











ARAŞTIRMA MAKALESİ

RESEARCH ARTICLE

The Effects of Exam Periods on Sleep and Eating Behaviors in Medical Students during Clinical Rotations

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Abstract

Objective: Medical school education includes numerous challenging factors, such as a heavy workload and oral interviews, which can lead to an increase in the stress levels of students. Irregularities in meeting physiological needs like sleep and nutrition are especially noticeable during exam periods among medical students, alongside heightened stress. In an attempt to enhance their academic performance, students often reduce the time allocated for basic needs. However, irregularities in sleep and eating behaviors may have potential adverse effects on learning and other cognitive functions. The aim of the current study was to examine the relationship between academic achievement, eating attitudes, sleep, and stress levels among medical school students.

Method: This study included 4th and 5th year students (n=169) from Necmettin Erbakan University, Meram Medical Faculty. The study participants completed a sociodemographic data form, the Pittsburgh Sleep Quality Index (PSQI), Three-Factor Eating Questionnaire (TFEQ), Depression Anxiety Stress Scale-21(DASS-21), Patient Health Questionnaire-9 (PHQ-9) and Patient Health Questionnaire-15 (PHQ-15) during their internship exam week. Academic achievement was evaluated on the basis of exam grades, grade repetitions, and the number of internships left for resist exams.

Results: Out of the 169 participants, 67.3% were female, 75.8% were 5th-grade students, 78.8% had no medical illnesses, 81.1% had no psychiatric illnesses, and 82.4% did not report the use of any psychiatric medication. The participants were divided into two groups based on their average academic achievement scores: a group demonstrating high academic achievement and a group demonstrating low academic achievement. There was no statistically significant difference between the high and low academic achiever groups in the PSQI total score, TFEQ, and DASS-21 scores. However, significant correlations were found between TFEQ and DASS-21 scale scores and PSQI and DASS-21 scales ($p<0.05$). A statistically significant and strong positive correlation was found

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between PHQ-9 and DASS total and subscale scores. There was no significant correlation between PSQI and TFEQ total and subscale scores.

Conclusion: Although the current study showed that academic achievement was not associated with sleep, eating behavior, and stress levels, a significant relationship was identified between stress levels, and poor sleep and eating behaviors among medical school students. Therefore, supporting medical school students with stress management, sleep patterns, and healthy eating practices is crucial.

Keywords: Sleep Quality, Eating Behavior, Academic Achievement, Stress, Medical School Students

Tıp Fakültesi Öğrencilerinde Klinik Staj Döneminde Sınav Dönemlerinin Uyku ve Yeme Davranışlarına Etkisi

Öz

Amaç: Tıp fakültesi eğitimi öğrencilerin stres düzeylerinde artışa neden olan ağır ders yükü, sözlü mülakat sınavları gibi birçok zorlayıcı etken içermektedir. Özellikle sınav dönemlerinde tıp öğrencilerinde artan stresle birlikte uyku ve yeme gibi fizyolojik ihtiyaçların karşılanmasında düzensizlik göz çarpmaktadır. Öğrenciler akademik başarılarını artırmak amacıyla temel ihtiyaçlarından kısararak ders çalışma sürelerini artırmaya çalışmaktadır. Ancak uyku ve yeme davranışlarındaki düzensizliğin öğrenme ve diğer bilişsel işlevler üzerine olası olumsuz etkileri söz konusu olabilir. Mevcut çalışmanın amacı tıp fakültesi öğrencilerinde akademik başarı, yeme tutumları, uyku ve stres düzeyleri arasındaki ilişkiyi incelemektir.

Yöntem: Bu çalışmaya Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi 4. ve 5. sınıflarında öğrenim gören 169 öğrenci dahil edildi. Staj sınavı haftası boyunca katılımcılar sosyodemografik veri formunu, Pittsburgh Uyku Kalitesi İndeksi (PUKİ), Üç Faktörlü Yeme Anketi (TFEQ), Depresyon Anksiyete Stres Ölçeği-21 (DASS-21), Hasta Sağlık Anketi-9 (PHQ-9) ve Hasta Sağlık Anketi-15 (PHQ-15) tamamladılar. Akademik başarı, sınav notları, sınıf tekrar sayıları ve telafi sınavları için bırakılan staj sayısına dayalı olarak değerlendirildi.

