

Impact of COVID-19 on the Life of Higher-Education Students in İstanbul: Relationship Between Social Support, Health-Risk Behaviors, and Mental/Academic Well-Being

ABSTRACT

Objective: This study aimed to draw a general picture of the impact of the coronavirus disease 2019 (COVID-19) pandemic on the life of higher-education students in İstanbul, with specific emphasis on the relationship between students' social support systems, health-risk behaviors, and mental/academic well-being.

Methods: A total of 2583 higher-education students from different fields of study participated in an online survey gathering information from several domains, including available social networks, support-seeking attitudes, substance use patterns, physical activity levels, academic stress, academic satisfaction, and psychological well-being during the pandemic.

Results: Our findings pointed to major changes in students' life circumstances and daily routines during COVID-19, including a significant decrease in contact with friends, overall substance use, and physical activity as well as high levels of depression, academic stress, and academic dissatisfaction. Depressive symptoms were significantly predicted by the loneliness score (OR=2.08, 95% CI=1.88-2.29), female gender (OR=1.65, 95% CI=1.21-2.24), frequency of binge drinking (OR=1.4, 95% CI=1.06-1.86), and level of academic stress (OR=1.15, 95% CI=1.1-1.19), whereas the number of people to easily borrow money from was found to be a protective factor against depression (OR=0.95, 95% CI=0.92-0.99).

Conclusion: Our results highlight the need for higher-education institutions to take the appropriate social and mental health interventions, tailored to fit the specific requirements of the COVID-19-related measures.

Keywords: COVID-19, health risk behaviors, social support, substance use, well-being

Introduction

The uncontrolled spread of coronavirus disease 2019 (COVID-19) caused the implementation of exceptional measures in higher-education institutions (HEIs) in many countries, including Turkey. As in other megacities around the world, the resulting impacts of the pandemic on the life of higher-education students have been tremendous and unique in İstanbul, the largest city in Turkey, with a total population of around 16 million. On March 12, 2020, the Turkish government first announced that HEIs would stay closed for a 3-week period. On March 26, the higher-education council decided to cease in-person teaching at HEIs for the rest of the semester and resume with online lectures only. To ensure social distancing, student residences with shared facilities were closed, and entry to college buildings and campuses was largely prohibited by mid-March. Finally, on April 3, the curfew restrictions in place were revised to include people younger than 20 years. As a result, the vast majority of higher-education students in İstanbul had to move back home, leaving their school life



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behind, or stay isolated in their student accommodation. Moreover, many of those who had built a relatively independent life by settling in İstanbul lost their jobs.

Although it is clear that these radical changes in their daily and academic lives have caused considerable distress among higher-education students, to what extent and by which mechanisms the well-being of this subpopulation was affected by the pandemic remains largely unexplored. To shed light on these issues, our theoretical framework was based on a body of research focusing on the complex relationship between young adults' health-risk behaviors, social support systems, and mental/academic well-being. Previous evidence suggests that positive mental health outcomes such as low rates of depression, anxiety, and hopelessness; enhanced school adjustment; and high life satisfaction are linked to different aspects of social support in this subpopulation.¹⁻³ Social support has also been studied as a protective factor against health-risk behaviors (e.g., smoking, binge drinking, physical inactivity), which in turn have been suggested to exhibit a strong relationship with mental health problems.^{4,5} Moreover, perceived social support from family and friends has been shown to partially account for the effects of psychological well-being on health-risk behaviors among young adults.^{3,6}

Based on the premise that the overall distress caused by the disruption of social networks and activities due to COVID-19 may have been particularly significant for young adults in higher education, we placed our emphasis on how factors related to students' social support systems, health-risk behaviors, and mental/academic well-being interacted during the pandemic. Thus, the research aims of this study were to assess the characteristics of higher-education students' resources for psychosocial support and their support-seeking patterns during the outbreak, examine their pattern of health-risk behaviors (including the use of psychoactive substances and physical inactivity), and evaluate how it changed during COVID-19 and assess how these relate to the students' mental and academic well-being. Our presumption was that students with poor perceived social support and/or increased health-risk behaviors would be more likely to present with higher academic stress, lower academic satisfaction, and impaired psychological well-being. We also hypothesized that, aside with well-established risk factors such as female gender, variables related to social support, health-risk behaviors, and academic well-being would help predict depression among students during the pandemic.

