

The relationship between physical activity and mindful awareness of university students

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Abstract

Background and Study Aim University students often face high levels of stress and mental health issues. These challenges can negatively affect their academic performance and overall well-being. Physical activity and mindfulness may offer benefits, but there is limited research on their relationship in students. The aim of this study is to investigate the correlation between physical activity status and mindful awareness in university students, considering their gender groups and smoking status.

Material and Methods The study was conducted using the relational screening method, a quantitative research design. The research population comprised associate and undergraduate students enrolled at public universities in Turkey. Of the 539 participants selected at random, 60.3% were women (n=325) and 39.7% (n=214) were men. The data were collected using the International Physical Activity Questionnaire - Short Form (IPAQ-SF) and the Mindful Attention Awareness Scale (MAAS). As the Shapiro-Wilk test indicated that the data were not normally distributed, the subsequent analyses employed the Mann-Whitney U test and Spearman's rho correlation analysis.

Results The mean age of participants was 22.0±4.5 years. The mean Body Mass Index (BMI) was 22.1±3.4 kg/m². The rate of physically inactive/sedentary students was 18.2%. The rate of students with low physical activity levels was 50.1%. The rate of students with sufficient physical activity levels was 31.7%. The total physical activity (PA) score was 2046 MET-min/week. The largest contribution to the total score came from walking activity. The MAAS score was found to be normal, with a mean of 59.2±12.5. The mindfulness score was positively related to vigorous physical activity. It was negatively related to sitting time.

Conclusions The findings suggest that increasing physical activity, particularly vigorous exercise, can positively impact mindfulness. Additionally, reducing sedentary behavior might further support the improvement of mindful awareness among university students. These results highlight the importance of incorporating physical activity programs into student lifestyles to promote mental well-being.

Keywords: IPAQ, MAAS, mindfulness, physical activity, university students.

Introduction

It is widely acknowledged that physical activity (PA) plays a pivotal role in preventing obesity, metabolic disorders, and chronic illnesses. However, physical inactivity or sedentary behavior (SB) remains quite common. It is the fourth largest risk factor, affecting 6% of global mortality [1]. Physical inactivity has become a leading risk factor for disease. In the European Region, 1 million deaths per year (10% of the total) and 8.5 million life years lost due to disability can be attributed to physical inactivity [2].

To address this issue, world health authorities recommend that adults aged 18 to 64 years should do at least 150 minutes of moderate-intensity PA or 75 minutes of high-intensity PA per week [3]. Despite these recommendations, over 80% of youth and adults do not meet these guidelines [4]. Large populations in both developed and developing

countries have failed to achieve the recommended PA levels [5].

Moreover, despite the existing benefits of physical activity, daily physical activity levels tend to decrease worldwide [6] and in Turkey. Research conducted by the Ministry of Health in Turkey in 2019 reported that the rate of people who do not exercise at all increases with age [7]. Furthermore, studies have shown that the COVID-19 pandemic, which affected the years 2020-2021, reduced the rate of physical activity in university students. However, post-pandemic analysis studies are insufficient [8, 9, 10]. This highlights the need for ongoing research to better understand and address these trends.

Recent studies investigating students' awareness levels are limited. Mindful awareness is considered as effortless, unbiased, moment-centered thoughts and feelings that arise in the attentional field [11]. Although the concept of awareness has a history of 2500 years, it is currently the focus of increasing interest [12]. This growing interest is due to the

potential benefits of mindfulness practices on mental health.

The evidence indicates that these techniques can assist in the management of stress and depression. They have been demonstrated to be efficacious in the treatment of addiction. Additionally, they are effective in numerous other domains. These include the prevention of relapse, the reduction of psychological vulnerability, the enhancement of psychological resilience, the treatment of post-traumatic stress disorder, and the management of anxiety [13]. These wide-ranging benefits highlight the importance of mindfulness in various aspects of mental health care.

Studies have shown a positive relationship between mindfulness and psychological emotions [14]. There is also a positive link between mindfulness and life satisfaction [15]. Mindfulness is crucial in emotional regulation [16], learning and teaching processes, academic performance, and social skills [17]. Furthermore, physical activity and mindfulness are complementary elements. Higher awareness of breath has been reported to be associated with higher levels of physical activity [18]. This synergy between physical activity and mindfulness suggests that combining these practices could enhance overall well-being.

