RESEARCH ARTICLE / *Araştırma Makalesi*

Levels of Anxiety and Relationship of Anxiety with Coping Styles and Related Factors in Medical Students During COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Tıp Fakültesi Öğrencilerinde Anksiyete Düzeyleri ve Anksiyetenin Başa Çıkma Stilleri ve İlgili Faktörler ile İlişkisi

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Abstract

Objective	The aim of our study is to investigate the relationship between "clinically significant anxiety" and coping styles and selected characteristics, as well as anxiety levels during the Coronavirus Disease-19 (COVID-19) outbreak in medical school students.
Materials and Methods	An online questionnaire was performed to evaluate 713 medical school students. The questionnaire included the sociodemographic data, items evaluating selected features, Generalized Anxiety Disorder-7 (GAD-7) Scale and Coping Styles Scale Brief Form (The Brief COPE).
Results	Of the 713 participants, 285 (39.97%) were normal, 261 (36.61%) were mild, 123 (17.25%) were moderate, and 44 (6.17%) had severe anxiety levels. Since 167 (23.42%) of the participants had GAD-7 scores ≥ 10, we can say that they had "clinically significant anxiety" and these individuals needed clinical evaluation in terms of possible GAD diagnosis. Being female (p<0.001) and younger (p=0.025) were statistically significantly associated with "clinically significant anxiety". More adoption by medical school students of the ineffective coping strategies such as focus on and venting of emotions, substance use, behavioral disengagement, mental disengagement, and the problem-focused coping strategies such as suppression of competing activities are considered predictors of "clinically significant anxiety". On the contrary, those who did not have "clinically significant anxiety" have statistically significantly more adopted problem-focused coping styles such as using instrumental social support (p=0.049) and planning (p<0.001), and emotional-focused coping styles such as positive reinterpretation (p<0.001) and acceptance (p=0.014).
Conclusion	Our results emphasize the factors and functional coping styles that should be considered to protect the mental health of medical school students while fighting a disaster that has a major impact on society worldwide.
Keywords	anxiety; COVID-19; coping styles; medical collage students; outbreak

Öz

Amaç	*Çalışmamızın amacı Coronavirus Hastalığı-19 (COVID-19) pandemisi sırasında tıp fakültesi öğrencilerinin anksiyete düzeyilerini, ayrıca "klinik olarak anlamlı anksiyete"nin başa çıkma stilleri ve seçilmiş özellikler ile ilişkisini araştırmaktır.*
Gereç ve Yöntemle	*713 tıp fakültesi öğrencisini değerlendirmek için çevrimiçi bir anket yapıldı. Anket sosyodemografik veriler, seçilmiş özelliklerin değerlendirildiği maddeleri, Yaygın Anksiyete Bozukluğu-7 (YAB-7) Ölçeği, Başa Çıkma Stilleri Ölçeği Kısa Formu (BÇSÖ-KF) alt bölümlerini içermekteydi.*
Bulgular	*713 katılımcının 285 (%39,97)'i normal, 261 (%36,61)'i hafif, 123 (%17,25)'i orta, 44 (%6,17)'ü ciddi seviyede anksiyeteye sahipti. Katılımcıların 167 (%23,42)'sinin YAB-7 skorları ≥ 10'du, böylece "klinik olarak anlamlı anksiyete"ye sahipti ve bu kişilerin YAB bakımından klinik değerlendirmeye ihtiyacı vardı. Kadın (p<0.001) ve daha küçük yaşta (p=0.025) olmak istatistiksel olarak anlamlı klinik anksiyete ile ilişkiliydi. İşlevsel olmayan (inefektif) başa çıkma stillerinden olan duygulara odaklanma ve ortaya koyma, madde kullanımı, davranışsal olarak ilgiyi kesme ve zihinsel olarak ilgiyi kesme ve problem odaklı başa çıkma stillerinden olan diğer etkinlikleri bırakmayı daha fazla benimseme "klinik olarak anlamlı anksiyete" üzerinde öngördürücüydü. Aksine, "klinik olarak anlamlı kaygısı" olmayanlar, problem odaklı olan araçsal sosyal destek kullanımı (p=0.049) ve planlama (p<0.001) ile duygusal odaklı olan olumlu yeniden yorumlama (p<0.001) ve kabullenme (p=0.014) başa çıkma stillerini istatisktiksel olarak anlamlı şekilde daha fazla benimsemiştir.*
Sonuç	*Bulgularımız, dünya çapında toplum üzerinde büyük etkileri olan bir felaketle savaşırken tıp fakültesi öğrencilerinin mental refahını korumak için dikkate alınması gereken faktörleri ve işlevsel olabilecek başa çıkma stillerini vurgulamaktadır.*
Anahtar Kelimeler	*anksiyete; COVID-19; başa çıkma stilleri; tıp fakültesi öğrencileri; salgın*

INTRODUCTION

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), the etiological agent for Coronavirus Disease-19 (COVID-19), was first identified in China as a cause of pneumonia on December 31, 2019 and the disease has since spread to many countries in the world. It was announced to be a global pandemic by the World Health Organization (WHO) on March 11, 2020.[1]

Several previous studies have shown that stressful experiences in life can influence the psychological and physical well-being of individuals.[2,3] The emergence and consequences of infectious diseases such as severe acute respiratory syndrome (SARS), Middle East Respiratory syndrome (MERS), and COVID-19 (e.g anxiety, threat and fear related to a disease) are incontestable stress factors.[4-6] This large-scale, viral, public health event has put tremendous pressure on healthcare workers and the public.[7,8] Not only did the epidemic raise the risk of death from viral infection, but it also placed intolerable psychological pressure on people around the world.[9,10] Many researches have reported the psychological effects of the outbreak on the public, healthcare professionals, and adolescents.[11-13]