Methods

Setting and Participants

This study was conducted as part of the COVID-19 International Student Well-Being Study (C19 ISWS), the result of a study design,

Main Points

- *The COVID-19 pandemic had multi-dimensional impacts on the life of higher-education students in İstanbul.*
- *The students presented with high levels of depression, academic stress, and academic dissatisfaction during the initial phase of the pandemic.*
- *Loneliness, female gender, binge drinking and academic stress predicted depression among the students.*
- *Social support stood out as a protective factor against depression.*

protocol, and questionnaire developed by Prof. Sarah Van de Velde, Dr. Veerle Buffel, and Prof. Edwin Wouters at the University of Antwerp, Belgium.⁷ For recruitment, students received an email from the university media with a hyperlink to the survey webpage. Study participation was voluntary, and participants' information was pseudonymized. Data from the Marmara University (one of the biggest in İstanbul, with over 60,000 students enrolled in different study programs) were collected by the Turkish version of the online questionnaire using Qualtrics software (Qualtrics, Provo, Utah, USA) between May 15 and June 5, 2020. Eventually, 2583 students from more than 20 different fields of study participated in the research. The mean sample age was 22.84 (SD=4.79) years (median=22) and two-thirds (65.5%) were female. Three-quarters 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%). A total of 2047 (79.2%) were enrolled in the bachelor program, while 167 (6.5%) were associate degree students, and 369 (14.3%) were graduate students. Of the students, 566 (22%) were in their first year. The international study protocol of C19 ISWS and the local study protocol were approved by the ethical committees of the University of the University of Antwerp and Marmara University (Approval Date: April 17, 2020; Approval Number: 092020-482), respectively.

Measures

The online questionnaire consisted of 43 questions (some contained several sub-items or consisted of scales) covering 7 domains: sociodemographic characteristics; information about studies (e.g., the importance attributed to studies compared to other activities); daily life before and after COVID-19; COVID-19 symptoms, concerns, and worries; stressors, support systems, and well-being; student-specific questions; and knowledge of COVID-19 and sources of information.

To assess the frequency and severity of feelings of depression, the 8-item version of the Center for Epidemiological Studies Depression Scale (CES-D-8) was used.^{8,9} The scale asked students to rate how often they experienced symptoms associated with depression over the past week (e.g., Please indicate how much of the time during the past week you felt that everything you did was an effort). The Likert options ranged from 0 (none or almost none of the time) to 3 (all or almost all the time), resulting in a total score of 0-24, with higher scores indicating greater severity of depression. Total score ≥ 9 is suggested to indicate the presence of clinically significant depressive symptoms.¹⁰

A 3-item scale adapted from the Roberts UCLA Loneliness Scale¹¹ was used to assess the overall level of experienced loneliness (e.g., How much of the time during the past week you felt isolated from others?). Total score is 0-9, with higher scores indicating greater levels of loneliness.

Given that no existing instruments were available because of the specificity of the COVID-19 pandemic, 2 self-report scales developed by the C19 ISWS coordinating team were used to assess students' levels of academic stress and academic satisfaction. Scale items were based on a literature review, a focus group with higher-education students, and on how the authors as higher-education lecturers thought COVID-19 might impact the lives of students. Each scale consisted of 4 items, with response options from 1 (strongly agree) to 5 (strongly disagree), resulting in a total score of 4-20 (Table 1). Tests

Table 1. Components of COVID-19-Related Academic Stress and Academic Satisfaction (n = 1943)

		Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
Academic Stress	My university/college workload has significantly increased since the COVID-19 outbreak.	637 (32.8%)	448 (23.1%)	483 (24.9%)	253 (13%)	122 (6.9%)
	I know less about what is expected of me in the different course modules/units since the COVID-19 outbreak.	616 (31.7%)	536 (27.6%)	424 (21.8%)	276 (14.2%)	91 (4.7%)
	I am concerned that I will not be able to successfully complete the academic year due to the COVID-19 outbreak.	828 (42.6%)	455 (23.4%)	266 (13.7%)	246 (12.7%)	148 (7.6%)
	The change in teaching methods resulting from the COVID-19 outbreak has caused me significant stress.	774 (39.8%)	533 (27.4%)	283 (14.6%)	231 (11.9%)	122 (6.3%)
Academic Satisfaction	The university/college provides poorer quality of education during the COVID-19 outbreak as before.	517 (26.6%)	403 (20.7%)	566 (29.1%)	327 (16.8%)	130 (6.7%)
	The university/college has sufficiently informed me about the changes that were implemented due to the COVID-19 outbreak.	326 (16.8%)	703 (36.2%)	409 (21%)	301 (15.5%)	204 (10.5%)
	I am satisfied with the way my university/college has implemented protective measures concerning the COVID-19 outbreak.	455 (23.4%)	815 (41.9%)	479 (24.7%)	117 (6%)	77 (4%)
	I feel I can talk to a member of the university/college staff (e.g., professor, student counselor) about my concerns due to the COVID-19 outbreak.	187 (9.6%)	424 (21.8%)	507 (26.1%)	433 (22.3%)	392 (20.2%)

COVID-19, Coronavirus Disease 2019.

of internal consistency (reliability) for all the 4 scales have been performed by the C19 ISWS team. Accordingly, reported Cronbach's alpha values for the Turkish versions of the scales are 0.845 for CES-D-8 Scale, 0.780 for Loneliness Scale, 0.737 for the Academic Stress Scale, and 0.697 for the Academic Satisfaction Scale⁷ (Supplementary Table 1).

Statistical Analysis

Data were processed by the C19 ISWS research team and underwent full anonymization before being shared with the international partners. Statistical analyses were performed using SPSS version 24.0 (IBM Corp., Armonk, NY, USA). The number of available responses differed between items due to questions that are in conditional format, uninformative response options provided for some questions (e.g., prefer not to say, do not know), and participants who left without completing the whole questionnaire.

Descriptive statistics are given as counts, percentages, means, standard deviations, medians, and ranges. Pearson chi-square test was used to compare the distribution of categorical variables (e.g., being in a relationship, having a confidante) between 2 independent groups (e.g., males and females). Mann-Whitney U test was used to compare non-normally distributed continuous (e.g., academic stress, academic satisfaction, CES-D-8, Loneliness scores) or ordinal variables (e.g., frequency of drinking, smoking, level of contact with the teaching staff) between 2 independent groups. Wilcoxon signed-rank test was used to compare non-normally distributed ordinal or continuous variables between 2 related samples (e.g., before and during COVID-19). Spearman correlation coefficient was used to evaluate the bivariate associations between variables of interest. A binary logistic regression test was conducted to assess the predictors of depression

as a major outcome of mental well-being. The significance level was established as $\alpha=0.05$.

Results

Informal Social Support and Support-Seeking Patterns

Characteristics and gender differences in the students' social support systems, health-risk behaviors, and psychological and academic well-being during COVID-19 are summarized in Tables 1 and 2: 985 (49.2%) of the students reported having more and 362 (18.1%) having less contact (offline and online combined) with their family. Since the implementation of COVID-19 measures, 1330 (66.5%) of the students reported less contact with their friends, 1527 (59.1%) reported not being in a steady relationship, and 419 (20.9%) had nobody to discuss intimate and personal matters during the pandemic—the rate of males being significantly higher than females for both the conditions ($P = .017$ and $P < .001$, respectively). Assigned as another measure to assess students' available social resources (family, friends, acquaintances, etc.) during COVID-19, the mean number of people to easily borrow money from (NOPBM; 1000 TL or 125 Euro within 2 days) was 5.49 (SD = 3.48), with no gender difference.

