EJSSE

Eurasian Journal of Sport Sciences and Education
Avrasya Spor Bilimleri ve Eğitim Dergisi
Vol: 6, Issue: 2, 2024
E-ISSN: 2717-8455
URL: http://www.dergipark.org.tr/ejsse

The Importance of Physical Activity in Terms of Mental Health: Investigating the Role of Regular Physical Activity in the Relationships Between Happiness, Mental Well-Being, Stress, Anxiety, and Depression

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Original Article
Received: 11.02.2024 Accepted: 13.07.2024 **DOI: 10.47778/ejsse.1434717**
Online Published: 30.09.2024

Abstract

Relevant studies indicate that sports increase happiness and helps protect mental health. However, the importance of physical activity in terms of its effects on happiness and mental health needs to be demonstrated. In this study, the purpose was to reveal the effect of doing regular physical activity in investigating the relations between happiness, mental well-being, stress, anxiety, and depression. Data were collected with the Perceived Stress Scale, Warwick-Edinburgh Mental Well-being Scale, the short form of Oxford Happiness Scale, and Hospital Anxiety and Depression Scale. A total of 1715 people, 854 males, and 861 females, between the ages of 18-78 participated in the present study. When the results were examined in terms of the condition of physical activity, it was determined that the participants who do physical activity regularly had higher happiness and mental well-being scores than those who not doing regular physical activity, and their stress and depression levels were lower. No differences were detected between the anxiety levels in terms of doing regular physical activity conditions. Different squared multiple correlation coefficients were calculated in predicting happiness, in different models having been compared, and in groups that were formed regarding the physical activity participation condition. It was observed that negative emotional structures explained happiness better without mental well-being in the non-sporting group. The opposite result was obtained when mental well-being mediated the relation between negative emotional structures and happiness.
Keywords: Physical activity, Happiness, Mental well-being, Stress, Anxiety, Depression

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INTRODUCTION

It was reported in previous studies that the sedentary lifestyle, which is considered to be the main cause of many health problems, is increasing in all countries causing 6% of the global deaths (World Health Organization, 2010). On the other hand, it is also stated that contributes to physical, social, psychological, and mental wellbeing and leads a healthy life. In this respect, many studies were conducted to show the relation between exercise and mental health (Mandolesi et al., 2018; Stevens et al., 2019). It was stated that individuals who exercise increase their social functionality and emotional flexibility, their moods change positively, they adapt more easily to stressful situations, and have more positive body images (Baruth et al., 2011; Chan et al., 2019; Mandolesi et al., 2018; Stevens et al., 2019; Wicker et al., 2017). It was shown in previously conducted studies that doing regular physical activity increases emotional balance, psychological well-being, self-efficacy, and self-esteem in addition to gaining the ability to manage stress (Baruth et al.,2011; Bhochhibhoya et al., 2014; Hogan et al., 2013; Stevens et al., 2019). It was also reported that it reduces anxiety, age-related cognitive decrease, the severity and frequency of depression (Chan et al., 2019; Fox, 1999; Mikkelsen et al., 2017; Stevens et al., 2019). It was seen that the stress, depression, and anger levels in individuals who regular exercise were lower compared to those who not exercise and who occasional exercise (Lindwall et al., 2011; Stanescu et al., 2014).

A great number of clinical, experimental, and epidemiological studies showed that doing regular physical activity has psychological benefits. When sportive activities and mood levels were examined, it was determined that the participants were better on the days when they exercised than the days, they did not any sports. In addition, it was also understood that people who did regular exercises had lower levels of anxiety, depression, stress symptoms, and had a better quality of life compared to those who did fewer exercise (de Asis et al., 2008; Mandolesi et al., 2018; Pugh et al., 2011).

In addition, the positive results of doing regular physical activity are valid for individuals from all age groups except for the elderly individuals (Ayotte et al., 2013; Hogan et al., 2013). Especially in children and adolescents, doing regular physical activity contributes positively to establishing empathy, to the development of mental health, having positive emotions about physical self, to the development of self-identity and self-confidence, and to establishing social relations and psychological well-being (Bhochhibhoya et al., 2014). In addition, doing regular physical activity is inversely related to anger, mental distraction, and tension (Duncan et al., 2005; Hogan et al., 2013; Marker et al., 2018; Zekioglu et al., 2018). However, it was reported that there were contradictory findings of doing regular physical activity in the form of an increase in the positive emotions of the elderly individuals after doing regular physical activity, and in some studies, the opposite results were reported (Hogan et al., 2013). However, it is widely accepted that doing regular physical activity is an important factor for having a healthy old age (Liffiton et al., 2012; Yen et al., 2018). Because doing regular physical activity leads to psychological well-being, increasing quality of life, and positive emotional experiences in old age. In addition, it supports

mental health and helps to prevent cognitive decline even if the biological mechanisms of these are not explained fully yet (Engeroff et al., 2018; Hogan et al., 2013; Klusmann et al., 2012; Mandolesi et al., 2018).