Bulgular: 169 katılımcının %67.3'ü kadın, %75.8'i 5. sınıf öğrencisiydi. %78.8'inin tıbbi hastalığı, %81.1'inin psikiyatrik hastalığı yoktu ve %82.4'ü psikiyatrik ilaç kullandığını bildirmemişti. Katılımcılar akademik başarı puanlarının ortalamasına göre yüksek akademik başarı gösteren grup ve düşük akademik başarı gösteren grup olmak üzere iki gruba ayrıldı. Akademik başarıyı yüksek ve düşük gruplar arasında PUKİ toplam puanı, TFEQ ve DASS-21 puanları açısından istatistiksel olarak anlamlı fark yoktu. Ancak TFEQ ve DASS-21 ölçek puanları ile PUKİ ve DASS-21 ölçek puanları arasında anlamlı korelasyon bulundu ($p<0.05$). PUKİ ile TFEQ toplam ve alt ölçek puanları arasında anlamlı bir ilişki yoktu.

Sonuç: Sonuç olarak, çalışmamız akademik başarının uyku, yeme davranışı ve stres düzeyi ile ilişkili olmadığını gösterse de tıp fakültesi öğrencilerinde stres düzeyi, uyku sorunları ve anormal yeme davranışları arasında anlamlı bir ilişki gözlenmektedir. Bu nedenle tıp fakültesi öğrencilerini stres yönetimi, uyku düzeni ve sağlıklı beslenme uygulamaları konusunda desteklemek önemlidir.

Anahtar Kelimeler: Uyku Kalitesi, Yeme Davranışı, Akademik Başarı, Stres, Tıp Fakültesi Öğrencileri

Introduction

Medical education in Türkiye consists of three years of preclinical education, followed by an additional three years of clinical education. Due to its demanding and rigorous curriculum, medical education represents a stressful environment that is associated with increased physical and mental health problems among students (Çilli, 1996; Sethia et al., 2019). High academic expectations, oral and written exams, high frequency of shift duties, and witnessing life-threatening illnesses are among the primary

causes of increased psychological problems among students undergoing medical education (Guthrie et al., 1998; Wear, 2002). Additionally, familial, emotional, and physical issues among medical students can further exacerbate stress levels (Fish & Nies, 1996). In light of the available data, medical students do experience high levels of stress (Shaikh et al., 2004; Sherina et al., 2004; Sreeramareddy et al., 2007), which may lead to problems such as eating and sleep disorders along with mood and anxiety disorders, ultimately impairing the

functionality of medical students (Brougham et al., 2009; Malathi & Damodaran, 1999).

Sleep is a physiological state that can significantly affect mental health, quality of life, and daily performance (Alotaibi et al., 2020). An increase in sleep problems can be observed among medical students, especially during the challenging exam weeks (Shad et al., 2015). Studies conducted in different countries have revealed that the incidence of sleep disorders among medical school students varies between 55.8% and 76.4% (Alotaibi et al., 2020; Lawson et al., 2019; Lemma et al., 2012; Shad et al., 2015). Impaired sleep quality and elevated stress levels are known to lead to adverse health outcomes (Almojali et al., 2017; Satti et al., 2019).

Eating disorders are mental disorders that are characterized by excessive food consumption or restrictive eating behaviors (Ngan et al., 2017). Based on international diagnostic classification systems, eating disorders can be classified as anorexia nervosa, bulimia nervosa, and binge eating disorder (American Psychiatric Association, 2013). Eating disorders can impact the mental state of a person and lead to functional impairments (Ngan et al., 2017). Stress is a significant factor that influences eating attitudes and lifestyle. Unhealthy eating habits and high-energy food consumption were shown to be more common in individuals with high-stress levels (Unusan, 2006; Zellner et al., 2006). Students generally tend to gravitate towards fast food and have a lower intake of healthy foods such as fruits and vegetables (Oliver & Wardle, 1999; Serlachius et al., 2007).