It is expected that delays in reopening of the universities due to spread of the disease and tight isolation measures will affect the mental health of university students. A study shows that public health crises can have several psychological effects on university students, which can be categorized as anxiety, fear and concern.[14] The virus may have an impact on their work and future employment and COVID-19 may have triggered this anxiety.[13,15] To our knowledge, the number of studies on mental health of university students facing the COVID-19 pandemic is limited.[16-18] Even so, unlike other students, medical students have a more comprehensive information on the nature of the disease, and this may make them more anxious during the quarantine period. This outbreak has disrupted and delayed the academic programs of medical schools, and the students have become potentially more anxious.[17,18]

At the present time, GAD-7 is the most commonly used measure for evaluation levels of anxiety in clinical practice and study due to its diagnostic reliability and efficacy.[19] It can be administered for screening, diagnosis and assessment of the severity of anxiety disorders, along with assessment post-traumatic stress disorders, social phobia and panic disorders.[20]

To our knowledge, only a few number of studies have investigated the coping strategies during outbreaks such as SARS and COVID-19.[21-23] We found only one study each investigating coping strategies among university students during the SARS (in China) and COVID-19 (in Pakistan) outbreaks.[24,25] As far as we know, our study is the first research to examine the coping styles of medical school students during any epidemic.

The development of strategies that direct students towards efficient and appropriate emotional control in public health emergencies and prevent losses during crises is a matter of urgency for universities. Thereby, we researched and examined the mental health status of medical students, their coping styles and related factors during the epidemic. In this context, our aim is to investigate the levels of anxiety in medical school students and their coping styles and related factors during the pandemic. Thus, we want to provide a conceptual basis for psychological interventions to medical students and provide a framework for the implementation of national and government policies.

MATERIAL and METHODS

Participants and study design

We designed a survey to assess the levels of anxiety among many medical school students in Turkey, their coping styles and related factors during COVID-19 pandemic. We used an online survey in order to reduce face-to-face interplay and encourage the participation of medical students. Representatives of medical faculties were contacted and the survey were shared in Whatsapp groups where faculty students were registered.

All participants gave informed consent before the study with a "yes-no question" confirming their desire to take part in the research. The data were collected within seven days between May 2 and 8, 2020; after April 11, 2020, the date with the highest number of cases in Turkey (5138 cases).

İstanbul Medipol University Ethics Committee approved the study (registration nr: 10840098-604.01.01-E14679, date of ethics committee approval:28.04.2020).

Survey instruments

The socio-demographic data of the students on age, gender, level of class, place of accommodation (living with parents; yes or no), regular scholarship income and family income levels during the outbreak were collected. A Likert-type questions ranging between 1 to 5 was used to measure the concerns about COVID-19, concern about infect COVID-19 to relatives, unwillingness to work in health sector, sleep problems, experiencing somatic symptoms, level of knowledge about COVID-19, social support and concern about educational process were questioned.

GAD-7 is a brief self-reporting test developed by Spitzer et al. in conjunction with DSM-IV-TR criteria and it is used to evaluate the common anxiety disorder.[26] It is a 7-item, 4-point paper-pen style likert-type scale (0 = zero, 1 = few days, 2 = more than half the days, 3 = almost every day) that measures the experiences in the last 2 weeks. The cut-off points of the scale for mild, moderate and severe anxiety are scores of 5, 10, and 15, respectively. Patients with a total score of 10 or higher should be examined and confirmed for a possible diagnosis of GAD. Konkan et al. has adapted the scale to Turkish.[27] In order to assess the reliability of the scale, the Cronbach Alpha coefficient was calculated by performing Reliability Analysis to determine the internal consistency of the items. The Cronbach's alpha value for GAD-7 total score was found to be 0.852. The obtained results show that the scale is reliable. Cronbach's alpha value of our GAD-7 scale was 0.907.

The Coping Styles Scale Brief Form (Brief COPE) was developed by Carver as the short form of the scale named Coping Styles (COPE) that was developed by Carver et al. to assess the different behaviors against the stressful conditions.[28,29] In the Brief COPE, there are 28 statements about different coping styles, each of which can be divided into 14 subscales with two expressions. Answers to each item can be scored from 1 to 4 as: 1 = I usually don't do this at all; 2 = I usually this a little bit; 3 = I usually do this a medium amount; 4 = I usually do this a lot. The raw score that can be obtained from each subscale varies between 2 and 8. Adaptation to Turkish was performed by Bacanlı et al. The Turkish version of Brief COPE was used to examine adopted coping strategies.[30] The scale consists of using instrumental social support, suppression of competing activities, restraint coping, planning, humor, acceptance, turning to religion, positive reinterpretation, using emotional social support, denial, behavioral disengagement, mental disengagement, focus on and venting of emotions and substance use subscales, and a high score indicates that that coping strategy is adopted more.

Statistical analysis

Data were analyzed using version 22 of the SPSS (SPSS V.22.0). In order to investigate the relationship between anxiety symptoms, coping styles and related factors, we performed univariate analysis by using Mann-Whitney U, t-test, Chi-square and Spearman's correlation tests (continuous variables had non-parametric distribution), in addition to descriptive statistics. Then, we conducted binary logistic regression analysis to determine the contribution of clinically significant anxiety and clinically non-significant anxiety to our categorical dependent variable according to the GAD-7 scale of the relevant predictors. For this purpose, statistically significant ($p<.05$) factors related to clinical anxiety in univariate analyzes were included as independent variables in the regression analysis.

RESULTS

Participant characteristics

The demographic and selected characteristics of the population studied are shown in Table 1a and 1b. Of the 713 medical school students, approximately two-thirds (63.53%) were females. 90.32% of the participants lived with their parents during the pandemic, 11.64% had financial difficulties or low income.