Among those who had consulted teaching staff at the HEI at least once to discuss worries about studies ($n=1431$), 651 (45.5%) reported seeking less contact with them during COVID-19, compared to 313 (21.9%) who reported increased contact. Similarly, among 797 students who had consulted teaching staff at least once to discuss psychosocial problems, 477 (59.8%) sought less and 51 (6.39%) sought more contact regarding the same topic during COVID-19. The overall tendency to consult teaching staff for both reasons exhibited a significantly higher decrease in males compared to females during

Table 2. Gender Differences in Students' Social Support, Support-Seeking Patterns, Health-Risk Behaviors, and Mental/Academic Well-Being

	Status/Range	Females	Males	Test	P
		n (%)	n (%)		
Being in a steady relationship (n = 2566)	Yes	602 (35.6)	263 (30.1)	^a	.017
	Single	969 (57.3)	549 (62.7)		
	Complicated	120 (7.1)	63 (7.2)		
Having someone to discuss intimate matters (n = 1991)	Yes	1101 (82.7)	472 (71.5)	^a	<.001
	No	230 (17.3)	188 (28.5)		
Seeking contact with student counseling services during COVID-19 (n = 1964)	Yes	81 (6.1)	43 (6.7)	^a	.644
	No	1239 (93.9)	601 (93.3)		
		Median (Min-Max)	Median (Min-Max)		
Number of people to easily borrow money from (n = 2566)	0-18 (and more)	5 (0-18)	5 (0-18)	^b	.078
Level of contact with the teaching staff to discuss worries about studies during COVID-19 (n = 1422)	1 (much less) to 5 (much more)	3 (1-5)	2 (1-5)	^b	.001
Level of contact with the teaching staff to discuss worries about psychosocial problems during COVID-19 (n = 793)	1 (much less) to 5 (much more)	3 (1-5)	2 (1-5)	^b	.019
The importance of studies compared to other activities (n = 2534)	1 (less) to 3 (more)	2 (1-3)	2 (1-3)	^b	<.001
Frequency of smoking before COVID-19 (n = 2017)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^b	<.001
Number of glasses of alcohol consumed per week before COVID-19 (n = 2037)	0-100	0 (0-100)	0 (0-100)	^b	.002
Frequency of binge drinking before COVID-19 (n = 2022)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^b	<.001
Frequency of using cannabis before COVID-19 (n = 2001)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^b	<.001
Frequency of vigorous physical activities before COVID-19 (n = 2028)	1 (almost never) to 5 (almost daily)	2 (1-5)	3 (1-5)	^b	<.001
Frequency of moderate physical activities before COVID-19 (n = 2028)	1 (almost never) to 5 (almost daily)	4 (1-5)	4 (1-5)	^b	.062
Academic stress score (n = 1933)	4-20	16 (4-20)	15 (4-20)	^b	.016
Academic satisfaction score (n = 1933)	4-20	13 (4-20)	12 (4-20)	^b	.029
CES-D-8 depression score (n = 1993)	0-24	13 (0-24)	12 (0-24)	^b	<.001
Loneliness score (n = 1973)	0-9	3 (0-9)	3 (0-9)	^b	.138

^aPearson chi-square test. ^bMann-Whitney U-test. Unavailable responses ("prefer not to say," "not applicable," etc.) were excluded from the analyses. Please note that only participants with binary gender information (f/m) are displayed. CES-D-8, Center for Epidemiological Studies Depression Scale (8-item version); COVID-19, Coronavirus Disease 2019.

the pandemic ($P = .001$ and $P = .019$, respectively). On the other hand, only 124 (6.31%) of the students reported seeking contact with student counseling or social services at the HEI during the pandemic, with the most common topic being worried about studies ($n = 92$), followed by psychosocial problems ($n = 18$), financial difficulties ($n = 7$), and other miscellaneous issues ($n = 29$).

Health-Risk Behaviors Before and During COVID-19

The frequency of smoking, using cannabis, and binge drinking was significantly higher among male students compared to females. In contrast, female students were significantly more likely to perform vigorous (but not moderate) physical activities compared to their male counterparts (Table 2). During the pandemic, the mean frequency of smoking tobacco and number of daily smoked cigarettes decreased significantly over the whole sample ($P < .001$). Similarly, the mean number of glasses of alcohol consumed per week, the rate of occasional binge drinking (≥ 6 glasses on a single occasion),

and the use of cannabis significantly decreased during COVID-19 ($P < .001$). Furthermore, a significant decrease was observed in the rate of those who performed vigorous and moderate physical activities at varying frequencies during the outbreak ($P < .001$ for both; Table 3).

