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Depression, Anxiety, Stress and Physical Activity: A Cross-Sectional Analysis of Adults

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ORIJINAL ARTICLE

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Abstract

The study aimed to examine the anxiety, depression, and stress levels of adults with different physical activity levels. The data of the study were collected through the Personal Information Form, International Physical Activity Questionnaire-Short Form (IPAQ-SF) and Depression, Anxiety, Stress Scale (DASS-21). After obtaining the necessary ethics committee approval for the study, data were collected from 55 of 81 provinces in Turkey by online method and convenient sampling. The sample of the study consisted of 488 adult individuals who filled the scales completely. Data obtained from adult individuals were analysed by using the SPSS (Statistical Package for Social Sciences) 26.0 program. Before the analyses, the assumptions required for the MANOVA test were discussed. After the necessary examinations were performed, descriptive statistics and the MANOVA test were used in the analysis of the data regarding the mean scores of the answers given by 488 adult individuals to the scales. Most of the individuals participating in the study had normal scores for anxiety (70.7%), depression (64.3%) and stress (77.5%). Despite this situation, it was observed that there were individuals with severe and very advanced anxiety (11.5%), depression (12.3%) and stress (9.4%) score ranges. In terms of physical activity levels, 56.9% (n=278) of the participants were found to be inactive and minimally active. The hypothesis test results showed that the anxiety, depression and stress levels of inactive individuals were significantly higher than those in the minimally active and very active groups. As a result, it can be said that there was a strong link between physical activity and negative emotions for adults.

Key Words: Anxiety, Depression, Physical Activity, Stress

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Depresyon, Anksiyete, Stres ve Fiziksel Aktivite: Yetişkinler Üzerine Kesitsel Bir Analiz

Öz

Bu araştırmanın amacı, farklı fiziksel aktivite düzeylerine sahip yetişkin bireylerin anksiyete, depresyon ve stres düzeylerini incelemektir. Araştırmanın verileri, Kişisel Bilgi Formu, Uluslararası Fiziksel Aktivite Anketi-Kısa Form (UFAA-KF) ve Depresyon, Anksiyete, Stres Ölçeği (DASS-21) yoluyla toplanmıştır. Çalışma için gerekli etik kurul izni alındıktan sonra veriler Türkiye'deki 81 ilin 55'inden çevrimiçi yöntemle ve kolayda örnekleme yoluyla toplanmıştır. Araştırmanın örneklemini ölçekleri eksiksiz dolduran 488 yetişkin birey oluşturmuştur. Yetişkin bireylerden elde edilen veriler, SPSS (Statistical Package for Social Sciences) 26.0 programı aracılığı ile analiz edilmiştir. Analizler öncesinde, MANOVA testinin yapılabilmesi için gerekli olan varsayımlar ele alınmıştır. Gerekli incelemeler sonrasında verilerin analizinde öncelikle 488 yetişkin bireyin ölçeklere vermiş oldukları cevapların puan ortalamaları doğrultusunda tanımlayıcı istatistikler ve MANOVA testi kullanılmıştır. Araştırmaya katılan bireylerin büyük çoğunluğunun anksiyete (%70,7), depresyon (%64,3) ve stres (%77,5) puan aralıklarının normal düzeylerde olduğu görülmüştür. Bu duruma karşın ileri ve çok ileri düzeyde anksiyete (%11,5), depresyon (%12,3) ve stres (%9,4) puan aralıklarına sahip bireylerin olduğu da görülmüştür. Fiziksel aktivite düzeylerinde ise katılımcıların %56,9'unun (n=278) inaktif ve minimal aktif olduğu görülmüştür. Hipotez test bulguları, inaktif bireylerin anksiyete, depresyon ve stres düzeylerinin anlamlı bir şekilde minimal aktif ve çok aktif gruplarda yer alan bireylerden daha yüksek olduğunu göstermiştir. Sonuç olarak, yetişkin bireyler için fiziksel aktivite ile negatif duygular arasında güçlü bir bağ olduğu söylenebilir.

Anahtar kelimeler: Anksiyete, Depresyon, Fiziksel Aktivite, Stres

Introduction

Emotions are of great social and individual importance. It is possible to examine emotions in two classes as positive and negative. While positive emotions include emotions such as happiness, optimism, and achievement, negative emotions include feelings such as depression, anxiety, and stress (Fredrickson and Joiner, 2002; cited by Yılmaz et al., 2017).