Table 1a. Socio-demographic and clinical characteristics of medical faculty students in the pandemic process (N:713).

	N (%) or Mean ± SD)
Overall	713 (100)
Gender	
Male	260 (36.47)
Female	453 (63.53)
Living with parents	
Yes	644 (90.32)
No	69 (9.68)
Regular scholarship income	
Yes	425 (59.61)
No	288 (40.39)
Family income levels	
Living difficulties	13 (1.82)
Low income	70 (9.82)
Middle income	406 (56.94)
Middle-High income	204 (28.61)
High income	20 (2.81)
Age	22.17 ± 2.40
Level of class	
1.	106 (14.87)
2.	104 (14.59)
3.	80 (11.22)
4.	124 (17.39)
5.	214 (30.01)
6.	85 (11.92)
Concern about COVID-19[1]	3.10 ± 0.83
Concern about infect COVID-19 to relatives[1]	3.43 ± 0.92
Unwillingness to work in health sector[2]	2.44 ± 1.30
Sleep problem[1]	2.73 ± 1.40
Experiencing somatic symptoms1	1.67 ± 0.99
Level of knowledge about COVID-19[3]	3.33 ± 0.83
Social support[1]	3.50 ± 1.02
Concern about educational process[1]	3.55 ± 1.21
GAD-7 score	6.48 ± 4.61

GAD-7: Generalized Anxiety Disorder-7
[1] As measured by a Likert scale. Possible scores range from 1 to 5, with higher scores indicating more frequency.
[2] As measured by a Likert scale. Possible scores range from 1 to 5, with higher scores indicating more unwillingness.
[3] As measured by a Likert scale. Possible scores range from 1 to 5, with higher scores indicating more knowledge.

Table 1b. Socio-demographic and selected characteristics of the study population (N:713).

Problem focused coping	
Using Instrumental Social Support	5.92 ± 1.49
Suppression of Competing Activities	5.41 ± 1.36
Restraint Coping	5.20 ± 1.24
Planning	6.46 ± 1.24
Emotional focused coping	
Humor	5.09 ± 1.82
Acceptance	6.54 ± 1.26
Turning to Religion	5.82 ± 2.03
Positive Reinterpretation	5.79 ± 1.47
Using Emotional Social Support	5.29 ± 1.42
Ineffective coping	
Denial	3.61 ± 1.48
Behavioral Disengagement	3.51 ± 1.46
Mental Disengagement	5.22 ± 1.51
Focus on and Venting of Emotions	5.50 ± 1.53
Substance Use	2.65 ± 1.31

Results of the GAD-7 scale

Mean and total scores of GAD-7 are presented in Table 1a. A total of 285 (39.97%) participants had normal, 261 (36.61%) mild, 123 (17.25%) moderate, and 44 (6.17%) had severe anxiety. The GAD-7 scores of 167 (23.42%) participants were ≥ 10, so they had clinically significant anxiety and required clinical evaluation in terms of general anxiety disorder.

Results of the Brief Cope Questionnaire

Mean Brief Cope questionnaire scores of all participants are presented in Table 1b. The most adopted coping styles were acceptance and planning (mean> 6), and the least

adopted coping styles were substance use, denial and behavioral disengagement (mean <4).

Factors related with possible anxiety in the total sample

The results of univariate analysis for "clinically significant anxiety" among all students are presented in Table 2a and Table 2b.

Table 2a. Sociodemographic factors associated with " clinically significant anxiety".

	GAD-7 score < 10, N (%)	GAD-7 score ≥10, indicated clinically significant anxiety, N (%)	qi-square test, p value
Gender			
Male	218 (83.85)	42 (16.15)	**<0.001**
Female	328 (72.41)	125 (27.59)	
Living with parents			
Yes	488 (75.78)	156 (24.12)	0.123
No	58 (84.06)	11 (15.94)	
Regular scholarship income			
Yes	320 (75.29)	105 (24.71)	0.326
No	226 (78.47)	62 (21.53)	
Family income levels			
Living difficulties	9 (69.23)	4 (30.77)	0.103
Low income	51 (72.86)	19 (27.14)	
Middle income	302 (74.38)	104 (25.62)	
Middle-High income	170 (83.33)	34 (16.67)	
High income	14 (70.00)	6 (30.00)	
Level of class			
1.	73 (68.87)	33 (31.13)	0.088
2.	82 (78.85)	22 (21,15)	
3.	60 (75.00)	20 (25.00)	
4.	90 (72.58)	34 (27.42)	
5.	168 (78.51)	46 (21.49)	
6.	73 (85.88)	12 (14.12)	

