

An Analysis of the Psychosocial Challenges Faced by the University Students During COVID-19 Pandemic, and the Students' Knowledge, Attitudes, and Practices Toward the Disease

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ABSTRACT

Introduction: The aims of the present study were 1) to identify the major psychosocial challenges faced by students of a university in Istanbul, during the initial period of the COVID-19 outbreak, 2) to assess how these interacted with their level of knowledge, attitudes, and practices toward COVID-19 and the related health measures in place.

Methods: As part of an international research, a total of 2583 university students from Istanbul participated in an online survey, which included questions in several domains including their studies and daily life before and after the outbreak, their concerns and worries about the pandemic, their level of knowledge on COVID-19, their views on the policies implemented by the government and their institution, their attitude and practices toward the protective measures.

Results: Majority of the students reported to suffer from financial adversities due to the outbreak. The closure of residential facilities and the cancellation of face-to-face lectures resulted in the vast majority of

the students moving back to their family home. Their daily routines were largely replaced by individual home activities, and social interactions shifted almost totally to digital platforms. They also reported high levels of anxiety and worries concerning a wide range of the possible detrimental outcomes of COVID-19, which were in close association with their knowledge, attitudes, and practices towards the disease, as well as their adherence to the policy measures and their satisfaction with the policies of the government.

Conclusion: These results may help policymakers in better understanding the psychosocial impacts of COVID-19 on the life of university students, and to develop more comprehensive strategies to address their multifaceted struggles, as well as to improve their compliance with the health measures in the future.

Keywords: COVID-19, university students, psychosocial, knowledge, attitude, practice

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has caused the implementation of unprecedented measures in many countries including Turkey. The impact of the outbreak has been most severe in Istanbul, the most populated city of the country with more than sixteen million residents, so that more than half of the total cases and the deaths from COVID-19 in Turkey were reported from Istanbul alone by the first week of July 2020. During the initial phase of the outbreak in particular, the shortage of masks and health equipment, as well as the fundamental lack of knowledge about COVID-19 as a novel disease, has induced anxiety, feelings of helplessness and fear of stigmatization among the community.

While the pandemic has made profound impacts on the lives of the residents of the city, university students in Istanbul have been likely to be affected in a unique way, which deserves to be addressed with further attention. One major reason is that, aside from the substantial changes in their life circumstances, students experienced additional distress due to the unpredictability of how and which measures would be implemented concerning the educational context in the near future. On March 12th, it was first announced that the universities would remain closed for the following three-weeks. On March 26th, the in-person teaching was suspended until the end of the semester, with the decision to organize the

lectures online. Students' shared facilities were then completely closed, resulting in thousands of students moving back next to their families, or stay isolated in their accommodations. Finally, the updating of the curfew restrictions on April 3rd, to involve people younger than 20 years old caused further turmoil among the youth. On top of the COVID-19 related health concerns and the distress caused by the quarantine, the majority of the university students also suffered from sudden and radical changes in their everyday life; some lost their jobs, while others had to move to their hometown, or even leave their school life totally behind.

Only a handful of studies having examined the impact of the COVID-19 on this particular subpopulation, their scopes were mostly limited to the assessment of the immediate psychological outcomes of the outbreak (general anxiety, depression, post-traumatic stress disorder, etc.) by means of self-reported questionnaires (1-4). However, further elaboration is strongly needed for a better understanding of the underlying psychosocial dynamics of these outcomes, including the characteristics of the changes in students' life circumstances, their health-related concerns about the pandemic, their understanding of the disease, and their views on the policies implemented by the governments and their higher education institutions.

In this research, we first examined how the living conditions (academic life and daily routines) of higher-education students in Istanbul changed during the initial phase of COVID-19 outbreak. Second, we attempted to evaluate students' concerns and worries about different aspects of the pandemic (fear of infection, collapse of the health system, frustration, inadequate information, etc.) and explore how these related to their knowledge, attitudes, and practices (KAP) toward COVID-19 during the initial phase of the outbreak.