Depression is expressed as sadness that can last for several weeks, with negative effects on thinking, body, and mood levels. The feeling of tension, danger, and fear that an individual perceives when faced with an undesirable event is called anxiety (worry), and this emotion usually results in angry behaviour. Anxiety affects social and psychological life, especially business life, in many ways (Yılmaz et al., 2017). Stress is defined as a state of physiological and psychological imbalance resulting from the inequality between situational demand and an individual's ability and motivation to meet these needs (Keerthi and Madhuri, 2020).

Most individuals overcome stressful life situations without developing pathological conditions. However, the magnitude of stressful life events is known as a general risk situation for the onset of clinical depression (Hagen, 2011; Hammen, 2015; Martell et al., 2010). After the curfews were imposed in many countries during the epidemic, it was determined that the levels of anxiety and depression increased in patients and healthy people (Huang and Zhao, 2020; Ozamiz-Etxebarria et al., 2020). However, research on the effects of measures taken during the epidemic, reports that increased symptoms of anxiety, stress, and depressive disorder and 30% higher suicide rates in societies affected by these measures. These results are replicated by numerous studies reporting an increased prevalence of depression and anxiety during the COVID-19 pandemic (Wolf et al., 2021). Since we do not know how long the effects of the epidemic will last, interventions to prevent or alleviate the psychological effects are important in terms of maintaining a healthy life, and quality of life. Although changing a sedentary lifestyle and starting an exercise regimen, which is increasing the level of physical activity, plays a beneficial role in combating anxiety and depression, it can be said that this is a challenging effort for many individuals (Hu et al., 2020).

Physical activity has positive effects on anxiety, stress, depression, mental health and psychological vitality. At the same time, physical activity increases the quality of life (Nelson et al., 2007). This research claims that adults can be less affected by the negative effects of negative emotions if they are more physically active.

Various measures taken especially during the epidemic period can worsen the relatively weak physical activity behaviour of individuals. Considering the effect of physical activity on individuals' mental health, it is thought that inactive life can harm the mood of individuals. From this point of

view, it is important to determine the depression, anxiety and stress levels of adult individuals and then examine the role of physical activity. The study aims to examine the anxiety, depression, and stress levels of adults with different physical activity levels.

Relationship between Depression, Anxiety, Stress, and Physical Activity

The beneficial effect of exercise on improving physical health and fighting disease has been widely studied (Warburton et al., 2006; Kandola et al., 2019). A great deal of evidence has suggested that regular exercise can significantly reduce the risk of depression, anxiety, and stress (Bailey et al., 2017; Hewett et al., 2018; Josefsson et al., 2014; Mammen and Faulkner, 2013; Mura et al., 2014; Rhodes et al., 2009; Yates et al., 2020; Wu et al., 2020).

Evidence that physical activity increases psychological well-being is available in different sample groups. Škrlec et al (2021), in their study examining the relationship between negative emotions (depression, anxiety, stress) and physical activity in a sample of university students and concluded that physical activity and the high prevalence of negative emotions decreased. Moreover, in a meta-analysis study investigating psychological well-being (in a sample of older adults without clinical disorders), physical activity was found to support psychological well-being (Netz et al., 2005).

It is concluded that with the increase in the physical activity levels of adolescents and adults, there is a decrease in depression symptoms (Josefsson et al., 2014). Therefore, it can be said that physical activity is effective in reducing depression. Long et al (2019) researched individuals aged 6-17 years. The results of the study revealed that weekly exercise is an effective treatment for mild to moderate depression.

Current research reveals that participation in minimally active physical activity is associated with anxiety and depression. Moreover, physically inactive individuals are approximately twice as likely to have anxiety (Zhua et al., 2019). Physical activity was also identified as a protective factor against depression (Schuch et al., 2018) and anxiety (Schuch et al., 2019) before the epidemic period.

In line with all these theoretical and factual studies, it is predicted that the negative emotion levels of adult individuals may vary according to different physical activity levels. Based on this situation, the following hypothesis was developed:

$H_{1(a\text{-}b\text{-}c)}$: Anxiety, depression, and stress levels of individuals with different physical activity levels differ.

Method

Research Model

In this research model, the conceptual model in Figure 1 was developed to determine the role of physical activity on negative emotions (depression, anxiety, and stress). The hypotheses in the study were determined in light of the studies in the literature.

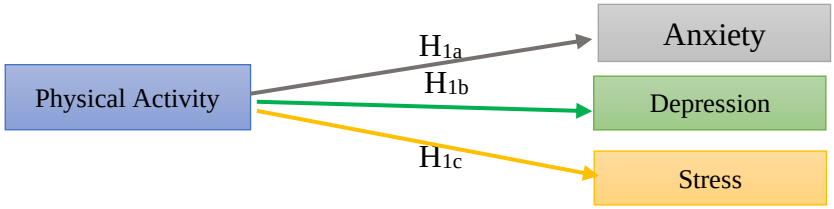

Figure 1: Model of the Study

The conditional effect in question was that depending on the different physical activity levels of individuals (low, medium, and high), depression, anxiety and stress levels would differ ($H_{1a\text{-}b\text{-}c}$). When this hypothesis was interpreted within the framework of the research; It was suggested that individuals with high levels of physical activity would experience lower levels of depression, anxiety, and stress.