Regular physical activity is also important and related to increasing happiness in addition to psychological factors in all age groups (Jones et al., 2005; Khazaee-Pool et al., 2015). However, it is understood that this relation is confused with the results of research arguing that there is no relation between exercise and happiness or that happy people do sport. In addition, it was seen that the contribution of doing regular physical activity to happiness is lower than the contribution of some socio-demographic factors to happiness (Lathia et al., 2017; Richards et al., 2015). In addition to these, doing regular physical activity indirectly affects happiness, and increases the quality of life, decreasing early mortality rates, depression, and anxiety, and helps to solve the problems related to psychological health problems like depression and anxiety (Fox, 1999; Huang et al., 2012).

Depending on the type of physical activity, doing regular physical activity also provides a positive contribution to the well-being of individuals (Dechamps et al., 2007; Mack et al., 2017). Psychological Mechanistic Hypothesis argues that doing regular physical activity helps individuals to be relieved from stressful events of daily life and increases well-being (Biddle and Ekkekakis, 2005). In other words, it was reported that doing regular physical activity affects the neurotransmitters and neuromodulators and increases well-being (de Varis et al., 2018). It was shown that doing regular physical activity increased well-being and decreased depressive symptoms in the group that was diagnosed with major depressive disorder (Landi et al., 2010; Sanchez-Viiegas et al., 2008). In addition, healthy individuals reported that they did more sports because of the increase in their well-being levels stemming from doing regular physical activity (Diener and Seligman, 2004; Reed and Buck, 2009).

It is seen that the number of studies reporting that doing regular physical activity increased happiness and helped to maintain mental health increased at a significant level. However, the problem at this point is showing the effect of doing regular physical activity among the components of happiness and in the protection of mental health. In this study, the purpose was to examine the effect of doing regular physical activity on happiness, mental well-being and stress, anxiety, and negative emotional dynamics such as depression mainly in terms of the current situation in Turkey. In this respect, no specific results are expected in revealing the relation between exercise and cases. However, understanding that the current situation in Turkey is quite low especially compared with the rates of doing regular physical activity in western countries and considering the cases in a sampling constitute the desired basis points planned and analyzed in this study. Does regular physical activity have any effect on the relationship between happiness, mental well-being, stress, anxiety and depression? An answer was sought to the question. In addition, it was also planned to test the mediating role of mental well-being in this relational structure.

METHOD

Design and Participants

This was a descriptive and cross-sectional study designed to investigate the role of doing regular physical activity in relations between happiness, mental well-being, stress, anxiety, and depression. The population of the study was reached using the convenience sampling method consisted of people living in Turkey. A total of 1715 people, 861 females (50.2%) and 854 males (49.8%) between the ages of 18-78 (average age=28.03±10.61 years) participated in the present study. It was determined that 257 of the participants regular physical exercised (15.0%), 694 exercised occasionally (40.5%), and 794 (44.5%) did not do any physical activity. The exclusion criterion of the study was taken as working in professional athletes or athletic environments, and people who had these characteristics were not given the form.

Data Collection and Tools

Informed Volunteering Consent Forms were received from the participants, and the form which consisted of the scales was given to them who voluntarily agreed to participate in the present study. The study was conducted with individuals who could be contacted with the Convenient Sampling Method in two months between June and July 2021 in Istanbul. The application was made only with the printed forms, and the application of one person was completed in about 10-15 minutes.

In this study, the Perceived Stress Scale, Warwick-Edinburgh Mental Well-being Scale, the concise form of Oxford Happiness Scale, and Hospital Anxiety and Depression Scale were applied. Physical activity measurement was determined by the three-grade (non-doing physical activity, rarely physical activity and regular physical activity) Osgood Semantic Differential Scales.

Oxford Happiness Scale: Hills and Argyle (2002) developed this scale, and Dogan and Cötok (2011) adapted it into Turkish. In this study, the concise form that consisted of 7 items was administered as a 5-point Likert-type scale (1=disagree, 5=fully agree). Items 1 and 7 of this scale were scored in opposite directions (Dogan and Cötok, 2011). Cronbach's alpha internal consistency and test-retest methods were used to reveal the reliability of OLS-K. The Cronbach's alpha internal consistency coefficient calculated over the data obtained from 321 participants was found to be .74. In the test-retest reliability study, the OLS-R was administered to 81 university students two weeks apart and a correlation of .85 was obtained between the two applications. These results show that the reliability of the scale is at an acceptable level.

Warwick-Edinburgh Mental Well-Being Scale: Tennant et al., (2007) developed this scale and Keldal (2015) translated it into Turkish. Scale, which did not have inverse items, consisted of 14 items with 5-point Likert-type scale (1=disagree, 5=fully agree) (Keldal, 2015). The internal

consistency reliability of the scale was calculated using data obtained from 348 participants and the Cronbach's alpha coefficient was found to be .89.