Mental and Academic Well-Being

The mean CES-D-8 score of the sample was 13.23 (SD = 4.98), with females scoring significantly higher than males ($P < .001$). Moreover, 1600 (80.7%) students (82% of females and 77.7% of males) scored ≥ 9 and were classified as "depressed." The mean score for loneliness was 3.54 (SD = 2.53), with no significant difference between the genders. The mean scores for COVID-19-related academic stress and academic satisfaction were 14.94 (SD = 3.75) and 12.43 (SD = 3.42), respectively. Stress scores were significantly higher for females than males, which was also true for academic satisfaction ($P = .016$ and $P = .029$, respectively; Table 2).

Table 3. COVID-19-Related Changes in Students' Health-Risk Behaviors

	Range	Before COVID-19 Median (Min-Max)	During COVID-19 Median (Min-Max)	Test	P
Frequency of smoking (n = 2027)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^a	<.001
Number of cigarettes smoked per day (smokers only, n = 758)	0-100	8 (0-80)	2 (0-100)	^a	<.001
Number of glasses of alcohol consumed per week (n = 2045)	0-100	0 (0-100)	0 (0-50)	^a	<.001
Frequency of binge drinking (n = 2033)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^a	<.001
Frequency of using cannabis (n = 2011)	1 (almost never) to 5 (almost daily)	1 (1-5)	1 (1-5)	^a	<.001
Frequency of vigorous physical activities (n = 2039)	1 (almost never) to 5 (almost daily)	2 (1-5)	1 (1-5)	^a	<.001
Frequency of moderate physical activities (n = 2039)	1 (almost never) to 5 (almost daily)	4 (1-5)	1 (1-5)	^a	<.001

^aWilcoxon signed-rank test. Unavailable responses ("prefer not to say," "not applicable," etc.) were excluded from the analyses. COVID-19, Coronavirus Disease 2019.

Associations Between Students' Social Support, Health-Risk Behaviors, and Mental/Academic Well-Being During COVID-19

Variables related to different forms of social support (having a steady relationship, having a confidante, NOPBM, etc.) were mostly intercorrelated (Table 4). Moreover, having a confidante and NOPBM were both in positive correlation with academic satisfaction ($P < .001$ for both) and in negative correlation with academic stress, CES-D-8, and loneliness scores ($P < .001$ for all). The importance of studies compared to other activities, which was significantly higher for females than males ($P < .001$), exhibited an inverse relationship with substance use in general ($P < .001$). Moreover, the frequency of smoking, the number of glasses of alcohol consumed per week, and the frequency of binge drinking were all associated with higher CES-D-8 and loneliness scores, increased levels of academic stress, and lower academic satisfaction. Finally, COVID-19-related academic satisfaction, academic stress, CES-D-8, and loneliness scores were all intercorrelated ($P < .001$ for all).

Regression Results

The presence of depression was assigned as a dichotomic (0: without depression; 1: with depression) outcome to assess mental well-being, with the cut-off score of 9 (Table 5). Accordingly, having potentially significant depressive symptoms was predicted by loneliness (OR = 2.08, 95% CI = 1.88-2.29, $P < .001$), female gender (OR = 1.65, 95% CI = 1.21-2.24, $P < .001$), frequency of binge drinking per week (OR = 1.4, 95% CI = 1.06-1.86, $P = .018$), and level of COVID-19-related academic stress (OR = 1.15, 95% CI = 1.1-1.19, $P < .001$); whereas NOPBM was found to be a protective factor against depression (OR = 0.95, 95% CI = 0.92-0.99, $P = .023$). Overall, the regression model predicted the absence and presence of depression with an accuracy of 48.1% and 94.1%, respectively ($P < .001$).

Discussion

This study aimed to assess the multifaceted impacts of the COVID-19 pandemic on the life of higher-education students in İstanbul, with a particular focus on the relationship between their resources of social support, support-seeking patterns, health-risk behaviors, and mental/academic well-being during the initial phase of the pandemic.

Students' Social Support and Support-Seeking Patterns

Social support relates to the well-being of young adults in different forms and through particular dynamics. Young adults depend less on their family both in the emotional and financial contexts. Moreover, friends and significant others begin to play a more influential role in their life than during adolescence,³ so support from general peers acts as a protective factor against depression in this age group.¹² In this regard, our findings pointed to a relatively poor psychosocial support among students in general: the majority had less contact with their friends since the outbreak, two-thirds did not have a romantic relationship, and one-fifth lacked a confidante to discuss intimate matters during COVID-19. Of note, both loneliness and NOPBM exhibited significant correlations with the main outcomes of students' academic and mental well-being. Moreover, loneliness proved to be one of the predictors of depression, whereas NOPBM stood out as a protective factor in the regression model.