Data were collected from 531 individuals within the scope of the research. The answers of 6 individuals (1.1%) under the age of 18 and over the age of 65, and of 8 individuals (1.5%) who were found to have filled in the questionnaire incorrectly were excluded from the analysis. In addition, 5% of trimmed values in the descriptives table were checked for the detection of extreme values, and in this context, 29 data (5.6%) were excluded from the analysis. Thus, the data of 488 adult individuals in total were evaluated within the scope of the analysis.

A total of 488 adult individuals (187 females and 301 males; 18-65 years old, $\bar{x}$=36.22, SD=12.44) participated in the study. 260 Of the participants (53.3%) were married and 228 (46.7%) were single.

Data were collected online from 55 of 81 provinces in Turkey. In the research, the questions in which all the scales related to physical activity and negative emotions were used, as well as the demographic information of the individuals, were transferred to the web-based Google form. Links were distributed to adult individuals via social media. Participation was voluntary. Informed consent was obtained from all participants. The survey data was kept anonymous and confidential, and before starting the research, the participants were briefed about the purpose of the research. The form was designed in such a way that questionnaires cannot be sent with missing data.

Convenience sampling was used in this study and the research was cross-sectional in nature. The G*Power (3.1.9.7, Germany) program (Biernat et al., 2022; Škrlec et al., 2021) was used to determine the required sample size. According to G*power, a sample of 210 people was sufficient for a study with a true power of .95.

Finally, the ethics committee approval required for the study was obtained from the Social and Humanitarian Ethics Committee of Recep Tayyip Erdogan University (dated 06.07.2022 and letter 2022/153). During the current research, it was acted within the framework of "Higher Education Institutions Scientific Research and Publication Ethics Directive".

Data Collection Tools

International Physical Activity Questionnaire-Short Form (IPAQ-SF):

The questionnaire, consisting of 7 questions in total, inquiries about the time spent physically in the last days. The form provides information about the time individuals spend on sitting, walking, and moderate and vigorous activities. When accessing this information, metabolic equivalent (MET) was calculated. The standard MET values were created for the specified activities.

These values, depending on the severity of the activity, sitting 1.5 METs, walking 3.3 METs, moderate-intensity physical activity 4 METs, and vigorous physical activity 8 METs. Therefore, according to these values, the weekly physical activity level of individuals can be calculated. After the MET value was determined, the physical activity levels of individuals were classified as inactive (<600 MET), minimally active (600 MET-3000 MET), and sufficiently active (>3000 MET) (Öztürk, 2005).

Depression, Anxiety, Stress Scale (DASS-21):

The scale was developed by Lovibond and Lovibond (1995). The scale was evaluated according to the total scores for Depression, Stress, and Anxiety (DASS). Each item in the scale has a 4-point scoring system that corresponds to 0, 1, 2, or 3 points according to the severity of the symptom. A minimum of 0 and a maximum of 21 points can be obtained in each dimension. Scorings in the 42-item (long form) DASS were as follows. The Cronbach Alpha internal consistency coefficients of the DASS-21 scale were determined as respectively as this depression; 0.819, anxiety; 0.808, stress; 0.755. Internal consistency results showed that the Turkish form of the scale was reliable and applicable (Yılmaz et al., Arslan, 2017). In this study, Cronbach Alpha values of the scale were determined as depression; 0.934, anxiety; 0.856, stress; 0.907.

Table 1

Score ranges of the DASS-21 Scale

Intensity	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Light	5-6	4-5	8-9
Medium	7-10	6-7	10-12
Advanced	11-13	8-9	13-16
Too Advanced	14+	10+	17+

Data Analysis

Data obtained from adult individuals were analyzed using the SPSS (Statistical Package for Social Sciences) 26.0 program.

The assumptions required for the MANOVA test were discussed before the analysis. In this context, the homogeneity of the variance-covariance matrix of the research data, linearity and multicollinearity problem, and values related to univariate and multivariate normality were examined (Büyüköztürk, 2013; Pallant, 2005). Histogram graphs of dependent variables, skewness, kurtosis values, Levene test, and box m test values were also discussed for univariate normality. As a result of the preliminary analysis, no violations were observed.