Perceived Stress Scale: Cohen et al., (1983) developed this scale and Eskin et al., (2013) translated it into Turkish. Scale consisted of 14 items with 5-point Likert-type answers (0=never, 4=very frequently), and 7 items were reversed. A high score indicated high stress perception level (Eskin et al., 2013). The reliability coefficient found for ASÖ-4 may seem low but considering that Cronbach's alpha values tend to decrease statistically when the number of items is low, 0.66 can be considered sufficient.

***Hospital Anxiety and Depression Scale*:** Zigmond and Snaith (1983) developed this scale and Aydemir et al., (1997) translated it into Turkish. Scale consisted of single-numbered items showing the Anxiety scores, and even-numbered items showed Depression Dimension, and consisted of fourteen 4-point Likert-type items and 8 items of the scale were scored reversely (Aydemir et al., 1997). Testing the reliability of HAD scale, Cronbach alfa coefficient for anxiety subscale it was 0.7784. Item total score correlation coefficients were ranging between 0.8161 and 0.8547 in anxiety subscale and o.7374 and 0.7795 in depression subscale.

It was calculated that the Oxford Happiness Scale that was employed in the study had an internal consistency reliability coefficient of 0.76, the Warwick-Edinburgh Mental Well-being Scale had 0.91, the Perceived Stress Scale had 0.76, the Hospital Anxiety Depression Scale Anxiety Dimension had 0.78, and the Depression Dimension had 0.73. The correlation coefficients between the total scores of the scales were between 0.45 (between Perceived Stress Scale and Hospital Anxiety Depression Scale Depression Dimension) and 0.75 (between Oxford Happiness Scale and Warwick-Edinburgh Mental Well-being Scale)

Ethical Approval

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Verbal and written consent of the participants was obtained. In addition, it was seen that the study was ethically appropriate with the decision of the Social and Human Sciences Ethics Committee of Bandirma Onyedi Eylul University, dated June 3, 2021, and numbered 5, with the decision numbered 2021/5.

Analysis of the Data

The data were examined using the internal consistency reliability coefficient of the scales, Pearson correlation between the scale total scores, and group comparisons with MANOVA. The Squared Multiple Correlation was calculated to compare the prediction rates of happiness in different models test, and the Path Analysis Coincident Indicators were calculated to show the relations between the variables and to test different models.

RESULTS

Table 1. Internal consistency reliability coefficient for the scales, correlation analysis between total scores and MANOVA results between groups

n=1715	**Alpha**	**1**	**2**	**3**	**4**	**F**	**Partial η^2**
1-Oxford Happiness Scale	0.76					4.13*	0.006
2-Warwick-Edinburgh Mental Well-being Scale	0.91	0.75***				4.88**	0.007
3-Perceived Stress Scale	0.76	-0.51***	-0.52***			6.55***	0.009
4-Hospital Anxiety Depression Scale - Anxiety dimension	0.78	-0.54***	-0.54***	0.54***		1.45	0.002
5-Hospital Anxiety Depression Scale-Depression dimension	0.73	-0.58***	-0.60***	0.45***	0.58***	4.13*	0.006

*p<0.05; **p<0.01; ***p<0.001

In the present study, the total scores of the scale were compared with MANOVA for doing regular physical activity condition groups. According to the results, the main effect was statistically significant in the comparison of doing regular physical activity condition groups in terms of total scores of the scales (Wilk's λ=0.98, $F_{(10,\ 2886)}$=2.84, p<0.01, partial η^2=0.010). When the scale scores were considered one-by-one, the main effect levels were as follows; for Oxford Happiness Scale ($F_{(267,\ 1447)}$=1.86, p<0.001, partial η^2=0.256), for Warwick-Edinburgh Mental Well-being Scale ($F_{(267,\ 1447)}$=1.73, p<0.001, partial η^2=0.241), for Perceived Stress Scale (F(267,1447)=1.96, p<0.001, partial η^2=0.266), for Hospital Anxiety Depression Scale Anxiety Dimension ($F_{(267,\ 1447)}$=1.49, p<0.001, partial η^2=0.216) and for Depression Dimension ($F_{(267,\ 1447)}$=1.68, p<0.001, partial η^2=0.236). When the scale total scores were examined in terms of doing regular physical activity condition, there were significant differences as follows; for Oxford Happiness Scale ($F_{(2,\ 1447)}$=4.13, p<0.05, partial η^2=0.006), for Warwick-Edinburgh Mental Well-being Scale ($F_{(2,\ 1447)}$=4.88, p<0.01, partial η^2=0.007), for Perceived Stress Scale ($F_{(2,\ 1447)}$=6.55, p<0.001, partial η^2=0.009) and for Hospital Anxiety Depression Scale Depression Dimension ($F_{(2,\ 1447)}$=4.13, p<0.01, partial η^2=0.006).