GAD-7: Generalized Anxiety Disorder-7

Table 2b. Socio-demographic and clinical characteristics associated with " clinically significant anxiety"				
	GAD-7score<10, Mean ± SD	GAD-7 score ≥10, indicated clinically signifcant anxiety, Mean ± SD	Statistic	Mann-Witney u Test, p value
Age	22.25 ± 2.39	21.89 ± 2.42	Z= -2.242	**0.025**
Concern about COVID-19[1]	2.98 ± 0.80	3.49 ± 0.78	Z= -6.921	**<0.001**
Concern about infect COVID-19 to relatives[1]	3.32 ± 0.90	3.80 ± 0.87	Z= -5.823	**<0.001**
Unwillingness to work in health sector[2]	2.38 ± 1.31	2.65 ± 1.27	Z= -2.443	**0.015**
Sleep problem[1]	2.46 ± 1.33	3.59± 1.28	Z= -9.032	**<0.001**
Experiencing somatic symptoms[1]	1.46 ± 0.80	2.37 ± 1.21	Z= - 9.771	**<0.001**
Levelof knowledge about COVID-19[3]	3.35 ± 0.83	3.28 ± 0.81	Z= -1.119	0.263
Social support[1]	3.60 ± 1.02	3.16 ± 0.96	Z= -5.179	**<0.001**
Concern about educational process[1]	3.41 ± 1.21	3.99 ± 1.12	Z=-5.708	**<0.001**
Problem focused coping				
Using Instrumental Social Support	5.98 ± 1.47	5.70 ± 1.55	Z=-1.962	**0.049**
Suppression of Competing Activities	5.34 ± 1.36	5.65 ± 1.30	Z=-2.462	**0.014**
Restraint Coping	5.14 ± 1.26	5.39 ± 1.17	Z=-2.144	**0.032**
Planning	6.55 ± 1.22	6.18 ± 1.28	Z=-3.359	**<0.001**
Emotional focused coping				
Humor	5.09 ± 1.80	5.07 ± 1.87	Z=-0.142	0.887
Acceptance	6.60 ± 1.25	6.34 ± 1.27	Z=-2.464	**0.014**
Turning to Religion	5.88 ± 2.03	5.65 ± 1.30	Z=-1.456	0.145
Positive Reinterpretation	5.93 ± 1.37	5.33 ± 1.66	Z=-4.315	**<0.001**
Using Emotional Social Support	5.24 ± 1.40	5.44 ± 1.49	Z=-1.426	0.154
Ineffective coping				
Denial	3.55 ± 1.41	3.81 ± 1.68	Z=-1.397	0.162
Behavioral Disengagement	3.28 ± 1.29	4.28 ± 1.71	Z=-7.018	**<0.001**
Mental Disengagement	5.10 ± 1.48	5.59 ± 1.55	Z=-3.563	**<0.001**
Focus on and Venting of Emotions	5.34 ± 1.53	5.99± 1.42	Z=-4.738	**<0.001**
Substance Use	2.53 ± 1.16	3.07 ± 1.66	Z=-4.238	**<0.001**
GAD-7: Generalized Anxiety Disorder-7				

The univariate analysis showed that female gender (p<0.001) and younger age (p=0.025) were statistically significantly associated with "clinically significant anxiety". Living with parents, regular scholarship income, income level of the family and the level of class were not significantly associated with "clinically significant anxiety".

When we examined the selected characteristics, we showed that concern about COVID-19, concern about infect COVID-19 to relatives, sleep problem, experiencing somatic symptoms and concern about educational process were higly statistically significantly more frequent in those with "significant clinical anxiety" than in those who did not (p<0.001), also, the frequency of receiving social support was statistically significantly less (p<0.001). In addition, these participants were also statistically significantly more unwilling to work in health sector (p=0.015). The level of knowledge about COVID-19 was not associated with "clinically significant anxiety".

In those with significant clinical anxiety, focus on and venting of emotions, substance use, behavioral disengagement and mental disengagement were highly statistically significantly more coping styles adopted than those without (p<0.001). Also suppression of competing activities (p=0.014) and restraint coping (p=0.032) were found to be statistically significantly more coping styles adopted.

On the contrary, positive reinterpretation (p<0.001) and planning (p<0.001) styles were highly statistically significantly more coping styles adopted in those who did not have "clinically significant anxiety", while using instrumental social support (p=0.049) and acceptance (p=0.014) were statistically significantly more adopted. Humor, turning to religion, denial and using emotional social support were not significantly associated with "clinically significant anxiety".

Independent variables were selected from coping styles associated with "clinically significant anxiety" in univariate analysis. A binary logistic regression analysis was conducted to ascertain the independent effects of focus on and venting of emotions, substance use, behavioral disengagement positive reinterpretation, mental disengagement, planning, using instrumental social support, acceptance, suppression of competing activities and restraint coping on the "clinically significant anxiety" (GAD-7score ≥ 10). Focus on and venting of emotions, substance use, behavioral disengagement, mental disengagement and suppression of competing activities were independently related with "clinically significant anxiety" (Table 3). These coping styles are considered predictive factors on clinically significant anxiety.

DISCUSSION

The main purpose of our study which was conducted right after the peak number of cases seen in Turkey was to determine the rate of clinically significant anxiety, coping strategies of the students and relevant factors during the quarantine period for COVID-19 outbreak. According to these results, more than half of the students had mild to severe levels anxiety and almost one fourth of them had "clinically significant anxiety" (moderate to severe levels anxiety). We consider that this is an important result that should be clinically evaluated as "possible anxiety disorder". Our findings were consistent with the previous studies examining the prevalence of anxiety during the COVID-19 outbreak.[13,31] Cao et al. have examined 7143 university students and they have found that about a quarter of the participants had mild to severe anxiety and 3.60% had moderate to severe anxiety.[16] In their study, Liu et al. have included 217 medical students, and found that

Table 3. Binary logistic regression analysis of factors influencing medical faculty students' clinically significant anxiety. (Nagelkerke R Square: 0,193, Hosmer and Lemeshow Test: 0,411)