METHODS

Setting and Participants

The present study has been conducted on university students from Istanbul, as part of the COVID-19 International Student Well-Being Study (C19 ISWS). C19 ISWS is the result of a study design, study protocol and questionnaire developed by the team of the University of Antwerp, Belgium (Prof. Sarah Van de Velde, Dr. Veerly Buffel and Prof. Edwin Wouters). The online questionnaire was translated into Turkish, and mailed to the students of Marmara University (one of the oldest higher education institutions in Istanbul, with around sixty-thousand students enrolled in different fields of study) via university media. Qualtrics software was used to collect data from the anonymous responders, within a three weeks' period (between May 15-June 5, 2020). The total number of participants was 2583, which consisted of students from various fields of study. The international study protocol of C19 ISWS, and the local study protocol were approved by the ethical committees of the University of Antwerp, and Marmara University respectively.

Procedure

Participants were required to give online informed consent to proceed to the survey. Once they began, they were free to leave at any point, just by closing the browser window. They were required to respond to each question on the display to proceed with the next item. The number of available answers differed between items due to the conditional questions in the survey, and the participants who left without completing the whole questionnaire.

Materials

Developed by the University of Antwerp research team, the questionnaire consisted of 43 items, which collected information within seven areas of interest, including 1) sociodemographic characteristics, 2) information about studies, 3) daily life before and after COVID-19, 4) COVID-19 symptoms, concerns and worries, 5) stressors, support systems, and well-being, 6) student specific questions, 7) knowledge of COVID-19 and sources of information (data within the scope of our research questions were used in the current study). Some of the items consisted of scales with composite scores (e.g. COVID-19 knowledge questionnaire), while some others were to be self-rated on a scale between 0-10 (e.g. level of worry about getting severely ill, perceived risk of getting infected, etc.). A supplementary item designed by the Turkish research team, which assessed changes in students' daily routines (time spent using social media, performing religious rituals, playing electronic games, reading other than textbooks, and watching TV) during the pandemic, was also added at the end of the questionnaire.

COVID-19 Knowledge Questionnaire

The questionnaire consisted of eight items which served to assess the students' level of general knowledge of COVID-19. Likert options were 1 (true), 2 (false) and 3 (I don't know), with a total number of correct answers indicating higher levels of knowledge of the disease.

Data Analysis

The UGent / UAntwerp research team completed the initial processing of

the international data acquired from various countries across the world, and ensured full anonymization before sharing them with the international partners. In the present work, data from Marmara University were analyzed using SPSS (version 24.0). Kolmogorov-Smirnov and Shapiro-Wilk were used to assess normal distribution. For the comparison of two independent groups, Pearson's chi-square test was used for categorical variables, and Student's t-test or the Mann-Whitney U test were used for continuous variables. Kruskal-Wallis or the one-way ANOVA were used for the comparison of three or more groups. Related samples were compared using paired Student's t-test or the Wilcoxon signed-rank test. Correlational analyses were performed to assess bivariate associations between variables of interest.

RESULTS

Sociodemographic Characteristics

The socio-demographic characteristics of the study sample (n=2583) are shown in Table 1. Accordingly, around two thirds of the participants were female (65.5%) and the mean age of the sample was 22.84±4.79. About three-fourths of the sample consisted of students from the fields of health (15.4%), engineering (15.2%), social and behavioral sciences (15%), business and administration (14%), and education (13.6%). 98.8% of the students were citizens of Turkey or permanent residents (96.7% were born in Turkey). Among 32 students who were enrolled as temporary residents, 6 reported to have moved back to their home country since the first implementation of COVID-19 measures.

Table 1. Demographic characteristics of the participants (n=2583)

		Number of participants (n)	Percentage (%)
Gender	Male	875	33.9
	Female	1691	65.5
	x	17	0.6
Age	18-20	806	31
	21-23	1119	43
	24-26	350	14
	27-30	141	5.5
	>30	167	6.5
Field of study	Health	397	15.4
	Engineering	392	15.2
	Social and behavioural sciences	388	15
	Business and administration	361	14
	Education	350	13.6
	Other	695	26.8
Program	Bachelor	2047	79.2
	Master	243	9.4
	Doctoral	111	4.3
	Associate	167	6.5
	Other	15	0.6
Country of birth	Turkey	2499	96.7
	Other	84	3.3