Based on the available data, it is clear that stress may lead to sleep and eating disorders in students. Various factors related to academic achievement among medical students have been reported (Gica et al., 2020; Terlemez et al., 2022); nonetheless, a literature review revealed the lack of sufficient studies on the relationship

between eating attitudes and behaviors and academic achievement. Therefore, further extensive research is needed to better understand the exact impact of stress on academic achievement. The current study aimed to approach the association between stress, sleep, eating disorders, and academic achievement from a different perspective and provide solutions for a healthier experience during challenging times. Prior to the start of the study we hypothesized that: i) students with sleep and eating disorders would have higher stress scores, ii) students with higher stress would have higher academic achievement, iii) students with higher depression scores would have a higher frequency of abnormal eating behavior iv) a relationship would exist between stress scores and emotional eating scores.

Method

Participants

The study included 169 participants aged between 18 and 30 years who were undergoing clinical rotation training at Necmettin Erbakan University, Meram Medical Faculty. All participants were provided prior information about the study and written and verbal consent was obtained from each participant. Individuals under the age of 18 years or over the age of 30 years, who had repeated more than two years in their undergraduate or graduate education, with known sleep disorders, currently experiencing psychiatric illness or using psychotropic medication, and participants who had used alcohol or substances within the past week were excluded.

Measurement Tools

Sociodemographic data form

The sociodemographic data form includes information about the participants' age, gender, weight, height, education level, employment status, presence of any additional physical illnesses, exercise amount, and tobacco-alcohol use.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI was developed by Buysse et al. and was shown to have adequate internal consistency, test-retest reliability, and validity (Buysse et al., 1989). The reliability and validity of the scale in the Turkish were reported in 1996 (Ağargün et al., 1996). The PSQI evaluates sleep quality over the past month and consists of 24 questions. Nineteen of these questions are self-report items that the participants answer themselves. The remaining 5 questions are answered by the student's partner or roommate; these data are used solely for clinical information and are not included in the scoring. The self-report questions cover various factors related to sleep quality. The 18 items that contribute to the scoring are grouped into seven component scores: subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), habitual sleep efficiency (component 4), sleep disturbances (component 5), use of sleep medication (component 6), and daytime dysfunction (component 7). Each question is scored between 0-3. The sum of the scores of all components provides the total PSQI score. Sleep quality is classified as "good" for total scores of 5 or below and "poor" for scores above 5. The PSQI has been found to have high diagnostic sensitivity (89.6%) and specificity (86.5%) in discriminating between good and poor sleepers. The Cronbach's alpha internal consistency coefficient was 0.804 (Ağargün et al., 1996; Buysse et al., 1989).

Three-Factor Eating Questionnaire (TFEQ)

The questionnaire, commonly known as TFEQ, is used to measure the level of conscious dietary restriction among individuals, uncontrolled eating behaviors, and changes in eating patterns based on emotional states (De Lauzon et al., 2004). The questionnaire was translated into the Turkish as "Üç Faktörlü Beslenme Anketi" by Kırac et al., and a validity-reliability study was carried out (Kırac et al., 2015) and

demonstrated that the questionnaire had structural validity and was highly reliable for measuring dietary habits. The questionnaire consists of 18 questions. In the first 13 questions, the response choices are scored from 4 to 1 from top to bottom; from questions 14 to 17, the scoring is reversed from 1 to 4 from top to bottom; and in question 18, the scoring is as follows: the first two choices are scored 1, 3-4 choices are scored 2, 5-6 choices are scored 3, and the last 2 choices are scored as 4.

Depression Anxiety Stress Scale (DASS-21)

The DASS-21 was developed by Lovibond and Lovibond (1995). The Turkish version of the scale and its psychometric properties were assessed by Sariçam (2018).