While the benefits of physical activity and mindfulness on health and well-being are well-documented, there is a notable gap in research specifically focusing on university students. Existing studies are limited in scope and fail to comprehensively address the relationship between physical activity and mindful awareness in this population. The aim of this study is to investigate the correlation between physical activity status and mindful awareness in university students, considering their gender groups and smoking status.

Materials and Methods

Participants

The research population comprises associate and undergraduate students enrolled at public universities in Turkey. The selected cluster and 15 public universities were determined, and official permissions were obtained for the study. According to the 2022-2023 academic year data of the Council of Higher Education, there are a total of 6,204,078 students in public universities in Turkey [19]. The total number of participants is 830. Of these, 291 (35.1%) people whose data were missing or incorrect were excluded, and the data of 539 (64.9%) people were included in the analysis. No stratification or blocking was done in the data sets, as the aim was to deliver the survey link to all students and allow for random participation.

G*Power power analysis was used to determine

the sample size. With a medium effect size ($d=0.3$), a commonly used significance level ($\alpha=0.05$), and power ($1-\beta=0.8$), the minimum required sample size was calculated to be approximately 175.

Study approval was received with the decision number 09 of Uşak University Clinical Research Ethics Committee dated 25.05.2022.

Research Design

In the present study, the relational screening method was employed [20].

Data Collection Instrument

The data were collected via an online Google Form survey between 02-15 May 2022. The form included the Voluntary Consent Form (1 question), Personal Information Questionnaire (7 questions), International Physical Activity Questionnaire - Short Form (IPAQ-SF) (7 questions), and Mindful Attention Awareness Scale (MAAS) (15 questions). The form link was delivered to students via Email, SMS, or WhatsApp communication.

The validity and reliability of the IPAQ-SF were determined by Öztürk [21] in a study conducted with university students in Turkey. The survey was used to determine students' physical activity levels. Physical activity level was classified as physically inactive-sedentary (<600 MET-min/week), low physical activity level (600–3000 MET-min/week), and sufficient physical activity level (>3000 MET-min/week) [22].

The MAAS is an inventory consisting of 15 items that evaluates the general approach of being aware of what is currently happening in daily life and focusing on these moments [23]. The validity and reliability of the scale in Turkish were examined by Özyeşil et al. [24]. In the present study, the internal consistency reliability of the scale was determined to be $\alpha = 0.846$, indicating that the scale exhibits high reliability.

Statistical Analysis

The data were evaluated using the SPSS 26.0 (Statistical Package for the Social Sciences) software. The demographic information of the participants and the distribution of their answers to the scale questions were examined by frequency analysis. Normality was checked with the Shapiro-Wilk test, and homogeneity of variance was checked with Levene's test. The normality analysis revealed that the data did not follow a normal distribution ($p < 0.05$), necessitating the use of non-parametric tests. The Mann-Whitney U test was employed to ascertain the disparity between the rank averages of variables with two categories, while Spearman's rho correlation analysis was conducted to evaluate the relationship between variables. The total PA scores of the participants were obtained using the IPAQ scale. The level of statistical significance was set at $p < 0.05$, with a 95% confidence interval.

Results

Table 1 presents the gender, smoking, and chronic disease prevalence among university students. The data show a higher prevalence of smoking among male students compared to female students. Additionally, the incidence of chronic disease among the participants is relatively low. These trends suggest gender differences in smoking habits and a generally low rate of chronic diseases within the study population.

Table 2 provides the average age and BMI of the students. The results indicate a relatively young and healthy student population, with a mean age of around 22 years and a BMI within the normal range.

Table 3 shows the students' total PA MET-min/week and MAAS scores. The data reveal a moderate level of physical activity and mindfulness among the students, suggesting that while some students are physically active and mindful, there is room for improvement in these areas.

Table 4 illustrates the distribution of physical

activity levels among students. The majority of students fall into the low physical activity category, with a smaller proportion being either inactive or sufficiently active. This indicates a need to encourage more students to reach higher levels of physical activity.

Table 5 compares the total PA and MAAS scores between male and female students. The results highlight that male students have higher total PA scores than female students, primarily due to higher vigorous activity levels. Additionally, male students exhibit slightly higher mindfulness scores compared to female students. These differences underscore the importance of considering gender when developing strategies to enhance physical activity and mindfulness.