Change in Life Circumstances and Daily Activities During Covid-19 Outbreak

The changes in the participants' life circumstances and daily routines due to COVID-19 outbreak are summarized in Table 2. Accordingly, the COVID-19 outbreak seemed to have a significant impact on the overall residential profile of the students ($p < 0.001$), with a significant increase

Table 2. COVID-19 related changes in students' life circumstances, school-related and daily routines

		Before COVID-19	During COVID-19	Statistics	p value
With how many persons did you live together (excluding weekends and holidays)?	Mean ± SD	2.85±1.79	3.26±1.62	-12.29 ^a	<0.001
Where did you mainly live (excluding weekends and holidays)?	With parents	46.2%	84.6%	-22.19 ^a	<0.001
	Student hall	16.6%	0.5%		
	Accommodation with others	17.7%	4.6%		
	Accommodation by him/herself	9%	3.5%		
	Other	10.4%	6.8%		
'I had sufficient financial resources to cover my monthly costs'	Strongly agree	28.6%	22.8%	-15.97 ^a	<0.001
	Agree	39.5%	30.5%		
	Neither agree nor disagree	18.1%	18.5%		
	Disagree	9.2%	17.6%		
	Strongly disagree	4.6%	10.6%		
How many hours did you spent in offline courses, online courses, personal study, and paid jobs?	Offline courses (M ± SD)	15.37±17.54	2.69±7.92	-28.39 ^a	<0.001
	Online courses (M ± SD)	3.1±10.14	8.26±10.51	-22.95 ^a	<0.001
	Personal study time (M ± SD)	11.01±18.25	11.06±15.07	-2.4 ^a	0.016
	Paid jobs (M ± SD)	7.31±14.83	3.18±10.81	-12.56 ^a	<0.001
Did you have more or less contact with family since the implementation of COVID measures?	More		49.2%		
	About the same		32.7%		
	Less		18.1%		
Did you have more or less contact with friends since the implementation of COVID measures?*	More		14.7%		
	About the same		18.8%		
	Less		66.5%		
Did you spent more or less time reading other than textbooks since the implementation of COVID measures?*	More		44.1%		
	About the same		29%		
	Less		26.9%		
Did you spent more or less time performing religious rituals?*	More		30.7%		
	About the same		49.1%		
	Less		20.3%		
Did you spent more or less time playing electronic games (PC, console, etc.)?*	More		51.7%		
	About the same		31.8%		
	Less		16.6%		
Did you spent more or less time using social media?*	More		73.1%		
	About the same		18.6%		
	Less		8.3%		
Did you spent more or less time watching TV, series or movies?*	More		76.8%		
	About the same		15.3%		
	Less		7.8%		

^aWilcoxon Signed Ranks Test, *Unavailable responses ("prefer not to say", "not applicable", etc.) were excluded from the analyses.

in the rate of those who lived with their parents (from 46.2% to 84.6%), as well as a nearly total discharge of the students (>97%) from student halls. The mean number of people one lived with (household population) during COVID-19 (3.26±1.62) was also found to be greater compared to the pre-pandemic period (2.85±1.79), with the increase being statistically significant ($p<0.001$).

Students' subjective evaluation on having sufficient financial resources to cover their monthly costs deteriorated significantly during COVID-19 outbreak, compared to the pre-pandemic period ($p<0.001$). Related samples analyses also revealed that, on a weekly basis, students spent significantly less time in offline courses (total duration decreased from 15.37±17.54, median=12, to 2.69±7.92 hours, median=0, $p<0.001$) and significantly more time in online courses (increased from 3.1±10.14, median=0, to 8.26±10.51 hours, median=6, $p<0.001$). Average duration for personal studies did not differ (11.01±18.25, median=6 vs. 11.06±15.07 hours, median=6, $p=.016$) whereas time spent in paid jobs significantly decreased during the pandemic (7.31±14.83, median=0, to 3.18±10.81 hours, median=0, $p<0.001$).

As for their daily routines during the pandemic, 49.2% of the students reported to have spent more time with their families, while 66.5% of them had spent less time with their friends. 44.1% of the students reported to spend more time reading other than textbooks. 30.7% of the students spent more time performing religious rituals. 51.7% of the students reported to engage more with electronic games (PC, console, etc.), whereas 73.1% of them spent more time using social media (Facebook, Instagram, etc.). Finally, 76.8% of the students declared spending more time watching TV, series or movies (Table 2).