According to the Tukey multiple comparisons test that was done to examine the differences between the groups, the total score of happiness and mental well-being of the group that did not any physical activity was lower than the other two groups. In terms of stress and depression scores, there was a difference between the three groups; and the scores of the group who did not any physical activity were high, and the scores of the group that did regular physical activity were low (Figure 1).

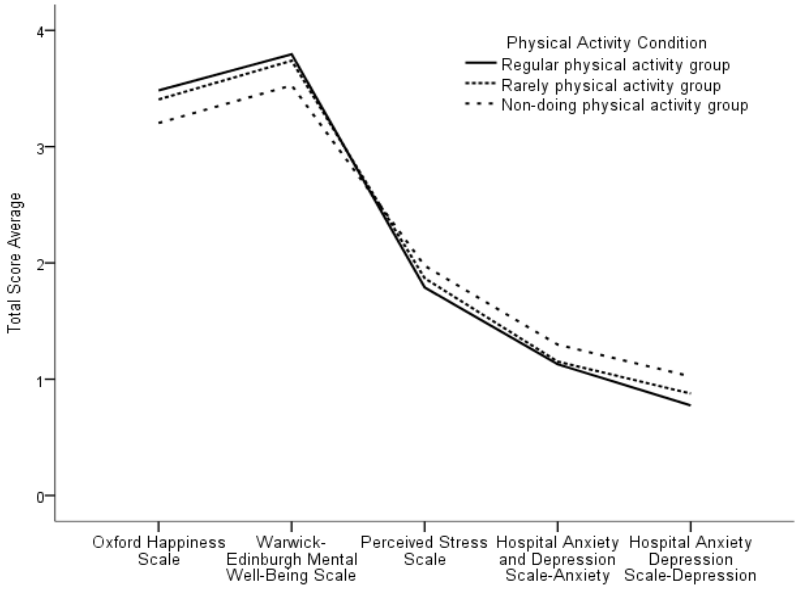

Figure 1. The distribution of the doing physical activity groups in terms of the scores of the scales

In the study, the models, which were created with the Path Analysis to show the relations between happiness and negative emotions as the mediating role of mental well-being, both for the whole group and for each doing regular physical activity condition group, were presented as stress, anxiety and depression were tested. In the present study, three different models were created to show the relations between emotional dynamics that consisted of happiness and stress, anxiety and depression. In Model 1, mental well-being was not included, and the model that predicted happiness only with stress, anxiety, and depression was tested. In Model 2, mental well-being was included between the emotional dynamics of happiness and stress, anxiety, and depression. However, in this model, the interaction between happiness and mental well-being was taken unilaterally; and the structure was created in which negative emotional status affected happiness with mental well-being. In Model 3, on the other hand, mental well-being was included between happiness and negative emotional structures again; however, in addition to the structure in Model 2, the interaction between happiness and mental well-being was established in a form which showed that happiness affected mental well-being (Figure 2).

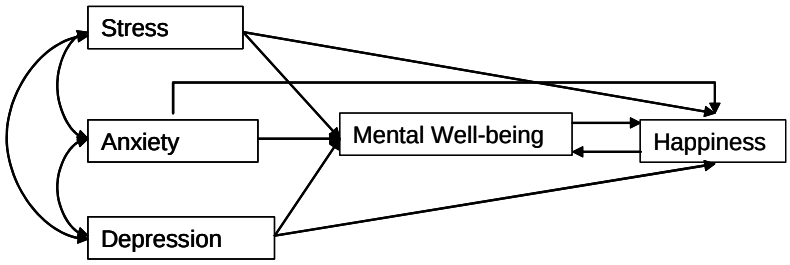

Figure 2. The hypothetical structure in which Model 3, which is supposed to be the common interaction between happiness and mental well-being, is tested

The three models were tested separately with the Path Analysis for the whole group and for each of the groups that made up the doing regular physical activity condition; and it was determined that the Coincidence Indicators showed high goodness of fit levels. For example, the goodness of fit indicators for Model 3 are given in Table 2.

Table 2. The compliance indicators in the results of path analysis of the structure that was tested with Model 3 for physical activity levels groups

Groups	χ^2	Sd	χ^2/Sd	RMR	GFI	AGFI	NFI	CFI	RMSEA
Whole Group	0.778	2	0.389	0.054	1.000	0.999	1.000	1.000	0.000
Regular physical activity group	4.633	2	2.316	0.322	0.993	0.947	0.992	0.995	0.072
Rarely physical activity group	0.863	2	0.432	0.117	1.000	0.996	0.999	1.000	0.000
Non-doing physical activity group	0.531	2	0.265	0.094	1.000	0.998	1.000	1.000	0.000

Table 3. The squares of the multiple correlations as the predictors of happiness that were calculated with the path analysis in the structures created with three different models for the whole group and the physical activity condition groups