Students' propensity to seek help from the available sources provided by HEIs during the pandemic was assigned as another outcome of interest, given that previous research underpins an inverse relationship between emotional support-seeking and feelings of loneliness.¹³⁻¹⁵ Our findings indeed indicated that the majority of students tended to seek less contact with their teaching staff since the outbreak, and only a few consulted available social services at their institution. Although largely due to the imposition of COVID-19 measures in the campus, other factors underlying this observed pattern remain unexplored in our study.

A gender difference regarding coping strategies has been underscored in previous research, with men more likely to use avoidance and problem-focused coping and women more prone to use emotion-focused coping and exhibit help-seeking attitudes.^{16,17} Indeed, it has been shown that the majority of clients in university counseling services consisted of women.¹⁸ In line with these findings, a significantly higher decrease in the tendency to seek contact with the teaching staff during COVID-19 was observed among male students in our sample. Given the crucial role of social support on youths' well-being, HEIs need to embrace the use of digital technologies in new and innovative ways, such as providing online platforms that

Table 4. Correlations Between Students' Social Support, Support-Seeking Patterns, Health-Risk Behaviors, and Mental/Academic Well-Being During COVID-19

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Being in a steady relationship	r_s	-																
	P	-																
2. Number of people to easily borrow money from	r_s	.109 ^c	-															
	P	<.001	-															
3. Importance of studies compared to other activities	r_s	-.045 ^b	-.009	-														
	P	.028	.649	-														
4. Frequency of smoking before COVID-19	r_s	.078 ^c	.017	-.103 ^c	-													
	P	.001	.451	<.001	-													
5. Number of cigarettes per day before COVID-19	r_s	-.072	-.008	-.068	.726 ^c	-												
	P	.062	.818	.062	<.001	-												
6. Number of glasses of alcohol per week before COVID-19	r_s	.112 ^c	.041	-.144 ^c	.378 ^c	.144 ^c	-											
	P	<.001	.064	<.001	<.001	<.001	-											
7. Frequency of binge drinking before COVID-19	r_s	.028	.045 ^a	-.132 ^c	.347 ^c	.170 ^c	.654 ^c	-										
	P	.224	.042	<.001	<.001	<.001	<.001	-										
8. Frequency of using cannabis before COVID-19	r_s	.050 ^a	.016	-.107 ^c	.215 ^c	.067	.266 ^c	.290 ^c	-									
	P	.031	.471	<.001	<.001	.073	<.001	<.001	-									
9. Frequency of vigorous physical activities before COVID-19	r_s	.002	.071 ^c	-.015	-.072 ^c	-.106 ^b	.009	.036	.011	-								
	P	.922	.001	.496	.001	.004	.701	.110	.629	-								
10. Frequency of moderate physical activities before COVID-19	r_s	-.012	-.023	-.003	-.053 ^a	-.063	.002	-.008	.011	.321 ^c	-							
	P	.588	.303	.900	.017	.087	.913	.733	.625	<.001	-							