	B	S.E.	Wald	Df	Sig.	OR	95,0% C.I.for OR
Focus on and Venting of Emotions	0.204	0.070	8.460	1	0.004	1.226	1.069 – 1.407
Substance Use	0.176	0.067	6.818	1	0.009	1.192	1.045 – 1.361
Behavioral Disengagement	0.300	0.072	17.408	1	0.000	1.349	1.172 – 1.553
Positive Reinterpretation	-0.135	0.078	3.040	1	0.081	0.873	0.750 – 1.017
Mental Disengagement	0.134	0.067	4.016	1	0.045	1.144	1.003 – 1.304
Planning	0.011	0.101	0.012	1	0.911	1.011	0.830 – 1.231
Using Instrumental Social Support	-0.103	0.074	1.967	1	0.161	0.902	0.780 – 1.042
Acceptance	-0.079	0.086	0.859	1	0.354	0.924	0.781 – 1.092
Suppression of Competing Activities	0.173	0.078	4.942	1	0.026	1.189	1.021 – 1.385
Restraint Coping	0.106	0.082	1.674	1	0.196	1.112	0.947 – 1.307

about one-fifth of the students had mild to severe anxiety and 7.40% had moderate to severe anxiety.[17] These studies have also used GAD-7 scale. The different results between these previous studies and our study may be due to the fact that these studies were performed in the early stages of the COVID-19 outbreak. In addition, unlike our study, these two studies have been conducted in a single university. Nevertheless, a study which has been performed in the later periods of the outbreak has included 2086 Chinese medical school students and 38.10% of the students had moderate to severe anxiety and this ratio is higher than previous studies.[18]

We believe that the variation in prevalences of stress and anxiety related to the pandemic among participants is largely dependent on many factors such as the study design and the rating system, in addition to timing of the research as conducting these studies before, during or after an outbreak may affect the results.[32]

The socio-demographic data analysis has shown that females and younger individuals have significantly higher "clinically significant anxiety". Our study showed that female students were more adversely affected from pandemic. A recent study conducted during the outbreak on university students has shown that females were more anxious because of the pandemic and this finding was consistent with our results.[33] In a study conducted on medical school students during the current pandemic period, no significant association has been shown between gender and anxiety.[17] In a study conducted in Chinese medical students during the COVID-19 pandemic, similar to our finding, the prevalences of anxiety (moderate - severe level) decreased with increasing age.[18]

In our study, there was no significant association between the parameters such as living with parents, income level of family, regular scholarship income and class levels and "clinically significant anxiety". However, Cao et al. during COVID-19 outbreak have shown that living with parents and having regular family income were associated with low levels of anxiety.[16] Consistent with our findings, a number of studies conducted on medical students[15] and university students in the COVID-19 outbreak have shown that there was no significant association between class status and levels of anxiety.[34] Lin et al. have conducted a study in a medical school in China and unlike our results, they have shown that as the higher grade students had lower prevalence of moderate to severe anxiety.[18]

The selected characteristics such as concern about COVID-19, concern about infect COVID-19 to relatives, sleep problem, experiencing somatic symptoms, concern about educational process and unwillingness to work in health sector were significantly more frequent in students who had "clinically significant anxiety", however, the frequency of receiving social support was significantly less.

Based on likert-style anxiety scale, we concluded that medical school students had more concerns about transmitting the infection to their relatives rather than their anxiety about the infection. In a similar study based on a 1-5 scale, it has been shown that healthcare providers were feeling more anxious about transmitting the coronavirus to a family member rather than acquiring the infection themselves.[35]

About one-third of the students stated that they often or always have sleeping problem. Some other studies have reported similar rates sleep disorders in general population and insomnia in medical staff.[36,37] In accordance with our findings, Cellini et al. have reported that the increase in sleep difficulties in general population during the COVID-19 outbreak was more significant in those with higher levels of anxiety.[31] Zhang et al. have reported that the medical staff experiencing insomnia during the outbreak had higher levels of anxiety on GAD-7 scale.[36] Concerns among healthcare professionals may cause affect the sleep quality.[38]

In accordance with our findings, recent studies conducted on university students and healthcare professionals during the COVID-19 period have shown a negative correlation between social support and anxiety levels.[11,16] During pandemic, social support not only decreases psychological pressure, but also changes the attitude towards help seeking methods. This result demonstrates that in public health crises, efficient and solid social support is needed.[39]

Similar to our findings, a recent study has shown a positive correlation between university students and anxiety of delayed academic plans during COVID-19 outbreak.[16] Due to the pandemic, some families will lose their incomes, so students may feel worried about paying tuition fees.[40] In our country, all primary, secondary schools and universities were closed and distance education methods were carried out. Undoubtedly, these steps have an impact on student education and growth.

About a quarter of medical school students in our study were either very or completely unwilling to do their jobs in the future. For this reason, we think that medical school students, who are the doctors of future, are a sensitive and special population. A survey study on health-care workers in Taiwan during the SARS outbreak has shown that 9% of staff were unwilling to work or they were thinking of resigning.[41] A recent study has reported that 15,30% of healthcare workers were considering re-planning or changing their working hours to avoid contact with coronavirus-infected patients.[35]

In our study, the level of knowledge about COVID-19 was not found to be associated with "clinically significant anxiety". In accordance with our results, two different studies have reported that there was no significant association between levels of anxiety and level of knowledge on coronavirus infection in midwifery students and general population.[33,42]

In our study, the most adopted coping strategies used by medical students were acceptance (one of the emotion-focused coping strategies) and planning (one of the problem-focused coping strategies). The least adopted coping strategies were substance use, denial and behavioral disengagement, which are among the ineffective coping strategies, respectively. In a study by Salman et al. among 1134 university students in Pakistan during the COVID-19 pandemic, the most frequent coping strategy adopted by students were religious/spiritual coping and acceptanc.[25] These results were partially consistent with our study.

We think that, focus on and venting of emotions, substance use, behavioral disengagement and mental disengagement from ineffective coping strategies, and suppression of competing activities and restraint coping from problem-focused coping strategies, were the more adopted coping strategies by the individuals who had "clinically significant anxiety". Moreover, regression analysis showed that focus on and venting of emotions, substance use, behavioral disengagement and mental disengagement which are among the ineffective coping strategies, and suppression of competing activities which is among problem focused coping strategies were considered predictors of "clinically significant anxiety". Apparently, these strategies were not optimal for medical school students. We need to explore the reasons behind these trends and develop strategies to encourage students to adopt more positive coping strategies.