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a widely used self-report questionnaire that was developed by Spitzer et al. (1999) for the assessment of symptoms of depression. It consists of nine items and employs a 4-point Likert-type scale. The scoring system for the PHQ-9 is as follows: 0 to 4 points indicates minimal depression, 5 to 9 points indicates mild depression, 10 to 14 points indicates moderate depression, 15 to 19 points indicates moderate-severe depression while 20 and above indicates severe depression. In terms of the scale's psychometric properties, the Cronbach's α coefficient, which is a measure of internal consistency, was determined to be 0.84 in the validity and reliability study for the Turkish version of the PHQ-9 (Sarı et al., 2016).

Patient Health Questionnaire-15 (PHQ-15)

The PHQ-15 is a checklist comprising of 15 somatic symptoms, which collectively represent over 90% of the symptoms commonly observed in primary care settings, excluding upper respiratory symptoms. The participants are instructed to rate the distress caused by each symptom over the past two weeks using a 3-point scale, ranging from 0 (no distress at all) to

2 (significant distress). A cumulative score for somatic symptoms is calculated, with potential scores ranging from 0 to 30. These scores are adjusted to accommodate an additional item specific to female participants relating to menstrual pain and related problems. The Turkish validation and reliability study of the PHQ-15 scale has been reported (Yazici-Güleç et al., 2012).

Academic achievement

This is an evaluation form that includes the grade point average (GPA) obtained by the students in medical school exams, the number of grade repetitions, and the number of resit examinations taken. The median score for all students was calculated and students with scores above the median were categorized under “high academic achievement” while those with scores below the median were classified under “low academic achievement”. The evaluations were carried out during the final week of the clinical rotation exams.

Ethical Approval

Ethical approval for this research was obtained from the Ethics Committee for Pharmaceutical and Non-Medical Device Researches of Necmettin Erbakan University, Meram Medical Faculty (IRB: 10.02.2023/169).

Data Analysis

Statistical Package for the Social Sciences (SPSS) version 23 software package for Windows (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses. Descriptive statistical methods (frequency, percentage, mean, and standard deviation) were used for evaluating the study data. The variables were examined for normal distribution using visual (histogram and probability diagrams) and analytical (Kolmogorov-Smirnov and Shapiro-Wilk) tests. Chi-square and Fisher’s exact test were used to compare qualitative data. Mann-Whitney U test was used to compare non-parametric numerical variables between

independent groups. The Spearman correlation test was used to evaluate correlation analysis between numerical variables. $p < 0.05$ was accepted as the level for statistical significance.

Results

The sociodemographic characteristics of the study participants indicated that among the 169 participants, 67.3% were female, 75.8% were in the 5th year, 78.8% reported no medical illness, 81.1% reported no history of psychiatric illness, and 82.4% did not report the use of psychiatric medication (Table 1). The large proportion of the participants (46%) lived with their families. No statistically significant difference was found in sociodemographic properties between the two achievement groups.

A comparison of the TFEQ total and subscale scores between the low and high academic achievement groups is presented in Table 2. No statistically significant difference was identified in the TFEQ total score and the subscales of uncontrolled eating, emotional eating, cognitive restraint, and hunger susceptibility between the low and high-academic-achievement groups. A comparison of the other psychometric scale scores between the low and high academic achievement groups also showed no statistically significant difference between the high and low academic achievement groups (Table 3).

Correlations between academic achievement and psychometric test results are presented in Table 4. Statistically significant weak positive correlations were identified between the PHQ-15 and TFEQ scores ($r=0.183$, $p < 0.05$) as well as between the TFEQ total and subscale scores and DASS-21 total and subscale scores ($r=0.244$, $p < 0.01$; $r=0.307$, $p < 0.01$; $r=0.269$, $p < 0.01$, respectively). Similarly, a statistically significant weak positive correlation was found between PSQI total score and DASS total score and subscale scores ($r=0.307$, $p < 0.01$; $r=0.262$, $p < 0.01$; $r=0.360$, $p < 0.01$, respectively). A statistically significant strong positive

Table 1: Comparison of Socio-Demographic Data of Low and High-Academic-Achievement Groups