Groups	r	Model 1 - R^2	Model 2 - R^2	Model 3 - R^2
Whole Group	1715	0.440	0.603	0.472
Regular physical activity Group	257	0.428	0.608	0.466
Rarely physical activity Group	694	0.430	0.604	0.474
Non- physical activity Group	764	0.432	0.582	0.448

As a summary of the models that were tested, the square of the multiple correlations was calculated as the predictive rates of happiness. The predictive rates of happiness were determined at higher levels with Model 2 in the whole group and in each of the groups that made up the doing physical activity condition. In the comparison of the groups that made up the doing regular physical activity condition, it was seen that negative emotional structures were more effective in the group that did not any physical activity (R^2=0.432) when mental well-being was not taken into consideration (Model 1). It was calculated that the rate of explaining happiness decreased as the amount of doing regular physical activity increased, and the effect of negative emotional structures was relatively less in the group that did regular physical activity (R^2=0.428). When the mental well-being was taken as the mediating variable between happiness and negative emotional structures (Model 2 and 3), the situation was reversed; and the rates of explaining happiness (R^2=0.608 for Model 2 and R^2=0.466 for Model 2) were higher in the regular physical activity group than the explaining happiness rates in the group that did not any physical activity (R^2=0.582 for Model 2 and R^2=0.448 for Model 3) (Table 3).

DISCUSSION

In this study, the purpose was to examine the role of doing regular physical activity in the relations that consisted of happiness and stress, anxiety and depression in Turkey. In this research, the secondary objective was planned to evaluate the mediating role of psychological well-being in the relational structure. The relations between the variables that were handled in this study, were presented in many studies (Fox, 1999; Mandolosi et al., 2018). For this reason, the prior point in this study was to consider these cases together in a sampling group; and to test the relations between structures on a sampling group.

The effects of regular physical activity on happiness, stress, anxiety and depression are generally supported by research. Today, the positive effects of regular exercise on mental health are emphasised. It is stated that physical activity supports feelings of happiness by increasing the secretion of happiness hormones such as serotonin and endorphins and helps to cope with stress. There is also widespread agreement that it reduces symptoms of anxiety and depression and improves overall mental health. In this context, research on the positive effects of physical activity on mental health provides important findings that regular exercise can improve the quality of life of individuals and support their psychological well-being (Arslan et al., 2011; Tekin et al., 2009). In this study, the happiness and psychological well-being levels of the group who performed regular physical activity were found to be higher than the group who did not perform any physical activity. It has been shown that it reduces tension, takes part in treatment processes as a healing factor in depression and thus contributes to the person's feeling of well-being and happiness. There are many studies (Huang and Humphreys 2012; Uğurlu et al., 2015). In addition, the effect of regular exercise on cognitive functions (Van Dijk et al., 2013), depression (Mammen and Faulkner, 2013) and quality of life (Bullo et al., 2015) was also revealed. Our study demonstrated the role of regular exercise in predicting psychological well-being and negative emotional dynamics in happiness.

Many studies show the importance of physical activity for psychological health (Chan et al., 2019; de Assis et al., 2008; Mandolosi et al., 2018; Mikkelsen et al., 2017; Stevens et al., 2019) and increases happiness and/or contributes to happiness (Fox, 1999; Huang and Humphreys, 2012; Khazaee-Pool et al., 2015). However, happiness has many components because of its nature, and the interaction and overlapping between the variables become inevitable as the number of variables increases. For this reason, it is the critical point to show the happiness with a variable that is also among the components of happiness and the effect of doing regular physical activity in this study. Furthermore, physical activity participation rates and happiness show differences among cultures, which makes it even more important to determine the current situation in Turkey in this respect. When considered in this context, it is of separated importance to determine the theoretical structure between happiness and relevant components and to deal with the factual structures in different cultures.

In terms of the factual structures considered in the present study, there were differences between the groups that made up the doing regular physical activity condition except for the anxiety dimension (Pot and Keizer, 2016; Sanchez-Villegas et al., 2008). The happiness and psychological well-being levels were higher in the group that did regular physical activity compared to the group who did not any physical activity. In the same context, the stress and depression levels of the group that did physical activity were lower than those who did not physical activity. The Rarely Sporting Group was in the middle. There was no difference between the only doing regular physical activity condition groups in terms of anxiety levels.

Three models were created depending on the way psychological well-being was included in the relations between the subjects that were dealt with in the study. The results obtained in this way with the Path Analysis ensured that the mediating role of negative emotional dynamics that consisted of stress, anxiety and depression, and psychological well-being was tested in the groups that made up the doing regular physical activity condition groups with the established theoretical models. The high goodness of fit indicators according to the results of the Path Analysis showed the fitness of the established theoretical models. The differences among the fitness levels between different models showed the role of psychological well-being and negative emotional dynamics in predicting happiness. The squares of multiple correlations that were obtained in predicting happiness with different models showed that psychological well-being had a different role in the groups that made up different doing regular physical activity conditions.