On the contrary, we think that those who do not have clinically significant anxiety to adopt more problem focused strategies such as planning and using instrumental social support coping strategies as well as emotional-focused coping strategies such as positive reinterpretation and acceptance. We believe that the adoption of planning, using Instrumental social support, positive reinterpretation and acceptance coping strategies by medical students should be supported.

In this context, Guo et al. have conducted a study in Chi-

nese adults during the COVID-19 outbreak and stated that more using problem focused and cognitive coping behaviors could predict a reduction in mental health problems, cognitive coping behaviors should be restructured, and cognitive behavioral treatments could be promising.[21] Some studies have reported that problem-focused coping strategies could relieve the symptoms of post-traumatic stress, depression and insomnia, and emotional focused coping strategies could aggravate mental health symptoms.[21,43]

Consistent with our study, Zhu et al. have reported that the overall score for positive coping strategies of the frontline workers such as doctors and nurses are negatively correlated with the total anxiety and depression scores during the COVID-19 outbreak. The questionnaire they used in their study (The Simplified Coping Style Questionnaire (SCSQ)) was somewhat different from our questionnaire (The Brief COPE). Zhu et al. have suggested that a positive coping style was a protective factor against anxiety and depression and it could help people resist negative emotions.[22] Holz et al. have reported that exposure to constant stress will increase the levels of depression and anxiety in adults, especially women, but positive coping styles might be beneficial.[44]

This research was mainly conducted to determine the association between anxiety and coping strategies. However, a previous study has shown that negative emotions such as anxiety in the early stages of disasters can lead to post-traumatic stress disorder when left unattended. On the other hand, if early measures are taken with the help of coping strategies, it can be possible to protect the mental health.[45] Meanwhile, during the 2003 SARS outbreak, a study that has investigated the association between stress, coping strategies and adaptation experiences among university students has also made some suggestions for university counseling services.[24] As there is excessive and possibly misguided information on the Internet, students should be provided with correct information about where and how to find the useful resources. This will make finding valuable knowledge easier for individuals. To make the lives of students more exciting, online courses can be launched, and this can provide a forum for students to connect with each other. As some students may have irregular habits, it is also necessary to encourage them to quit these habits, as bad habits can also cause bad moods. Students with moderate or severe depression or anxiety should pay more attention by teachers and be provided with some relaxation platforms. One of the ways of relieving and relaxing is helping them solve problems they have encountered. However, if a student's symptoms are too serious to be resolved by the teacher, professional help and medical advice should be seeked.[17]

Due to the partial differences in scales of coping strategies and results, we think that more studies should be conducted during the epidemic period on students, especially on medical school students. We think that, especially in disasters and pandemics, in addition to individual rehabilitation, determining the coping strategies is an essential starting point for setting educational strategies and policies which might help the students' struggle against mental health problems.

Limitations

Our study has some limitations. This may have contributed to a selection bias, as participation in this survey was voluntary. In addition, we used a self-report survey to evaluate psychological symptoms that were not based on the diagnostic evaluation of mental health practitioners to reach as many participants as possible and reduce face-to-face contact. Sleep problems were determined using a likert-type scale instead of a structured interview. In addition, we would like to point out that we do not have data on the provinces or regions where the students are located as a limitation. Finally, as Elif Karaahmet et al. stated in their article, the measured anxiety levels may not be specific to the corona virus pandemic and may be etiologically related to other nonspecific anxiety sources. We would like to

express this situation as a limitation of our study.[46]

The results of this research, despite the above limitations, provide useful information on the psychological effects of COVID-19 on medical students in Turkey. First and foremost, our results will lead to the adoption of effective measures by health, education and policy authorities worldwide to minimize the psychological impact on students of the greatest pandemic of our time. We also recommend integrating 'training on coping with stress' into the medical school curriculum.

CONCLUSIONS

It is very important to ensure the mental well-being of medical school students, in order to sustainability of health services during our fight against outbreak and disasters in the future. Our findings show that women and younger medical students are in the increased risk group and should be monitored closely.

Concern about COVID-19, concern about infect COVID-19 to relatives, sleep problem, experiencing somatic symptoms and concern about educational process were highly significant more frequent in those with "significant clinical anxiety" than in those who did not, on the contrary, the frequency of receiving social support was significantly less. In addition, these participants were also more unwilling to work in health sector. The level of knowledge about COVID-19 was not associated with "clinically significant anxiety".

The ineffective coping strategies such as focus on and venting of emotions, substance use, behavioral disengagement, mental disengagement and problem-focused coping strategies such as suppression of competing activities, are considered predictors of clinically significant anxiety. In addition, we think that the students with "clinically significant anxiety" have adopted restraint coping more, one of the problem-focused coping strategies. On the contrary, those who did not have clinically significant anxiety have adopted problem-focused strategies more such as planning and using instrumental social support and emotional-oriented strategies such as positive reinterpretation and acceptance.

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Authors' Contributions

A.K., M.B.G.: conceptualization, data collection, and writing, statistical analysis, and writing; Z.K.: conceptualization, data collection, supervision, and writing

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Conflict of interest statement

The Authors declare that there is no confl ict of interest.

Ethics committee approval

The Declaration of Helsinki was complied with while conducting the research, and approval was obtained from the Non-Interventional Clinical Research Ethics Committee of İstanbul Medipol University, dated 28.04.2020 and numbered 10840098-604.01.01-E14679.