Characteristics		Total	Low-Academic-Achievement	High-Academic-Achievement	Z/df	p
Age	Median (Range)		23 (23)	23 (3)	-1.475	.140
Sex	Male n (%)	54 (32.7)	28 (34.6)	26 (31)	1	.621
	Female n (%)	111 (67.3)	53 (65.4)	58 (69)		
Grade (Year)	Grade 4 n (%)	40 (24.2)	21 (25.9)	19 (22.6)	1	.620
	Grade 5 n (%)	125 (75.8)	60 (74.1)	65 (77.4)		
Income	Median (Range)		2.00 (3.00)	2.00 (3.00)		
Place of Living	Dormitory n (%)	18 (11)	11 (13.8)	7 (8.4)	3	.703
	Family House n (%)	75 (46)	35 (43.8)	40 (48.2)		
	Student House n (%)	59 (36.2)	28 (35.0)	31 (37.3)		
	Alone n (%)	11 (6.7)	6 (7.5)	5 (6.0)		
Mother's Education Level	Primary Education n (%)	62 (37.6)	31 (38.3)	31 (36.9)	3	.983
	Secondary Education n (%)	36 (21.8)	18 (22.2)	18 (21.4)		
	Associate Degree –Bachelor's Degree n (%)	47 (28.5)	23 (28.4)	24 (28.6)		
	Master's Degree n (%)	20 (12.1)	9 (11.1)	11 (13.1)		
Father's Education Level	Primary Education n (%)	25 (15.2)	14 (17.3)	11 (13.3)	4	.363
	Secondary Education n (%)	31 (18.9)	11 (13.6)	20 (24.1)		
	Associate Degree –Bachelor's Degree n (%)	67 (40.9)	34 (42)	33 (39.8)		
	Master's Degree n (%)	29 (17.7)	14 (17.3)	15 (18.1)		
	Doctorate n (%)	12 (7.3)	8(9.9)	4 (4.8)		
History of Medical Illness	Doesn't Exist n (%)	130 (78.8)	67 (82.7)	63 (75)	1	.226
	Exists n (%)	35 (21.2)	14 (17.3)	21 (25)		
History of Psychiatric Illness	Doesn't Exist n (%)	133 (81.1)	67 (83.8)	66 (78.6)	1	.397
	Exists n (%)	31 (18.9)	13 (16.2)	18 (21.4)		
Psychiatric Medication Use	No n (%)	136 (82.4)	65 (80.2)	71 (84.5)	1	.471
	Yes n (%)	29 (17.6)	16 (19.8)	13 (15.5)		
Alcohol Consumption	No n (%)	147 (89.1)	75 (92.6)	72 (85.7)	1	.157
	Yes n (%)	18 (10.9)	6 (7.4)	12 (14.3)		
Smoking	No n (%)	143 (86.7)	74 (91.4)	69 (82.1)	1	.082
	Yes n (%)	22 (13.3)	7 (8.6)	15 (17.9)		

Chi-square and Mann-Whitney U tests were used

Table 2. Comparison of Three-Factor Eating Scale Scores between Low and High-Academic-Achievement Groups (Mean \pm Standard Deviation)

	Low-Academic-Achievement	High-Academic-Achievement	Z	p
Total Score of TFEQ (Median)	43.49 \pm 8.39 (43.00)	41.61 \pm 8.62 (41.00)	-1.3847	.166
TFEQ Uncontrolled Eating (Median)	12.76 \pm 3.42 (13.00)	13.05 \pm 11.75 (11.50)	-1.475	.140
TFEQ Emotional Eating (Median)	7.58 \pm 2.79 (7.00)	7.57 \pm 2.81 (8.00)	-.064	.949
TFEQ: Cognitive Restraint (Median)	13.36 \pm 4.00 (14.00)	12.85 \pm 3.09 (13.00)	-.769	.442
TFEQ Hunger Sensitivity (Median)	9.55 \pm 3.37 (9.00)	9.22 \pm 3.30 (9.00)	-.556	.579

TFEQ: Three-Factor Eating Questionnaire

Note: Mann Whitney U test was used, $p < 0.05$ **Table 3.** Comparison of Other Psychometric Test Results between Low and High Academic Achievement Groups (Mean \pm Standard Deviation)