COVID-19 Diagnosis, Symptoms, Perceived Worries

Among 826 students (40.6%) who thought to have experienced symptoms such as coughing, sneezing, or a runny nose during the last month, 161 (19.5%) reported to have tried to hide these symptoms from other people on several occasions. A total of 29 students reported to have been diagnosed with COVID-19 (either confirmed by test or told by a healthcare provider). Measured on a scale between 0–10, the subjective perception on the possibility to get infected (or re-infected

Table 3. Gender differences in students' level of COVID-19 knowledge, adherence to measures and disease related worries

It	Range	Overall (Mean ± SD)	Females (Mean ± SD)	Males (Mean ± SD)	Statistics	p value
Level of COVID-19 knowledge	*	5.90±1.26	5.95±1.19	5.78±1.36	-1.78 ^a	0.074
Degree of adherence to the COVID-19 measures of the government	**	8.94±1.55	9.08±1.49	8.68±1.65	-6.91 ^a	<0.001
Perceived risk of getting (re) infected by COVID-19	**	3.68±2.44	3.74±2.40	3.56±2.52	-2.02 ^a	0.043
Level of worry of getting (re) infected by COVID-19	**	5.46±3.12	5.79±3.07	4.8±3.11	-6.67 ^a	<0.001
Level of worry of getting severely ill by COVID-19	**	4.69±3.29	5.12±3.3	3.83±3.14	-8.33 ^a	<0.001
Level of worry about an acquaintance to get infected by COVID-19	**	7.69±2.76	7.94±2.65	7.22±2.92	-5.75 ^a	<0.001
Level of worry about an acquaintance to get severely ill from a COVID-19 infection	**	7.58±2.9	7.86±2.78	7.04±3.08	-6.38 ^a	<0.001
Level of worry about a probable failure of the health system during COVID-19	**	5.38±3.43	5.74±3.38	4.64±3.45	-6.71 ^a	<0.001

*Range between 0-8, **between 0-10, ^aMann-Whitney U test

for those who had been diagnosed with COVID-19) were significantly higher for students who already received a diagnosis, compared to those who did not, with mean scores of 4.86±3.58 (median=4) and 3.67±2.42 (median=3), respectively ($p=.009$). On the other hand, the level of worry about getting re-infected/infected (5.68±3.61 vs 5.45±3.11; median=5 for both) and the worry about getting severely ill from re-infection/infection (4.65±4.15 vs 4.69±3.28; median=5 for both) did not significantly differ between the groups ($p=.68$ and $p=.95$ respectively).

Mean values for the students' reported levels of worry concerning an acquaintance (anyone from their personal network) to be infected with COVID-19 or to get severely ill from a COVID-19 infection, was 7.69±2.76 (median=9) and 7.58±2.9 (median=9) respectively. Students' mean score of worry about a probable failure of hospitals to provide sufficient medical supplies to handle the COVID-19 outbreak was 5.38±3.43 (median=5).

Students' Knowledge, Attitude, and Practices (KAP) Toward COVID-19

Measured on a scale between 0-8, mean scores for the students' level of knowledge of COVID-19 were 5.95±1.19 for the females, 5.78±1.36 for the males, and 5.90±1.26 (median=6) for the whole sample (Table 3). Again, on a scale between 0-10, mean scores for the students' reported degree of adherence to the COVID-19 measures implemented by the government, were 9.08±1.49 for the females, 8.68±1.65 for the males ($p<0.001$), and

8.94±1.55 (median=10) for the whole sample. Finally, regarding the gender differences, females reported significantly higher levels of worry in all domains, compared to their male counterparts ($p<0.001$).