References

1. *World Health Organization: Coronavirus (COVID-19). 2020, April 4. (Accessed July 30, 2020). Available at: https://experience.arcgis.com/experience/685d0ace521648f8a5beeeee-1b9125c*
2. *DeLongis A, Folkman S, Lazarus RS. The impact of daily stress on health and mood: psychological and social resources as mediators. J Pers Soc Psychol. 1988;54(3):486-495. doi:10.1037//0022-3514.54.3.486*
3. *Kendler KS, Karkowski LM, Prescott CA. Stressful life events and major depression: risk period, long-term contextual threat, and diagnostic specificity. J Nerv Ment Dis. 1998;186(11):661-669. doi:10.1097/00005053-199811000-00001*
4. *Cheng C, Tang CS. The psychology behind the masks: Psychological responses to the severe acute respiratory syndrome outbreak in different regions. Asian J Soc Psychol. 2004;7(1):3-7. doi:10.1111/j.1467-839X.2004.00130.x*
5. *Leppin A, Aro AR. Risk perceptions related to SARS and avian influenza: theoretical foundations of current empirical research. Int J Behav Med. 2009;16(1):7-29. doi:10.1007/s12529-008-9002-8*
6. *Jeong H, Yim HW, Song YJ, Ki M, Min JA, Cho J, et al. Mental health status of people isolated due to Middle East Respiratory Syndrome. Epidemiol Health. 2016;38:e2016048. Published 2016 Nov 5. doi:10.4178/epih.e2016048*
7. *Pan X, Ojcius DM, Gao T, Li Z, Pan C, Pan C. Lessons learned from the 2019-nCoV epidemic on prevention of future infectious diseases. Microbes Infect. 2020;22(2):86-91. doi:10.1016/j.micinf.2020.02.004*
8. *Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern [published correction appears in Lancet. 2020 Jan 29;:]. Lancet. 2020;395(10223):470-473. doi:10.1016/S0140-6736(20)30185-9*
9. *Xiao C. A Novel Approach of Consultation on 2019 Novel Coronavirus (COVID-19)-Related Psychological and Mental Problems: Structured Letter Therapy. Psychiatry Investig. 2020;17(2):175-176. doi:10.30773/pi.2020.0047*
10. *Duan L, Zhu G. Psychological interventions for people affected by the COVID-19 epidemic. Lancet Psychiatry. 2020;7(4):300-302. doi:10.1016/S2215-0366(20)30073-0*
11. *Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak [published correction appears in Lancet Psychiatry. 2020 May;7(5):e27]. Lancet Psychiatry. 2020;7(4):e15-e16. doi:10.1016/S2215-0366(20)30078-X*
12. *Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry. 2020;29(6):749-758. doi:10.1007/s00787-020-01541-4*
13. *Wang C, Pan R, Wan X, Tan Y, Xu L, Ho C, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5):1729. Published 2020 Mar 6. doi:10.3390/ijerph17051729*
14. *Mei SL, Yu JX, He BW, Li JY, et al. Psychological investigation of university students in a university in Jilin province. Med Soc (Berkeley). 2011;24(05):84–86.*
15. *Cornine A. Reducing Nursing Student Anxiety in the Clinical Setting: An Integrative Review. Nurs Educ Perspect. 2020;41(4):229-234. doi:10.1097/01.NEP.0000000000000633*
16. *Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 2020;287:112934. doi:10.1016/j.psychres.2020.112934*
17. *Liu J, Zhu Q, Fan W, Makamure J, Zheng C, Wang J. Online Mental Health Survey in a Medical College in China During the COVID-19 Outbreak [published correction appears in Front Psychiatry. 2020 Aug 14;11:845]. Front Psychiatry. 2020;11:459. Published 2020 May 13. doi:10.3389/fpsyt.2020.00459*
18. *Lin Y, Hu Z, Alias H, Wong LP. Influence of Mass and Social Media on Psychobehavioral Responses Among Medical Students During the Downward Trend of COVID-19 in Fujian, China: Cross-Sectional Study. J Med Internet Res. 2020;22(7):e19982. Published 2020 Jul 20. doi:10.2196/19982*
19. *Johnson SU, Ulvenes PG, Øktedalen T, Hoffart A. Psychometric Properties of the General Anxiety Disorder 7-Item (GAD-7) Scale in a Heterogeneous Psychiatric Sample. Front Psychol. 2019;10:1713. Published 2019 Aug 6. doi:10.3389/fpsyg.2019.01713*
20. *Moreno E, Muñoz-Navarro R, Medrano LA, González-Blanch C, Ruiz-Rodríguez P, Limonero JT, et al. Factorial invariance of a computerized version of the GAD-7 across various demographic groups and over time in primary care patients. J Affect Disord. 2019;252:114-121. doi:10.1016/j.jad.2019.04.032*
21. *Guo J, Feng XL, Wang XH, van IJzendoorn MH. Coping with COVID-19: Exposure to COVID-19 and Negative Impact on Livelihood Predict Elevated Mental Health Problems in Chinese Adults. Int J Environ Res Public Health. 2020;17(11):3857. Published 2020 May 29. doi:10.3390/ijerph17113857*
22. *Zhu J, Sun L, Zhang L, Wang H, Fan A, Yang B, et al. Prevalence and Influencing Factors of Anxiety and Depression Symptoms in the First-Line Medical Staff Fighting Against COVID-19 in Gansu. Front Psychiatry. 2020;11:386. Published 2020 Apr 29. doi:10.3389/fpsyt.2020.00386*
23. *Wong TW, Yau JK, Chan CL, Kwong RS, Ho SM, Lau CC, et al. The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. Eur J Emerg Med. 2005;12(1):13-18. doi:10.1097/00063110-200502000-00005*
24. *Main A, Zhou Q, Ma Y, Luecken LJ, Liu X. Relations of SARS-related stressors and coping to Chinese college students' psychological adjustment during the 2003 Beijing SARS epidemic. J Couns Psychol. 2011;58(3):410-423. doi:10.1037/a0023632*
25. *Salman M, Asif N, Mustafa ZU, Khan TM, Shehzadi N, Tahir H, et al. Psychological Impairment and Coping Strategies during the COVID-19 Pandemic among Students in Pakistan: A Cross-Sectional Analysis [published online ahead of print, 2020 Oct 22]. Disaster Med Public Health Prep. 2020;1-22. doi:10.1017/dmp.2020.397*
26. *Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092-1097. doi:10.1001/archinte.166.10.1092*
27. *Konkan R, ŞENORMANCI Ö, Güçlü O, Aydin E, Sungur MZ, et al. Yaygın Anksiyete Bozukluğu-7 (YAB-7) Testi Türkçe Uyarlaması, Geçerlik ve Güvenirliği. Noro Psikiyatr Ars. 2013; 50(1). doi:10.4274/npa.y6308*
28. *Carver CS. You want to measure coping but your protocol's too long: consider the brief COPE. Int J Behav Med. 1997;4(1):92-100. doi:10.1207/s15327558ijbm0401_6*
29. *Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. J Pers Soc Psychol. 1989;56(2):267-283. doi:10.1037//0022-3514.56.2.267*
30. *Bacanli H, Surucu M, Ilhan T. An Investigation of Psychometric Properties of Coping Styles Scale Brief Form: A Study of Validity and Reliability. Educational Sciences: Theory and Practice. 2013;13(1):90-96.*
31. *Cellini N, Canale N, Mioni G, Costa S. Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. J Sleep Res. 2020;29(4):e13074. doi:10.1111/jsr.13074*
32. *Leung GM, Ho LM, Chan SK, Ho SY, Bacon-Shone J, Choy RY, et al. Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. Clin Infect Dis. 2005;40(12):1713-1720. doi:10.1086/429923*
33. *Sögüt S, Dolu İ, Cangöl E. The relationship between COVID-19 knowledge levels and anxiety states of midwifery students during the outbreak: A cross-sectional web-based survey [published online ahead of print, 2020 Jun 14]. Perspect Psychiatr Care. 2020;10.1111/ppc.12555. doi:10.1111/ppc.12555*
34. *Naser AY, Dahmash EZ, Al-Rousan R, Alwafi H, Alrawashdeh HM, Ghoul I, et al. Mental health status of the general population, healthcare professionals, and university students during 2019 coronavirus disease outbreak in Jordan: A cross-sectional study. Brain Behav. 2020;10(8):e01730. doi:10.1002/brb3.1730*
35. *Temsah MH, Al-Sohime F, Alamro N, Al-Eyadhy A, Al-Hasan K, Jamal A., et al. The psychological impact of COVID-19 pandemic on health care workers in a MERS-CoV endemic country [published correction appears in J Infect Public Health. 2020 Oct;13(10):1599]. J Infect Public Health. 2020;13(6):877-882. doi:10.1016/j.jiph.2020.05.021*
36. *Fu W, Wang C, Zou L, Guo Y, Lu Z, Yan S, et al. Psychological health, sleep quality, and coping styles to stress facing the COVID-19 in Wuhan, China. Transl Psychiatry. 2020;10(1):225. Published 2020 Jul 9. doi:10.1038/s41398-020-00913-3*
37. *Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of Insomnia and Related Social Psychological Factors Among Medical Staff Involved in the 2019 Novel Coronavirus Disease Outbreak. Front Psychiatry. 2020;11:306. Published 2020 Apr 14. doi:10.3389/fpsyt.2020.00306*
38. *Kirwan M, Pickett SM, Jarrett NL. Emotion regulation as a moderator between anxiety symptoms and insomnia symptom severity. Psychiatry Res. 2017;254:40-47. doi:10.1016/j.psychres.2017.04.028*
39. *Yin-xia, B. A. I., GEGENTUYA, H., Hu, L. I. U., Zhen-Hua W, Wen-Rui W, Zhi-Gang NG. Correlation Between Psychological Changes of The Community Cro wd and The Social Support in Grave Public Health Event [J]. Nei Moivgol Medical Journal. 2005;4.*
40. *Peng L, Zhang J, Li M, Li P, Zhang Y, Zuo X,et al. Negative life events and mental health of Chinese medical students: the effect of resilience, personality and social support. Psychiatry Res. 2012;196(1):138-141. doi:10.1016/j.psychres.2011.12.006*