	Low-Academic-Achievement	High-Academic-Achievement	Z	p
PHQ-15 (Total) (Median)	9.65 \pm 5.16 (8.50)	10.12 \pm 5.43 (10.00)	-410	.682
DASS-21-Depression (Median)	7.81 \pm 5.12 (8.00)	7.89 \pm 5.30(7.00)	-.031	.975
DASS-21 Anxiety (Median)	5.46 \pm 3.84 (5.00)	5.76 \pm 4.26 (5.00)	-.281	.778
DASS-21 Stress (Median)	7.74 \pm 4.61 (7.00)	7.88 \pm 4.59 (8.00)	-.178	.859
PHQ-9 (Total) (Median)	10.39 \pm 5.60 (10.00)	10.28 \pm 5.47 (10.00)	-.154	.877
PSQI (Total) (Median)	7.57 \pm 2.03 (7.00)	7.86 \pm 2.04 (8.00)	-.778	.436

DASS-21: Depression-Anxiety-Stress Scale-21; PHQ-9: Patient Health Questionnaire-9; PHQ-15: Patient Health Questionnaire-15; PSQI: Pittsburg Sleep Quality Index

Note: Mann Whitney U test was used, $p < 0.05$

Table 4. Correlations between Academic Achievement and Psychometric Test Results

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1.Last Rotation Scores	-												
2.Number of Grade Repetitions	-0.226**	-											
3.Number of Terms Without Final Exams	0.197*	-0.03	-										
4.Number of Make-up Exams	-0.193*	0.311**	-0.235**	-									
5.How many days before the exam do you start studying?	0.057	0.059	0.064	-0.087	-								
6.When you study regularly, how many hours do you study per day?	0.184*	0.083	0.198*	0.062	0.088	-							
7.TFEQ Total	-0.062	0.049	0.009	-0.04	0.005	-0.099	-						
8.PHQ-15 Total	0.044	0.045	-0.043	-0.077	0.074	0.100	0.183*	-					
9.DASS-21 Depression	0.009	0.008	-0.102	0.084	-0.069	-0.031	0.244**	0.412**	-				
10.DASS-21 Anxiety	0.039	-0.073	-0.084	0.033	0.060	-0.081	0.307**	0.448**	0.652**	-			
11.DASS-21 Stress	0.011	-0.05	-0.127	0.059	0.044	0.017	0.269**	0.613**	0.578**	0.696**	-		
12.PHQ-9 Total	-0.006	0.009	-0.082	0.105	0.019	0.071	0.296**	0.550**	0.708**	0.638**	0.633**	-	
13.PSQI Total	0.069	0.023	-0.060	0.008	-0.124	0.100	0.124	0.446**	0.307**	0.262**	0.360**	0.343**	-

*p<0,05, **p<0.01, Spearman correlation test was used

TFEQ: Three Factor Eating Scale, DASS-21: Depression-Anxiety-Stress Scale-21, PHQ-9: Patient Health Questionnaire-9, PHQ-15: Patient Health Questionnaire-15, PSQI: Pittsburg Sleep Quality Index

correlation was found between PHQ-9 and DASS total and subscale scores ($r=0.708$, $p<0.01$; $r=0.638$, $p<0.01$; $r=0.633$, $p<0.01$, respectively). No significant correlation was identified between PSQI and TFEQ total and subscale scores. Furthermore, no significant correlation was identified between the academic achievements of the participants and the administered psychometric scales.

Discussion

The current study aimed to investigate the association between academic achievement levels and psychological well-being, including stress, eating attitudes, and sleep disorders among 4th and 5th year students at Necmettin Erbakan University, Meram Medical Faculty.

The results showed no significant association between DASS-21 and PSQI scores and the sociodemographic data. In contrast to our findings, a study conducted in Egypt reported higher DASS-21 scores in females compared to males and in students living with their families compared to students living in dormitories (Fawzy & Hamed, 2017a). However, in other studies, gender was reported to be not associated with stress or sleep disorders (Almojali et al., 2017; Safhi et al., 2020; Waqas et al., 2015a). One possible reason for this discrepancy is that medical education in Turkiye does not differ significantly based on gender. Evaluation of comparable studies from other countries revealed both positive and negative relationships between age and sleep problems (Brick et al., 2010; Fawzy & Hamed, 2017b; Giri et al., 2013; Ibrahim et al., 2017). These conflicting results may reflect the differences in medical education and study designs across different countries.