CONCLUSIONS

It was seen that doing regular physical activity was effective on happiness, mental well-being, stress, anxiety and depression. It was also seen that happiness was affected by the number of sports, and especially, by the mental well-being as was tested in this study. However, many other psychological factors affect happiness and that were not included in this study. Examining some of these structures by including them in the models that were included in this study seems to be contributing more to understanding the role of doing regular physical activity and explaining happiness.

Limitations of Study

Doing regular physical activity involves simple physical activities like running and dangerous physical activity branches like parachuting. For this reason, “doing regular physical activity or participating in sports” is considered in a wide range. Particularly, the evaluation of how physical activity were performed was not included in the scope of the study and was not included in the model constitute an important limitation of this study. Another limitation of the study and the general problem for such studies was the difficulty in taking physical activity as a qualitative variable and evaluating it in quantitatively. A measurement in the form of measuring how many hours of sporting a day is done or a week does not allow a comparison because of the differences in physical activity. However, evaluating doing regular physical activity as a quantitative variable may allow the establishment of different models in path analysis.

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Funding

The authors declare that this study received no funding.

Conflicts of Interest: The authors have no conflicts of interest to declare.

Authors' Contribution: Research Design: AZ; Data Collection: AZ, DA; Statistical Analysis: AT; Preparation of the Article: AZ, DA

Ethical approval

Ethics Committee: Bandırma Onyedi Eylül University Social and Human Sciences Ethics Committee
Date: 03 June 2021
Protocol Number: 2021-5

REFERENCES

Aydemir, Ö., Guvenir, T., Kuey, L., & Kultur, S. (1997). Validity and reliability of Turkish version of Hospital Anxiety and Depression Scale. *Journal of Turkish Psychiatry*, *8*(4), 280-7.

Ayotte, B. J., Margrett, J. A., & Patrick, J. H. (2013). Dyadic analysis of self-efficacy and perceived support: The relationship of individual and spousal characteristics with physical activity among middle-aged and young-older adults. *Psychology and Aging*, *28*(2), 555-563. https://doi.org/10.1037/a0032454

Arslan, C., Güllü, M., & Tutal, V. (2011). Spor yapan ve yapmayan ilköğretim öğrencilerinin depresyon durumlarının bazı değişkenlere göre incelenmesi. *Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi*, *5*(2), 120-130

Baruth, M., Lee, D. C., Sui, X., Church, T. S., Marcus, B. H., Wilcox, S., & Blair, S. N. (2011). Emotional outlook on life predicts increases in physical activity among initially inactive men. *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, *38*(2), 150-158. https://doi.org/10.1177/1090198110376352

Bhochhibhoya, A., Branscum, P., Taylor, E. L., & Hofford, C. (2014). Exploring the relationships of physical activity, emotional intelligence, and mental health among college students. *American Journal of Health Studies*, *29*(2), 191-197. https://doi.org/10.47779/ajhs.2014.215

Biddle, S.J., & Ekkekakis, P. (2005). Physically active lifestyles and well-being. F.A. Huppert, B. Keverne, N. Baylis (Ed), *The science of well-being* (p.141-168). Oxford University Press.

Bullo, V., Bergamin, M., Gobbo, S., Sieverdes, J. C., Zaccaria, M., Neunhaeuserer, D., & Ermolao, A. (2015). The effects of Pilates exercise training on physical fitness and well being in the elderly: A systematic review for future exercise prescription. *Preventive Medicine*, *75*, 1-11. https://doi.org/10.1016/j.ypmed.2015.03.002

Chan, J., Liu, G., Liang, D., Deng, K., Wu, J., & Yan, J. H. (2019). Special issue-therapeutic benefits of physical activity for mood: A systematic review on the effects of exercise intensity, duration, and modality. *The Journal of Psychology*, *153*(1), 102-125. https://doi.org/10.1080/00223980.2018.1470487

Cohen, S., Kamarck, T., Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385-396. https://doi.org/10.2307/2136404

De Assis, M. A., de Mello, M. F., Scorza, F. A., Cadrobbi, M. P., Schooedl, A. F., Gomes da Silva, S., de Albuquerque, M., da Silva, A. C., & Arida, R. M. (2008). Evaluation of physical activity habits in patients with posttraumatic stress disorder. *Clinics (Sao Paulo, Brazil)*, *63*(4), 473-478. https://doi.org/10.1590/s1807-59322008000400010

De Vries, J. D., van Hooff, M., Geurts, S., & Kompier, M. (2018). Trajectories of well-being during an exercise randomized controlled trial: The role of exposure and exercise experiences. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *34*(1), 24-35. https://doi.org/10.1002/smi.2758

Dechamps, A., Lafont, L., & Bourdel-Marchasson, I. (2007). Effects of Tai Chi exercises on self-efficacy and psychological health. *European Review of Aging and Physical Activity*, *4*(1), 25-32. http://dx.doi.org/10.1007/s11556-007-0015-0

Diener, E., & Seligman, M. E. (2004). Beyond money: toward an economy of well-being. *Psychological Science in the Public Interest: A Journal of the American Psychological Society*, *5*(1), 1-31. https://doi.org/10.1111/j.0963-7214.2004.00501001.x

Doğan, T., & Çötok, N. A. (2011). Adaptation of the short form of the Oxford Happiness Questionnaire into Turkish: A validity and reliability study. *Turkish Psychological Counseling and Guidance Association*, *4*(36), 165-172.