41. Bai Y, Lin CC, Lin CY, Chen JY, Chue CM, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. Psychiatr Serv. 2004;55(9):1055-1057. doi:10.1176/appi.ps.55.9.1055

42. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res. 2020;288:112954. doi:10.1016/j.psychres.2020.112954

43. Snyder CM, Fauth E, Wanzek J, Piercy KW, Norton MC, Corcoran C, et al. Dementia caregivers' coping strategies and their relationship to health and well-being: the Cache County Study. Aging Ment Health. 2015;19(5):390-399. doi:10.1080/13607863.2014.939610

44. Holz NE, Boecker R, Jennen-Steinmetz C, Buchmann AF, Blomeyer D, Baumeister S, et al. Positive coping styles and perigenual ACC volume: two related mechanisms for conferring resilience?. Soc Cogn Affect Neurosci. 2016;11(5):813-820. doi:10.1093/scan/nsw005

45. Adams RE, Boscarino JA, Galea S. Social and psychological resources and health outcomes after the World Trade Center disaster. Soc Sci Med. 2006;62(1):176-188. doi:10.1016/j.socscimed.2005.05.008

46. Karaahmet E, Angın Ü, Yılmaz O, Deniz D, Konuk N. Assessment of psychometric characteristics of the Coronavirus Anxiety Scale in patients with preexisting psychiatric disorders. Death Stud. 2022;46(3):569-573. doi:10.1080/07481187.2021.1876184