To determine the extreme values, the 5% trimmed values in the descriptives table were checked and, in this context, 29 data (5.6%) were excluded from the analysis. Especially the MANOVA test was very sensitive to extreme values (Pallant, 2005; Trans: Balcı and Ahi).

After the necessary examinations, descriptive statistics and MANOVA test were used in the analysis of the data. In addition, the Tukey HSD test, which is a Level 2 test, was applied to determine the source of significant differentiation. Data were tested at $\alpha = 0.05$ significance level.

Results

Descriptive Statistics

The distribution of individuals participating in the study according to their anxiety, depression, stress intensity levels, and physical activity categories was shown in Tables 2-3.

Table 2

Depression, Anxiety, and Stress Distributions of Participants

Intensity	Depression (n, %)	Anxiety (n, %)	Stress (n, %)
Normal	314 (%64.3)	345 (%70.7)	378 (%77.5)
Light	48 (%9.8)	53 (%10.9)	35 (%7.2)
Medium	66 (%13.5)	34 (%7.0)	29 (%5.9)
Advanced	26 (%5.3)	20 (%4.1)	36 (%7.4)
Too Advanced	34 (%7.0)	36 (%7.4)	10 (%2.0)
Total	488(%100)	488(%100)	488(%100)

Table 3

Categorical Physical Activity Distributions of Participants

Category	(n, %)
İnactive	30 (%6.1)
Minimal active	248 (%50.8)
Very Active	210 (%43.1)

The majority of adult individuals participating in the study had normal scores for anxiety (70.7%), depression (64.3%), and stress (77.5%). Despite this situation, there were individuals with severe and very advanced anxiety (11.5%), depression (12.3%), and stress (9.4%) score ranges. In terms of physical activity levels, 56.9% (n=278) of the participants were found inactive and minimally active.

The score distribution of the answers given to the scale and questionnaire by the individuals participating in the research was shown in Table 4.

Table 4

Scores of Depression, Anxiety and Stress Scales and Physical Activity Level Questionnaire

Scales	n	Mean	SD	Min.	Max.
Anxiety	488	2.90	3.58	0	17
Depression	488	4.18	5.02	0	21
Stress	488	4.79	4.70	0	21
Physical Activity Level (Total Met)	488	4889.05	14449.82	45	278253

*p<0.05

When the values in Table 4 were examined, the mean scores of anxiety ($\bar{x}$ =2.90±3.58), depression ($\bar{x}$=4.18±5.02), and stress ($\bar{x}$=4.79±4, 70) scales were determined. On the other hand, it was seen that the mean physical activity levels of adults were ($\bar{x}$=4889.05±14449.82).

Results Related to Hypothesis 1 (a-b-c)

The MANOVA test results performed to determine whether physical activity levels influence negative emotions are shown in Table 5.

Table 5

MANOVA Results of Depression, Anxiety, and Stress Levels of Individuals by Physical Activity Levels

Wilks' Lambda	F	Hypothesis Df	Error Df	P
0.938	5.212	6	966	**0,000**

*p<0.05

MANOVA test results on negative emotions (depression, anxiety, and stress) revealed that negative emotions differed significantly depending on the physical activity levels of individuals (WilksL(λ)=.938; F (6.966)=5.212; p<0.05). These results indicated that the scores obtained from the linear component consisting of sub-dimension scores varied depending on physical activity levels.

Since there was a significant difference in the MANOVA test, the ANOVA test was performed to examine how the group means differed according to the physical activity levels, and the results were presented in Table 6.

Table 6

ANOVA Results of Depression, Anxiety and Stress Levels of Individuals by Physical Activity Levels

Scales	Physical Activity Levels	n	Mean	SD	F	P	Difference
Anxiety	**1-**Inactive	30	6.06	4.40	13.96	**0,000**	1>2-3
	2-Minimal Active	248	2.88	3.62			
	3-Very Active	210	2.46	3.16			
Depression	**1-**Inactive	30	7.46	6.20	8.27	**0,000**	1>2-3
	2-Minimal Active	248	4.31	5.36			
	3-Very Active	210	3.57	4.19			
Stress	**1-**Inactive	30	8.63	4.92	11.94	**0,000**	1>2-3
	2-Minimal Active	248	4.79	4.87			
	3-Very Active	210	4.24	4.20			

*p<0.05

When the results obtained for the dependent variables were considered separately, the ANOVA results were evaluated using the Bonferroni adjusted alpha level of 0.016, depending on the physical activity levels of the individuals' significant differences were found in anxiety (F(2.485) =13.96, p=0.00); depression (F(2.485) =8.27, p=0.00); stress (F(2.485) =11.94 p=0.00) score levels. According to the Tukey HSD test results performed in all significant groups, it was observed that the anxiety, depression, and stress levels of inactive individuals were significantly higher than those in the minimally active and very active groups.