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2005). Sources and types of social support in youth physical activity. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *24*(1), 3-10. https://doi.org/10.1037/0278-6133.24.1.3

Engeroff, T., Füzéki, E., Vogt, L., Fleckenstein, J., Schwarz, S., Matura, S., Pilatus, U., Deichmann, R., Hellweg, R., Pantel, J., & Banzer, W. (2018). Is objectively assessed sedentary behavior, physical activity and cardiorespiratory fitness linked to brain plasticity outcomes in old age? *Neuroscience*, *388*, 384-392. https://doi.org/10.1016/j.neuroscience.2018.07.050

Eskin, M., Harlak, H., Demirkıran, F., & Dereboy, Ç. (2013). The adaptation of the Perceived Stress Scale into Turkish: A reliability and validity analysis. *New Symposium*, *51*(3), 132-140.

Fox, K. R. (1999). The influence of physical activity on mental well-being. *Public Health Nutrition*, *2*(3A), 411-418. https://doi.org/10.1017/s1368980099000567

Hills, P., & Argyle, M. (2002). The Oxford Happiness Questionnaire: A compact scale for the measurement of psychological well-being. *Personality and Individual Differences*, *33*(7), 1073-1082. https://doi.org/10.1016/S0191-8869(01)00213-6

Hogan, C. L., Mata, J., & Carstensen, L. L. (2013). Exercise holds immediate benefits for affect and cognition in younger and older adults. *Psychology and Aging*, *28*(2), 587-594. https://doi.org/10.1037/a0032634

Huang, H., & Humphreys, B.R. (2012). Sports participation and happiness: Evidence from US microdata. *Journal of Economic Psychology*, *33*(4), 776-793. https://doi.org/10.1016/j.joep.2012.02.007

Jones, M. V., Lane, A. M., Bray, S. R., Uphill, M., & Catlin, J. (2005). Development and validation of the sport emotion questionnaire. *Journal of Sport and Exercise Psychology*, *27*(4), 407-431. https://doi.org/10.1123/jsep.27.4.407

Keldal, G. (2015). Turkish version of the Warwick-Edinburgh Mental Well-Being Scale: A validity and reliability study. *The Journal of Happiness & Well-Being*, *3*(1), 103-115. http://dx.doi.org/10.29228/TurkishStudies.22098

Khazaee-Pool, M., Sadeghi, R., Majlessi, F., & Rahimi Foroushani, A. (2015). Effects of physical exercise programme on happiness among older people. *Journal of Psychiatric and Mental Health Nursing*, *22*(1), 47-57. https://doi.org/10.1111/jpm.12168

Klusmann, V., Evers, A., Schwarzer, R., & Heuser, I. (2012). Views on aging and emotional benefits of physical activity: Effects of an exercise intervention in older women. *Psychology of Sport and Exercise*, *13*(2), 236-242. https://doi.org/10.1016/j.psychsport.2011.11.001

Landi, F., Abbatecola, A. M., Provinciali, M., Corsonello, A., Bustacchini, S., Manigrasso, L., Cherubini, A., Bernabei, R., & Lattanzio, F. (2010). Moving against frailty: Does physical activity matter?. *Biogerontology*, *11*(5), 537-545. https://doi.org/10.1007/s10522-010-9296-1

Lathia, N., Sandstrom, G. M., Mascolo, C., & Rentfrow, P. J. (2017). Happier people live more active lives: using smartphones to link happiness and physical activity. *Plus One*, *12*(1), Article e0160589. https://doi.org/10.1371/journal.pone.0160589

Liffiton, J. A., Horton, S., Baker, J., & Weir, P. L. (2012). Successful aging: How does physical activity influence engagement with life?. *European Review of Aging and Physical Activity*, *9*(2), 103-108. http://dx.doi.org/10.1007%2Fs11556-012-0098-0

Lindwall, M., Larsman, P., & Hagger, M. S. (2011). The reciprocal relationship between physical activity and depression in older European adults: A prospective cross-lagged panel design using SHARE data. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *30*(4), 453-462. https://doi.org/10.1037/a0023268

Mack, D. E., Gunnell, K. E., Wilson, P. M., & Wierts, C. (2017). Well-being in group-based exercise classes: Do psychological need fulfillment and interpersonal supports matter?. *Applied Research in Quality of Life*, *12*(1), 89-102. https://doi.org/10.1007/s11482-016-9454-y