11. Having someone to discuss intimate matters	r_s	.195 ^c	.209 ^c	-.029	-.025	-.093 ^a	-.010	-.031	-.031	-.012	-.016	-
	P	<.001	<.001	.194	.271	.011	.662	.164	.164	.581	.471	-
12. CES-D-8 depression score	r_s	-.049 ^a	-.235 ^c	-.064 ^b	.163 ^c	.000	.096 ^c	.122 ^c	.028	-.044	-.002	-.253 ^c
	P	.037	<.001	.005	<.001	.993	<.001	<.001	.223	.051	.936	<.001
13. Loneliness score	r_s	-.117 ^c	-.247 ^c	-.019	.149 ^c	.023	.075 ^c	.093 ^c	.022	-.022	-.010	-.337 ^c
	P	<.001	<.001	.407	<.001	.544	.001	<.001	.325	.329	.663	<.001
14. Level of contact with the teaching staff to discuss worries about studies	r_s	.032	.039	.094 ^c	-.062 ^a	-.067	-.029	-.027	.015	.012	-.027	-.090 ^c
	P	.250	.141	<.001	.020	.127	.275	.316	.564	.663	.301	.016
15. Level of contact with the teaching staff to discuss worries about psychosocial problems	r_s	.021	.027	.021	.006	-.009	-.019	.025	.007	.035	-.036	-.014
	P	.368	.237	.343	.781	.805	.402	.271	.763	.120	.112	.523
16. Seeking student counseling services	r_s	.024	.012	.019	.029	-.044	-.017	-.007	.009	.018	-.028	.056 ^a
	P	.303	.597	.403	.200	.240	.452	.757	.685	.431	.210	.013
17. Academic stress score	r_s	.032	-.188 ^c	-.036	.087 ^c	.023	.048 ^a	.032	-.022	.009	.053 ^a	.437 ^c
	P	.178	<.001	.111	<.001	.536	.036	.167	.347	.677	.019	<.001
18. Academic satisfaction score	r_s	-.022	.111 ^c	.071 ^b	-.143 ^c	-.037	-.142 ^c	-.114 ^c	-.031	-.009	-.021	-.158 ^c
	P	.358	<.001	.002	<.001	.330	<.001	<.001	0.174	.679	.347	<.001

^a $P < .05$; ^b $P < .01$; ^c $P < .001$. COVID-19, Coronavirus Disease 2019.

Table 5. Binary Logistic Regression Analysis of Factors Associated with Depression (CES-D-8 Score \geq 9)

Variable	OR (95% CI)	P
Gender (Female)	1.65 (1.21-2.24)	.001
Number of people to easily borrow money from	0.95 (0.92-0.99)	.023
Frequency of smoking before COVID-19 (1-5)	1.03 (0.94-1.12)	.572
Frequency of binge drinking before COVID-19 (1-5)	1.40 (1.06-1.86)	.018
Having someone to discuss intimate matters	0.94 (0.58-1.52)	.799
Loneliness score (0-9)	2.08 (1.88-2.29)	<.001
Academic stress score (4-20)	1.15 (1.10-1.19)	<.001
Academic satisfaction score (4-20)	0.96 (0.92-1.01)	.099

CES-D-8, Center for Epidemiological Studies Depression Scale (8-item version); COVID-19, Coronavirus Disease 2019; CI, confidence interval; OR, odds ratio.

allow young adults to share information about their well-being and resource needs.¹⁹

Students' Health-Risk Behaviors

Not surprisingly, a dramatic decline in the use of psychoactive substances was observed among students during the initial phase of the pandemic. Although seemingly encouraging, the underlying mechanism is probably multifactorial and should be addressed with caution. First, the observed decrease was most likely due to the restrictions placed on sales through the enforced closure of stores, supermarkets, bars, and restaurants.²⁰ Second, moving back in with parents may have resulted in a "forced abstinence" for many students due to the reinvolvement of parental control and lower availability of substances. Third, the immediate financial difficulties that arose due to the students' and/or their families' unemployment may have limited access to substances. It has indeed been shown by previous research that higher disposable income is associated with more frequent alcohol use and that students who live with their parents drink less frequently.²¹ Finally, some students may have deliberately refrained from using substances, considering the increased risk of adverse health outcomes and exacerbation of symptoms with COVID-19 infection. Whatever the reasons, psychological strain from the prolonged social isolation risks negating or reversing this possible benefit by leading to a spike in stress-induced consumption of alcohol and other addictive agents in vulnerable students particularly.^{20,22}

The association between psychological well-being and health-risk behaviors during early adulthood is well-evidenced in the literature: life satisfaction among students has been shown to correlate negatively with smoking and physical inactivity;²³ depression has been linked to alcohol consumption;²⁴ and binge drinking and drinking to cope have been associated with suicidal ideation.²⁵ Although our findings suggest no or weak negative correlations between the outcomes for mental/academic well-being and substance use in general, the frequency of binge drinking stood out as a predictor of depression in our sample.