Obesity is recognized as a risk factor for various sleep disorders and mental health issues. However, the literature presents conflicting results in this regard. One study reported a negative impact of high BMI on sleep quality (Vargas et al., 2014), while another study

reported no significant association (Ibrahim et al., 2017). Consistent with the latter study, we also did not find a significant relationship between BMI and PSQI scores.

We observed a significant association between stress levels and poor sleep quality, which is corroborated by studies conducted in Pakistan and Saudi Arabia (Safhi et al., 2020; Waqas et al., 2015b). High stress levels are common among medical students (Sethia et al., 2019); furthermore, increased stress levels are critical in the etiology of sleep disorders (Suchecky et al., 2009). Poor sleep quality can lead to various adverse outcomes, including depression, fatigue, irritability, and cognitive problems (Pilcher et al., 1997).

Our study found no significant relationship between stress levels and academic achievement, consistent with other studies (Al-Khani et al., 2019; Alsalhi et al., 2018; Safhi et al., 2020). However, it is important to note that Fawzy et al. reported an association between DASS-21 scores and academic achievement, and the daily study duration (<2 hours/day or >6 hours/day) was identified as a risk factor (Fawzy & Hamed, 2017a). These contradictory findings may be due to the cross-sectional nature of the studies; further longitudinal research may provide better insight into this relationship.

High-stress levels are known to influence changes in eating habits. A correlation between stress and unhealthy eating habits, especially among women, was reported from Kuwait. We observed a significant association between DASS-21 scores and TFEQ and its subscale scores, supporting the published evidence. Similarly, a study carried out with university students revealed an increase in unhealthy eating habits as stress levels increased (El Ansari & Berg-Beckhoff, 2015). Medical students in India demonstrated an increased risk of eating disorders among individuals with higher stress levels (Iyer et al., 2021). However,

a study carried out with medical students in Malaysia reported no relationship between stress levels and eating habits (Ngan et al., 2017). The use of different scales to measure eating attitudes may explain this discrepancy.

Eating disorders are among the psychiatric disorders that are more commonly observed in women. Although our study did not find a significant relationship between gender and TFEQ scores, there are inconsistent results in the literature. A study conducted in India reported no significant difference in eating attitudes as a function of gender (Iyer et al., 2021), supporting our data. On the contrary, other studies have reported that the relationship between stress and maladaptive eating habits were more significant in men than in women (El Ansari & Berg-Beckhoff, 2015; Papier et al., 2015). A large-scale study carried out with students in a Health Department in Lebanon reported a higher prevalence of eating disorders among women (Hoteit et al., 2022). The cross-sectional nature of the studies, variations in the psychometric scales used, and inherent differences in the samples may explain the inconsistencies in these results. Therefore, additional studies are needed to reach a clear conclusion.

Medical education is rigorous and highly demanding, resulting in increased physical and mental health challenges for students. Factors like high academic expectations, exams, long hours, and exposure to critical medical situations contribute to psychological stress. Sleep disturbances are common, particularly during exam periods, and a significant percentage of medical students suffer from sleep disorders. However, research on the relationship between eating behaviors and academic performance among medical students is lacking. To address this gap, the current study investigated the associations between stress, sleep, eating disorders, and academic achievement, aiming to provide new insights for a healthier experience in medical education.

In conclusion, although our study showed that academic achievement was not associated with sleep, eating behavior and stress levels among medical students, it showed a relationship between stress levels and poor sleep and eating behaviors, suggesting that stress can negatively impact sleep patterns and lead to sleep disorders. Additionally, students under stress may exhibit changes in their eating habits. Therefore, supporting medical students in stress management, sleep patterns, and healthy eating habits is essential. Due to our study's cross-sectional nature, use of self-administrated scales, and a relatively small sample size, the results should be interpreted with caution. Prospective longitudinal studies with larger sample sizes are needed to comprehensively evaluate the factors associated with academic achievement.

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