Students' Perspective on Their Institution's and the Government's Reaction to COVID-19

53.3% of the students (the sum of those who strongly agree and agree) believed that the government provided information concerning the COVID-19 outbreak on time, whereas 24.8% (the sum of those who disagree and strongly disagree) thought the opposite (Table 4). Similarly, 61.4% of the students were convinced that the government provided comprehensive information concerning the COVID-19 outbreak, while 18.1% were not. Concerning their view on the policy of their institution, 53% of the students thought that they were sufficiently informed about the changes to be implemented due to COVID-19, while 26% believed the opposite. Finally, 65.3% reported to be satisfied with the way their institution had implemented protective measures, whereas 10% of them were dissatisfied (Table 4).

Correlations Between Students' Concerns About the Outbreak, and KAP Toward COVID-19 and the Policies in Place

The level of worry of being (re) infected by COVID-19, the level of worry of getting severely ill from a (re) infection, the perceived risk of getting (re) infected, the level of worry about a relative (someone from the personal network) to be infected or get severely ill, and the level of worry about

Table 4. Students' perspective on their institution's and the government's reaction to COVID-19

		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Satisfaction concerning the higher education institution's reaction to COVID-19 (n=1943)	The university/college has sufficiently informed me about the changes that were implemented due to the COVID-19 outbreak.	16.8%	36.2%	21%	15.5%	10.5%
	I am satisfied with the way my university/college has implemented protective measures concerning the COVID-19 outbreak.	23.4%	41.9%	24.7%	6%	4%
Satisfaction concerning the government's reaction to COVID-19 (n=1925)	The government provided information concerning the COVID-19 outbreak on time	20.3%	33%	22%	15%	9.8%
	The government provided comprehensive information concerning the COVID-19 outbreak	22.4%	39%	20.4%	11.6%	6.5%

Table 5. Correlations between changes in students' life circumstances, disease related concerns, and their knowledge, attitudes and practices towards COVID-19

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Level of financial adversities during COVID-19	-														
2. Number of people one lived with (before COVID-19)	0.033	-													
3. Number of people one lived with (during COVID-19)	0.057*	0.552**	-												
4. Actual or past infection by COVID-19	-0.023	-0.032	-0.019	-											
5. Perceived risk of getting (re) infected by COVID-19	0.015	-0.023	-0.035	-0.033	-										
6. Level of worry of getting (re) infected by COVID-19	0.048*	-0.013	-0.016	-0.010	0.278**	-									
7. Level of worry of getting severely ill	0.058**	-0.023	-0.042	0.007	0.265**	0.674**	-								
8. Level of worry about an acquaintance to get infected by COVID-19	0.071**	-0.003	0.008	0.019	0.249**	0.578**	0.448**	-							
9. Level of worry about an acquaintance to get severely ill	0.056*	-0.024	-0.002	0.005	0.221**	0.502**	0.490**	0.772**	-						
10. Level of worry about a probable failure of the health system	0.108**	-0.103**	-0.078**	-0.021	0.153**	0.353**	0.344**	0.353**	0.332**	-					
11. Having an acquaintance with a history of COVID-19 infection	-0.024	-0.073**	-0.042	0.128**	-0.113**	-0.029	-0.031	-0.059**	-0.035	0.003	-				
12. Degree of adherence to the measures of the government	-0.022	0.022	-0.009	0.004	-0.052*	0.161**	0.102**	0.129**	0.135**	0.041	0.040	-			
13. Level of COVID-19 knowledge	-0.031	-0.010	0.016	0.006	0.084**	0.075**	0.039	0.057*	0.060**	0.037	-0.014	0.009	-		
14. Dissatisfaction concerning the timeliness of the information provided by the government	0.075**	-0.164**	-0.150**	0.043	0.069**	0.076**	0.059**	0.081**	0.074**	0.341**	0.003	-0.026	-0.044	-	
15. Dissatisfaction concerning the comprehensiveness of the information provided by the government	0.110**	-0.159**	-0.134**	0.035	0.059**	0.062**	0.046*	0.035	0.038	0.321**	0.030	-0.074**	-0.062**	0.727**	-

Significant correlations are shown in bold font. *p<0.05 and **p<0.01

a probable failure of the health system to provide sufficient supplies to handle COVID-19 outbreak, were all positively inter-correlated (Table 5).

