2 Physical activity levels

Activity	MET-min/week	SD
Leisure-time	750	600
Work-related activity	300	200
Transportation-related physical activities	150	100
Mean total	1200	900

Mental Health Status

Mental health was assessed using the General Health Questionnaire (GHQ-12), with scores ranging from 0 to 12. The mean GHQ-12 score for the sample was 3.5 (SD = 2.5), indicating a generally low level of psychological distress. However, 25% of participants scored above the cutoff of 4, suggesting they were at risk for mental health issues. A

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breakdown of scores revealed that 15% of participants reported moderate distress (scores of 5-7), while 10% reported high distress (scores of 8 or above).

Correlation Analysis

Pearson correlation coefficients were computed to examine the relationship between total physical activity scores and GHQ-12 scores. A significant negative correlation was found ($r = -0.45$, $p < 0.001$), suggesting that higher levels of physical activity were associated with lower levels of psychological distress. This finding supports the hypothesis that increased physical activity may contribute to improved mental health outcomes.

Regression Analysis

To further explore the predictive relationship between physical activity and mental health, a multiple regression analysis was conducted. GHQ-12 scores served as the dependent variable, while total physical activity scores were included as the independent variable, controlling for demographic and lifestyle factors. The regression model was statistically significant ($F(7, 442) = 12.45$, $p < 0.001$), explaining 18% of the variance in GHQ-12 scores ($R^2 = 0.18$).

As results shown, total physical activity was a significant predictor of mental health ($\beta = -0.32$, $p < 0.001$), indicating that for each 100 MET-min/week increase in physical activity, GHQ-12 scores decreased by approximately 0.32 points. Among the covariates, sleep quality emerged as a significant predictor ($\beta = -0.25$, $p < 0.01$), suggesting that better sleep quality was associated with lower psychological distress. Age and smoking status did not significantly contribute to the model.

Moderating Effects

To assess potential moderating effects of demographic and lifestyle variables, interaction terms were included in the regression analysis. However, none of the interaction terms significantly contributed to the model, suggesting that the relationship between physical activity and mental health was consistent across different demographic groups.

Effect Sizes

Effect sizes were calculated to determine the practical significance of the findings. The effect size for the relationship between physical activity and mental health was medium (Cohen's $d = 0.50$), indicating that the observed association is meaningful in a practical context.

Conclusion

The results of this study support the hypothesis that higher levels of physical activity are associated with better mental health outcomes. The findings underscore the importance of promoting physical activity as a

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potential intervention for enhancing mental well-being in the adult population. Further research is warranted to explore the mechanisms underlying this relationship and to assess the impact of structured physical activity programs on mental health.

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