Discussion, Conclusion and Suggestions

Recently, it is possible to see the effects of negative emotions in individuals of all age categories. Negative emotions include emotions such as anxiety, depression, and stress (Yılmaz et al., 2017). Anxiety, depression, and stress, considered dependent variables in this research, were constructed as negative emotions under a single composite variable. Thus, in this study, the question of whether different physical activity levels of adult individuals between the ages of 18-65 influenced negative emotions was discussed.

The negative emotional intensities of most adult individuals were examined within normal limits, and they predominantly performed minimally active and very active physical activity. However, it was determined that approximately 10% of the participants were in severe and very advanced negative emotions and were physically inactive. In the study conducted by Soylu (2021), in a sample of physicians, contrary to the results of this study, depression, anxiety, and stress scores

were higher than normal values in all groups. Despite this situation, it was observed that the results of Škrlec et al (2021) research on university students were partially like the results of our study.

Physically inactive individuals experienced higher levels of anxiety compared to minimally active and very active individuals. In other words, individuals who did not engage in physical activity were observed to experience significantly higher levels of negative mood states such as fear of unknown cause, feeling of panic, heart palpitations and difficulty in breathing, compared to individuals who did moderate and high levels of physical activity. In a study conducted by Zhua et al (2019) in a sample of children and adolescents, they suggested that the probability of experiencing anxiety may decrease with participation in physical activity. In other words, physical activity was associated with anxiety. This result was in parallel with the result of our study.

Again, physically inactive individuals experienced higher levels of depression compared to minimally active and very active individuals. Moreover, it was observed that individuals who performed at least 20 minutes of vigorous physical activity for three or more days or who performed moderate physical activity for five days or more, experienced negative emotions such as feeling worthless and feeling sad at relatively lower levels. In other words, being more physically active in adults can make them show fewer depressive symptoms. In their research, Hu et al (2020) stated that exercise was an important factor in reducing and preventing depression symptoms. Similarly, Yates et al (2020) stated that physical activity has an important role in preventing depression and for therapeutic purposes. It can be said that these results support the results of our study.

Individuals who do minimally active and very active physical activity were observed to experience lower levels of stress. In other words, it can be said that individuals who did not engage in physical activity tend to overreact to events, are more sensitive, and may have problems unwinding and relaxing. That is, adult individuals being more physically active may cause them to show fewer stress symptoms. Hewett et al (2018) found that a 16-week exercise program significantly reduced stress. It can be said that this result was like the results of our study.

As a result, it can be said that there was a strong connection between physical activity and negative emotions for adults. Considering the negative effects of the epidemic period on individuals, the importance of participation in physical activity should be emphasized again.

The limitations and strengths of the current study should also be addressed for future research. Firstly, although data were collected homogeneously from 55 different provinces, the limitations of the convenience sampling method should not be ignored. Individuals under the age of 18 and over the age of 65 were not included in the study. However, it can be argued strongly that the theoretical framework and the results were parallel. Especially considering the time of implementation, the fact

that the research examines the effects of the epidemic period reveals the importance of the results of the study in terms of guiding future studies.

The results of our research once again emphasize the importance of physical activity. It can be said that physical activity supports the physical and mental health of societies, especially these days when the effects of the epidemic period are still foregrounded. The World Health Organization (WHO) recommends at least 150 minutes of moderate-intensity aerobic physical activity per week or at least 75 minutes of vigorous-intensity aerobic physical activity per week for adults aged 18-64 years (sample of current research). Moreover, WHO states that aerobic activities should include large muscle groups for at least 10 minutes; suggests that muscle-strengthening activities should be done two or more days a week (WHO, 2010; WHO, 2018).

In further studies, the question of whether physical activity has a moderator or mediator role in the relationship between negative emotions and quality of life can be examined. Besides, research models can be expanded by including demographic variables such as gender. Again, large-scale studies can be organized by including the sample of adolescents and the elderly in the studies. The data in the research were collected by using self-reported scale, which may cause some subjective errors. In additional, this study was conducted on a non-clinical sample from different cities in Turkey.

Ethics Committee Permission Information

Ethics Review Board: Social and Humanitarian Ethics Committee of Recep Tayyip Erdogan University

Dated: 06.07.2022

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Statement of Researchers' Contribution Rates

The processes related to the introduction and discussion part of the research were carried out by the first author, findings, methods, results and suggestions were carried out by the second author.

Conflict Statement

The author(s) did not have a conflict statement regarding the research.

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