The level of knowledge on COVID-19 was positively correlated with the perceived risk of getting (re) infected by COVID-19 and the levels of worry about health issues in general (except the worry of getting severely ill from an infection). The overall levels of worry about the disease, but not the level of knowledge on COVID-19, were positively correlated with

the level of adherence to the government's measures. Finally, the overall levels of worry and the perceived risk of (re) infection were all positively correlated with the participants' discontentment with the timeliness and the comprehensiveness of the information provided by the government. To put it another way, students dissatisfied with the government's reaction to the pandemic were more likely to experience higher levels of worry concerning the potentially detrimental outcomes of COVID-19, and tended to more strictly adhere to the protective measures in place.

DISCUSSION

This study had two main objectives: 1) to define the radical changes in the living conditions (academic life and daily routines) of university students in Istanbul, during the initial period of the COVID-19 outbreak, 2) to shed light on their concerns and worries about the immediate outcomes of the pandemic, with an emphasis on how these interacted with their level of knowledge and attitudes toward COVID-19 and the related health measures in place.

Changes in Students' Life Circumstances During COVID-19

First of all, our findings pointed out that there has been a significant deterioration in the university students' financial status, compared to the pre-pandemic period. One possible reason for this is the sudden increase in the unemployment rates, which in turn, was most likely due to the unpredicted closure of workplaces and curfew restrictions in the context of COVID-19 measures. This was also supported by the significant decrease in the time spent for paid jobs reported by the students. In line with these findings, a recent report of International Labor Organization (2020a) concerning the impact of the COVID-19 crisis pointed out that the youth were the ones who were most affected by the massive job losses and growing precarity of work during the outbreak (5). On the other hand, the financial deterioration may also be in part related to the parents' unemployment, or to the decline in their monthly income, given that most students largely depend on their families concerning financial issues.

Concerning the residential profile of the students, our findings, not surprisingly, indicated a significant increase in their rate of living with parents and the level of contact with their families during the outbreak. Similarly, the number of persons one lived with (household population) during COVID-19 was also found to have significantly increased. This pattern could not be solely accounted for by the forced evacuation of student halls, given that the rates of those who lived in student accommodations with others or by themselves were also found to have substantially decreased. Considering the positive correlation between the household population during the outbreak and the level of financial adversities, it may be speculated that the students who were more severely affected by the immediate economic outcomes of the outbreak, were more likely to abandon their actual accommodations and get back to their family home, because they were simply not able to afford the basic expenses of 'staying away from the nest'. Moreover, due to the cancellation of face-to-face classes, and the implementation of online courses, living away from the family home may have become more than luxury for many students. As expected, students reported to have spent significantly more time for home/indoor activities including reading, playing electronic games, using social media, watching TV and performing religious activities, while their contact with their friends showed a substantial decrease during the outbreak. Unfortunately, their personal study time had not increased as compensation.

COVID-19 Related Worries

In their model of the psychological experiences during the COVID-19 pandemic, Schimmenti et al. (2020) proposed four interrelated fear domains: 1) fear for the body, 2) fear for significant others, 3) fear of not knowing, and 4) fear of inaction (6). In parallel with this model, our findings pointed out that the students experienced considerable levels of worry concerning the possible outcomes of a COVID-19 infection, with mean scores greater than 5 out of 10. Moreover, the perceived risk of getting (re) infected by COVID-19 was found to be significantly higher for those who already received a diagnosis. This may imply that the virus has been transmitted more easily than expected, resulting in an additional state of vigilance among the infected. Females reported significantly higher scores in all domains of worries, which is in line with the literature

on gender differences concerning the psychological response to stressful life events (7-9). Similarly, two recent online studies (one conducted on a population sample, the other on Swiss university students) identified female gender among the risk factors for anxiety during COVID-19 (10, 11). The latter study also reported that the rate of moderate to severe anxiety was significantly higher among university students who experienced a strong impact of COVID-19 on their daily life, compared to those who were affected by the pandemic at a low or moderate level.

Another interesting finding was that, among those who recently experienced non-specific symptoms such as coughing and a runny nose, one fifth tried to hide these from others, pointing out to a possible fear of stigmatization related to the disease. Stigmatization has always been important in the context of outbreaks, and should be carefully addressed given that it may trigger feelings of fear and criticism against those with a suspected infection. In some cases, these may result in social rejection and even violence against particular sub-groups, which may in turn hinder people from seeking medical care (12). It is thus a public health priority to fight against misinformation and other factors that may lead to stigmatization and discrimination toward infected individuals and vulnerable groups (13).