Table 6 shows the differences in physical activity and mindfulness between smokers and non-smokers. Notably, smokers have higher physical activity scores in vigorous and moderate activities. However, non-smokers exhibit higher levels of mindful awareness. This suggests that while

Table 1. Demographic characteristics of the participants

Categories	Gender	n	%
Gender	Female	325	60.3
	Male	214	39.7
	Total	539	100.0
Smoker	Female	61	18.8
	Male	76	35.5
	Total	137	25.4
With chronic disease	Female	23	7.1
	Male	17	7.9
	Total	40	7.4

Table 2. Physical Characteristics of Participants by Gender

Variables	Female (n= 325) $\bar{x} \pm sd$	Male (n= 214) $\bar{x} \pm sd$	Total (n=539) $\bar{x} \pm sd$
Age (Years)	21.7 $\pm$ 4.4	22.3 $\pm$ 4.8	22.0 $\pm$ 4.5
Height (cm)	1.65 $\pm$ 0.6	1.78 $\pm$ 0.72	1.70 $\pm$.10
Body Weight (kg)	57.9 $\pm$ 10.2	73.9 $\pm$ 11.1	64.3 $\pm$ 13.1
BMI (kg/m ²)	21.4 $\pm$ 3.5	23.2 $\pm$ 3.0	22.1 $\pm$ 3.4

Note. BMI: Body Mass Index

Table 3. Scores obtained from the IPAQ and MAAS

Categories	IPAQ and MAAS Score $\bar{x} \pm sd$
Total PA Score	2046 $\pm$ 1479
Vigorous PA	580 $\pm$ 846
Moderate PA	379 $\pm$ 587
Walking	1090 $\pm$ 958
Sitting Time	376 $\pm$ 192
MAAS Score	59.2 $\pm$ 12.5

Table 4. Physical Activity Level (PAL) distribution by gender

Physical Activity Levels	Female (n= 325)		Male (n= 214)		Total (n=539)	
	n	%	N	%	n	%
Physically Inactive	76	23.4	22	10.3	98	18.2
Low PA Level	163	50.1	107	50.0	270	50.1
Adequate PA Level	86	26.5	85	39.7	171	31.7

Table 5. Comparison of IPAQ and MAAS scores by Gender

Categories	Female (n=325)	Male (n=214)	z	P
	$\bar{x} \pm sd$	$\bar{x} \pm sd$		
Total PA Score	1961±1515	2176±1417	-2.334	.020*
Vigorous PA	425±745	814±933	-6.725	.000**
Moderate PA	375±608	385±555	-1.758	.079
Walking	1160±10780	982±728	-.688	.491
Sitting Time	387±194	360±187	-1.883	.060
MAAS Score	58.3±12.5	60.6±12.4	-2.208	.027*

Note. MAAS: Mindful Attention Awareness Scale, PA: Physical Activity, *: $p < .05$, **: $p < .001$

Table 6. Comparison of IPAQ and MAAS scores by smoking status

Categories	Smoker (n=137)	Non-Smoker (n=402)	z	p
	$\bar{x} \pm sd$	$\bar{x} \pm sd$		
Total PA Score	2395±1603	1927±1418	-2,960	.003*
Vigorous PA	755±865	520±832	-3.872	.000**
Moderate PA	460±646	351±564	-2,000	.045*
Walking	1181±1040	1059±927	-1.168	.243
Sitting Time	370±187	378±194	-.524	.600
MAAS Score	56.6±12.2	60.1±12.2	-2.913	.004*

Note. *: $p < .05$ **: $p < .001$

Table 7. Relationship between IPAQ and MAAS scores, age and BMI for university students

Variables	Total PA	Vigorous PA	Moderate PA	Walking	Sitting	MAAS Score	BMI (kg/m ²)
Age (years)	rho	-.028	-.019	-.001	-.054	.022	.039
	p	.261	.328	.493	.106	.303	.184
	n	539	539	539	539	539	539
BMI (kg/m ²)	rho	.028	.028	.034	-.051	.009	.070
	p	.257	.257	.218	.120	.420	.052
	n	539	539	539	539	539	539
MAAS Score	rho	.066	.074*	.038	.019	-.085*	
	p	.062	.042*	.191	.329	.025*	
	n	539	539	539	539	539	

Note. *: $p < .05$, **: $p < .001$, rho: Spearman's Correlation Coefficient

smoking students might engage in more physical activity, their overall mindfulness may be lower compared to non-smoking students.