Mandolesi, L., Polverino, A., Montuori, S., Foti, F., Ferraioli, G., Sorrentino, P., & Sorrentino, G. (2018). Effects of physical exercise on cognitive functioning and wellbeing: Biological and psychological benefits. *Frontiers in Psychology*, *9*, 509. https://doi.org/10.3389/fpsyg.2018.00509

Marker, A. M., Steele, R. G., & Noser, A. E. (2018). Physical activity and health-related quality of life in children and adolescents: A systematic review and meta-analysis. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *37*(10), 893-903. https://doi.org/10.1037/hea0000653

Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., & Apostolopoulos, V. (2017). Exercise and mental health. *Maturitas*, *106*, 48-56. https://doi.org/10.1016/j.maturitas.2017.09.003

Mammen, G., & Faulkner, G. (2013). Physical activity and the prevention of depression: A systematic review of prospective studies. *American Journal of Preventive Medicine, 45*(5), 649-657. https://doi.org/10.1016/j.amepre.2013.08.001

Pot, N., & Keizer, R. (2016). Physical activity and sport participation: A systematic review of the impact of fatherhood. *Preventive Medicine Reports, 4*, 121-127. https://doi.org/10.1016/j.pmedr.2016.05.018

Pugh, N. E., & Hadjistavropoulos, H. D. (2011). Is anxiety about health associated with desire to exercise, physical activity, and exercise dependence?. *Personality and Individual Differences*, *51*(8), 1059-1062. https://doi.org/10.1016/j.paid.2011.08.025

Reed, J., & Buck, S. (2009). The effect of regular aerobic exercise on positive-activated affect: A meta-analysis. *Psychology of Sport and Exercise*, *10*(6), 581-594. https://doi.org/10.1016/j.psychsport.2009.05.009

Richards, J., Jiang, X., Kelly, P., Chau, J., Bauman, A., & Ding, D. (2015). Don't worry, be happy: Cross-sectional associations between physical activity and happiness in 15 European countries. *BMC Public Health*, *15*, 53. https://doi.org/10.1186/s12889-015-1391-4

Sanchez-Villegas, A., Ara, I., Guillén-Grima, F., Bes-Rastrollo, M., Varo-Cenarruzabeitia, J. J., & Martínez-González, M. A. (2008). Physical activity, sedentary index, and mental disorders in the SUN cohort study. *Medicine and Science in Sports and Exercise*, *40*(5), 827-834. https://doi.org/10.1249/MSS.0b013e31816348b9

Stănescu, M., & Vasile, L. (2014). Using physical exercises to improve mental health. *Procedia-Social and Behavioral Sciences*, *149*, 921-926. https://doi.org/10.1016/j.sbspro.2014.08.289

Stevens, M., Rees, T., & Polman, R. (2019). Social identification, exercise participation, and positive exercise experiences: Evidence from parkrun. *Journal of Sports Sciences*, *37*(2), 221-228. https://doi.org/10.1080/02640414.2018.1489360

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., ... & Stewart-Brown, S. (2007). The Warwick-Edinburgh mental well-being scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes*, 5, 1-13. https://doi.org/10.1186/1477-7525-5-63

Tekin, G., Amman, T.M., ve Tekin, A. (2009). Serbest zamanlarda yapılan fiziksel egzersizin üniversite öğrencilerinin depresyon ve atılganlık düzeylerine etkisi. *Uluslararası İnsan Bilimleri Dergisi*, *6*(2), 148-159.

Uğurlu, M.F., Şakar, M., ve Bingöl, E. (2015). Spor yapan ve spor yapmayan üniversite öğrencilerinin duygusal zekâ ve mutluluk düzeylerinin karşılaştırılması. *Akademik Sosyal Araştırmalar Dergisi*, *3*(17), 461-469

Van Dijk, M., De Groot, R., Savelberg, H., Van Acker, F., & Kirschner, P. A. (2013). Physical activity, cognitive performance, and academic achievement: An observational study in Dutch adolescents using accelerometers. Paper presented at ICO National Fall School, Maastricht, Netherlands.

WHO (World Health Organization). (2010*). Global Recommendations on Physical Activity for Health, Switzerland*. WHO Press.

Wicker, P., & Frick, B. (2017). Intensity of physical activity and subjective well-being: an empirical analysis of the WHO recommendations. *Journal of Public Health (Oxford, England)*, *39*(2), e19-e26. https://doi.org/10.1093/pubmed/fdw062

Yen, H. Y., & Lin, L. J. (2018). Quality of life in older adults: Benefits from the productive engagement in physical activity. *Journal of Exercise Science and Fitness*, *16*(2), 49-54. https://doi.org/10.1016/j.jesf.2018.06.001

Zekioglu, A., Tatar, A., & Ozdemir, H. (2018). Analysis of sports and social skill relation in a non-sportive group. *Journal of Education and Training Studies*, *6*(8), 108-115.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361-370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x