We also found it noteworthy that, the clinical manifestation of the COVID-19 being indistinguishable from the common cold and the flu in many cases, even nonspecific mild symptoms seemed to have triggered higher levels of arousal among the students. It is well evidenced that, in the context of a pandemic, people with higher levels of health anxiety are more likely to misinterpret nonspecific symptoms and bodily sensations as a sign of infection, which may result in further panic and a series of maladaptive health-related behaviors (14). For example, higher health anxiety was associated with greater levels of fear for the Swine flu pandemic (15), as well as the Zika virus outbreak, among the university students (16). Similarly, Mertens et al. (2020) reported that health anxiety was among the predictors for increased fear of COVID-19 (17).

Our findings also demonstrated that the students' levels of anxiety concerning the possible infection/or severe illness of an acquaintance were significantly greater than the concerns of getting individually infected. From this view, it can be claimed that the students' worries about COVID-19 were rather "altruistic" in nature, that is, they were not limited to preoccupations about one's own health but consisted more of the concerns about the survival or welfare of the loved ones (18). This pattern is most likely due to the higher mortality and morbidity rates reported in the elderly as well as the highly contagious profile of the virus, which may have triggered fears of transmitting the infection to family members, relatives or acquaintances. This kind of "altruistic" anxiety is also commonly stressed concerning the healthcare workers who are involved in the treatment of patients with COVID-19, where fears of infecting others are at least as prominent as fears of being personally infected (19).

Another finding of our study was the considerably high levels of worry concerning the probable failure of the health system to provide sufficient medical supplies to handle the COVID-19, with females' scores being significantly greater than males'. This concern should not be deemed unreasonable, given that the data were collected during the initial period of the outbreak, at a time of chaos when the shortage of supplies ranging from masks and hand sanitizers to more sophisticated equipment such as mechanical ventilators was most prominent. Moreover, the forced and sudden evacuation of the dormitories, where thousands of people would subsequently be taken into quarantine, may have exacerbated feelings of helplessness and vulnerability, leading the way to a catastrophic thinking pattern among the university students.

COVID-19 Knowledge, Information and Adherence to Health Measures

Our findings showed that, with a mean of 5.9 ± 1.25 out of 8, the students' level of knowledge on COVID-19 was hardly satisfactory. Considering the relatively high levels of knowledge and awareness of global events attributed to university students in general, we suggest that this discrepancy was most likely due to the universal lack of knowledge and understanding about COVID-19, during the initial phase of the outbreak in particular. In a recent study that was carried out among Italian undergraduates, being female, attending life sciences, and knowing someone with a history of COVID-19 infection were reported as factors associated with higher levels of knowledge about the pandemic (20).

In our study, level of knowledge was positively, although weakly, correlated with the COVID-19 related worries; i. e. those with higher levels of knowledge about the disease tended to be more concerned about the negative outcomes of a possible infection. This result is consistent with higher expectancy to get re-infected of those who already had a COVID-19 diagnosis, in terms of pointing out that the lack of knowledge and experience about the disease may have resulted in the underestimation of its possibly detrimental impacts. Research on previous outbreaks such as the H5N1 influenza, showed that increased exposure to threat information was related to greater levels of fear of infection (21). Similarly, seeking information about the corona virus was also found to be associated with higher levels of fear of COVID-19 in a recent study (17). The pattern of interaction between the COVID-19 knowledge and the level of exposure to disease related information seems therefore to be related with substantially different psychological and behavioural outcomes.

Our findings indicated that the students have strictly adhered to the government's COVID-19 measures in general. Once again, the level of adherence was significantly higher for female students, and was positively correlated with the perceived risk of getting infected, as well as the levels of worry concerning the outcomes of one's or significant others' infection with COVID-19. This is in line with the findings of a previous study, which reported that individuals with lower perceived risk of infection were less likely to wash their hands and to seek vaccination during the H1N1 influenza pandemic (14, 22). Finally, we found no significant relation between the level of COVID-19 knowledge and the degree of adherence to the health measures in place, whereas higher level of knowledge was found to be significantly associated with female gender, as well as positive attitudes, and preventive practices towards COVID-19 among Chinese residents in a recent study (23). Taken together, our results suggest that the students with higher levels of arousal, but not necessarily higher knowledge about COVID-19, tended to exhibit higher adherence to the protective measures in place.