Table 7 analyzes the relationship between total PA MET scores, mindfulness, age, and BMI. The analysis found no significant relationship between severe PA, moderate PA, walking, sitting, and age and BMI. However, as expected, a positive significant relationship was found between age and

BMI. Additionally, a low but significant positive relationship was identified between vigorous physical activity and mindful awareness. This indicates that increased vigorous physical activity is associated with higher mindful awareness. Conversely, a low-level negative relationship was found between sitting time and mindful awareness, suggesting that increased sitting time is associated with lower mindful awareness.

Discussion

The aim of this study was to investigate the correlation between physical activity status and mindful awareness in university students, considering their gender groups and smoking status. The data obtained contribute to the understanding of PA levels and mindful awareness, which are important health factors. Monitoring and promoting these factors can improve health outcomes [5]. Additionally, this study demonstrates that the findings are potentially comparable to other studies that use the IPAQ Short Form questionnaire and address four domains of individuals' physical activity.

In the study conducted by Hallal et al. [25], the prevalence of physical inactivity was found to be 38.2% in individuals aged 20-29 years old, as measured by the IPAQ in Brazil. In meta-analysis study, Keating et al. [26] reported that nearly 50% of university students exhibited low or inactive levels of PA. Similarly, Garcia et al. [27] investigated the PA patterns of 900 college students at Columbia University and found that 68.90% of the students demonstrated low levels of physical activity or were inactive. In comparison, our study found that the rate of students with low physical activity levels was 50.1%, which aligns with the findings of Keating et al. but is lower than the rates reported by Hallal et al. [25] and Garcia et al. [27].

The 2013 Chronic Diseases Risk Factors Survey, conducted by the Turkey Ministry of Health, revealed that 87% of women and 77% of men in Turkey engage in low levels of physical activity or are physically inactive. In the Turkey Nutrition and Health Survey, the data collected in 2017 showed that the prevalence of low physical activity or inactivity levels was 59.2% for men and 86.4% for women aged 18-29 years old [7]. Our study found that 18.2% of students were not physically active, and 50.1% had low physical activity levels. This indicates a lower prevalence of inactivity in our sample compared to the general population data from the surveys conducted by the Turkey Ministry of Health [7].

In the study conducted by Savcı et al. [29], the PA levels of 1,097 university students enrolled in health-related departments at Hacettepe University during the 2003-2004 academic year were assessed using the IPAQ. The findings indicated that 82% of the students were sedentary or had insufficient activity levels, while only 18% had sufficient physical activity. In a separate study, Ölçücü et al. [30] investigated the activity levels of 455 university students using the IPAQ Long Form. Their findings indicated that 64% of the students were inactive or had insufficient activity levels. Bulguroğlu et al. [8] examined the PA levels of 332 volunteer university students during the period of the Coronavirus Disease 2019 pandemic at Ankara Medipol

University in the 2019-20 academic year. Their findings revealed that 30.7% of the students were not physically active, 48.5% exhibited low levels of PA, and 20.8% demonstrated sufficient levels of PA.

In comparison, our study found that 18.2% of students were not physically active, 50.1% had low physical activity levels, and 31.7% had sufficient physical activity levels. These results are somewhat consistent with the findings of Bulguroğlu et al. [8], showing a similar distribution of activity levels. However, our results indicate a higher proportion of students with sufficient physical activity levels compared to the studies by Savcı et al. [29] and Ölçücü et al. [30].

In the present study, the prevalence of physically inactive (sedentary) students was 18.2%, those with low PA levels was 50.1%, and the prevalence of those with adequate PA levels was 31.7%. When considered collectively, the prevalence of low PA levels or inactivity among university students has ranged between 70% and 80% over the past two decades. Although this rate increased during the period of the pandemic, it can be stated that it is now on a downward trajectory once more. The solution suggestions for the difficulties in participating in physical activity identified in previous studies, such as the lack of access to physical activity opportunities, time constraints, and the intensity of classes, may have had an impact.

Savcı et al. [29] recorded the average calculated total PA scores of the students as 1958 ± 1588 MET-min/week. Vigorous PA was determined to be 326 ± 817 MET-min/week, moderate PA was 203 ± 475 MET-min/week, and walking was 1429 ± 1156 MET-min/week. Cengiz et al. [31] found that the average total PA scores of 857 undergraduate students at Middle East Technical University in 2005-6 were 2318 MET-min/week. In the study conducted by Bulguroğlu et al. [8], it was determined that the average total PA scores of the students during the period of the pandemic were 1764 ± 1135 MET-min/week.