Students' Perceptions on the Government's and Their Institution's Policy Measures

Majority of the students in our study believed that the government provided information concerning the COVID-19 outbreak on time. Most of them were also convinced that the government provided comprehensive information concerning the COVID-19 outbreak. Similarly, more than half of the students thought that they were sufficiently informed by their institution concerning the changes due to COVID-19 outbreak, whereas the vast majority were satisfied with the way their college had implemented the protective measures. The levels of worry concerning the outcomes of COVID-19 infection, the perceived risk of getting infected and the worry about a probable failure of the health system were all negatively correlated with the levels of satisfaction with the government's policies in response to COVID-19 during the period of interest. That is, those who were not content with the government's overall reaction to the pandemic, were also likely to be more concerned and distressed about the possible outcomes of COVID-19.

A recent survey that assessed public views concerning the COVID-19 measures implemented by policymakers among samples from seven European countries reported that, although citizens were overall satisfied with their government's reaction to the pandemic, the level of conviction differed across the countries and the policies (24). It is without doubt that, during the COVID-19 pandemic, gaining the trust of university students' will be of paramount importance for the policymakers (the governments, the higher education institutions, etc.) as for many other sub-populations. Policymakers are therefore needed to identify the possible reasons for the diversity in the students' satisfaction concerning the implemented policies, and address their concerns convincingly in order to ensure high compliance with the COVID-19 measures in the future.

The findings of our study should be considered within its strengths and methodological limitations. One strength is the chronological significance, given that the data were collected during the initial phase of the outbreak, in a chaotic period where the COVID-19 measures concerning university students were implemented in the strictest and dramatical ways across the country. Another strength is that, unlike previous studies on this particular sub-population, the scope of our work was not limited to the direct assessment of the psychological outcomes, but extended to a more elaborate and qualitative evaluation of the students' underlying psychosocial dynamics and subjective experiences. On the other hand, the cross-sectional design of our study precluded the possibility of a more objective comparison with the pre-pandemic profiles of the students. Moreover, although the sample size was considerably large and heterogeneous in terms of the fields of study, the participants were all from the same higher education institution, implying that the results may not be generalizable to all the university students in Istanbul.

CONCLUSION

In sum, our findings revealed that the majority of the university students in Istanbul experienced substantial changes in their life circumstances during the initial phase of the outbreak. Many suffered from financial difficulties due to overall economic impacts of the COVID-19 measures. The closure of residential facilities, the increased burden of living apart from the family, and the government's decision to resume the rest of the semester with online courses resulted in the vast majority of the students moving back to their family home with more densely populated households. Their daily routines were largely replaced by individual home activities and social interactions shifted almost totally to digital platforms. Our findings also pointed out that the students experienced considerably high levels of anxiety and worry concerning a wide range of the potentially detrimental outcomes of COVID-19. These concerns were in close association with their level of COVID-19 knowledge, their attitude toward the disease, their adherence to the health measures and their satisfaction with the policies of the government. These results may be helpful for the policymakers and higher education institutions in better understanding the psychosocial impacts of COVID-19 on the life of university students, and to develop more comprehensive strategies to address their multifaceted struggles, as well as to improve their knowledge and compliance with the health measures in the days to come. Finally, bearing in mind that the overall picture provided by the current findings are specific to the initial phase of the outbreak and the impacts of the pandemic are becoming increasingly devastating, it can be anticipated that the university students' agenda (daily struggles, views and concerns) may undergo dramatic changes over time, which should be addressed by follow-up studies in the near future.

Committee Approval: The international study protocol of C19 ISWS, and the local study protocol were approved by the ethical committees of the University of Antwerp, and Marmara University respectively.

Informed Consent: Participants were required to give online informed consent to proceed to the survey. Once they began, they were free to leave at any point, just by closing the browser window.

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