In the present study, the mean MET scores were calculated as follows: total PA 2046 ± 1479 , vigorous PA 580 ± 846 , moderate PA 379 ± 587 , and walking 1090 ± 958 MET-min/week. When considered alongside the aforementioned research, the total physical activity scores of university students over the past two decades have fluctuated between approximately 2318 and 1750 MET-min/week. The high level of these results may be due to the nature of the mission of the faculties where students study, such as health sciences. The fact that some results are low can also be considered as the effect of the pandemic period.

In the present study, the mean total PA score of 2046 MET-min/week is significant in terms of decreasing the pandemic effect and showing the tendency of students towards physical activity.

However, it is noteworthy that the biggest contribution to the total score comes from walking activity. This situation is similar to all the studies mentioned above. In the present study, vigorous and moderate PA scores, which are expected to have health benefits, are relatively higher than in previous studies, showing that students are engaging in more qualified physical activity.

Savcı et al. [29] determined that the physical activity level of male students was significantly higher than that of female students in all categories. In this study, the total PA scores of males were found to be higher than the scores of females (2176 ± 1417 and 1961 ± 1515 MET-min/week, respectively), mainly due to the effect of vigorous PA scores (male 814 ± 933 and female 425 ± 745 MET-min/week). Moderate PA and walking scores did not differ between genders. These results are partially compatible with the study by Savcı et al. [29].

As expected, while men are at the forefront in qualified physical activities, it can be thought that neither group makes a special effort in walking activity. Walking scores can only be seen as a reflection of daily living requirements and routine distance walking on campus. Although in some studies the PA scores of smokers were found to be higher than the PA scores of non-smokers [29], in the current study, no difference was found in the PA scores due to smoking.

Many comprehensive studies have not found a relationship between physical activity and BMI [32, 33, 34]. While physical activity plays a role in maintaining body weight, it has not been demonstrated to be an effective standalone strategy for reducing body weight. PA exerts a health-protective effect irrespective of changes in body weight [35]. In the present study, no association was observed between vigorous PA, moderate PA, walking, and sitting situations and BMI, and no relationship was identified with age.

A study conducted in the city of Izmir during the 2016-17 academic year involved a total of 363 university students, of whom 64.7% were female and 33.3% were male. The mean MAAS score was found to be 57.49 [36]. Another study with a sample of 244 university students, of whom 187 were women (76.6%) and 57 were men (23.4%), found a mean MAAS score of 60.86 [37].

The current study yielded a mean MAAS score of 59.2 ± 12.5 , which is in close alignment with the findings of the aforementioned studies. One of the most significant findings is that there is a positive linear relationship between vigorous physical activity and mindfulness. It may therefore be posited that the level of mindfulness can be increased by encouraging vigorous physical activity. Concurrently, practices that enhance mindfulness can facilitate both the encouragement of PA and

the motivation of individuals to reduce sedentary behavior. This finding is consistent with the study of Kurtipek et al. [38], which reported that the level of athlete mindfulness increases with sports age. However, it is not aligned with the study of Akpınar and Güler [39], which reported that there is no relationship between PA and mindfulness in adult women.

In studies investigating the mindfulness levels of university students, no significant difference was identified according to gender [40, 41]. However, the current study revealed that these values differed according to gender, with men exhibiting higher levels of mindfulness than women (60.6 ± 12.4 and 58.3 ± 12.5 , respectively). It is possible that the higher rate of vigorous physical activity observed in men may be a confounding factor in this context.

Limitations

The exclusion of 291 participants (35.1%) from the study due to missing or incorrect data highlights the challenges associated with obtaining consistent and accurate data through the e-survey method and PA scale. The total average value is influenced by the gender distribution of the participants, with male and female participants not being equal. This can render comparisons of averages in study results challenging. To address this, the averages of the gender groups should be taken separately and evaluated in comparisons. Since the effect mechanisms have not been measured, the relationship between PA and mindfulness should be the subject of further experimental research, conducted in a way that eliminates the influence of other factors.

Conclusions

The level of physical activity among university students is relatively low. However, a comparison with recent studies reveals that, contrary to popular belief, PA levels do not tend to decrease. It was found that moderate physical activity and walking do not have a positive effect on awareness. It is possible that the level of mindful awareness may be enhanced by undertaking vigorous physical exercise. It would be beneficial to investigate the reasons why female students do not participate in vigorous physical activities and to develop solutions to this issue. Further research could investigate the relationship between physical activity and mindfulness by determining the level of PA with objective tools such as smart band-based pedometers.

Conflict of interest

The authors declare that there is no conflict of interests.

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