Both substance use and poor social support have been linked to psychological problems in young adults, although the mechanisms by which these factors interact remain relatively controversial. Some study findings indicate that peer support may be associated with increased involvement in health-risk behaviors,²⁶ whereas others relate it to well-being and better adjustment to stressful life events.^{3,12,27} Our findings pointed to a weak correlation between the presence of a steady relationship and alcohol use, whereas alcohol

use (together with smoking) was also positively correlated with loneliness. These seemingly contradictory findings are likely to stem from potentially dissimilar characteristics of the available social support systems in question. That is, support from close friends, general peers, family, or significant others may have unique mediating effects on young adults' health-risk behaviors and psychological well-being. Finally, our findings also indicated that those who attributed more importance to school work tended to refrain from substance use in general, which is in line with previous evidence suggesting an association between low schooling commitment and higher levels of substance abuse and worse mental health outcomes.^{28,29} This relationship is particularly important, given that social isolation, decreased contact with peers, and closure of campuses due to COVID-19 may negatively affect students' connectedness to their institution and their academic satisfaction, which may in turn lead to involvement in health-risk behaviors and other psychological problems. Of note, caution is warranted when drawing conclusions from the present findings, given that the correlations in question are mostly weak.

Another finding concerning health-risk behaviors was the significant decrease in students' overall levels of physical activity, which may be considered an immediate and inevitable outcome of the implementation of COVID-19 measures. Evidence suggests that the relationship between physical inactivity and psychological problems (depression and anxiety)³⁰ is mostly bidirectional: an inverse association was reported between physical activity and psychological problems among college students;³¹ high screen time and low physical activity together were also shown to increase psychological problems.³² Moreover, socializing has been suggested to partially mediate the relationship between physical activity and mental health among young adults.^{6,31,33} With the potential long-term consequences of COVID-19 on students' health-risk behaviors, health-promoting strategies of HEIs should involve interventions to improve students' physical activity, preferably within socially interactive contexts.

Students' Academic and Psychological Well-Being

The majority of students (80.7%) scored \geq 9 on the CES-D-8, suggesting the potential presence of clinically significant depressive symptoms at the time of evaluation. The mean scores and percentage of those with above-threshold scores were higher in females than males. Furthermore, COVID-19 seemed to elicit greater stress concerning academic life in females, although they presented higher academic satisfaction compared to their male counterparts. These results are consistent with the literature, which point to higher psychological distress caused by negative life events in females.³⁴⁻³⁶ In our study, female gender was identified as an independent risk factor

for depression, whereas the contribution of loneliness to depression was similar for both genders.

While a multitude of studies assessed the psychological impacts of COVID-19 on different sub-populations, those that focused on young adults in higher education are relatively few. One study reported that around 25% of Chinese medical students experienced significant anxiety during COVID-19.³⁷ Moderate to extremely severe scores of anxiety, depression, and stress were reported by 21.34%, 34.19%, and 28.14%, respectively, of a university community in Spain,³⁸ whereas a study conducted with Greek university students reported a 2.5- to 3-fold increase in possible cases of depression and an almost 8-fold increase in suicidal thoughts during COVID-19.³⁹ Compared to these numbers, the rate of students with possible depression appears to be strikingly high in our sample, which is not fully explainable by the findings of this study. One reason may be that the Turkish students experienced greater stress and less satisfaction in the educational context during COVID-19 compared to their counterparts from other countries. It is indeed noteworthy that the majority of students in our sample reported significantly increased school workload as well as greater concern and uncertainty regarding their education during the pandemic. Similarly, the rates of those who were satisfied with the quality of education and those who felt able to consult university staff about their problems during COVID-19 were strikingly low compared to those who reported the opposite. Nevertheless, such an inference is highly premature due to the lack of comparative data on levels of academic satisfaction and academic stress among students from different countries.

Another possible reason is that the voluntary nature of the survey might have led to a selection bias, given that students who experienced higher levels of distress during COVID-19 may have been more willing to participate in the study than others. It should also be noted that the psychometric properties of the instruments used to assess the psychological outcomes of the pandemic differ largely between the aforementioned studies, which limit the comparability of the findings.

The high variability in reported rates of depression (and other mental health outcomes) during COVID-19 is evident even among studies conducted on Turkish samples. For example, 77.6% of health care workers⁴⁰ and 64.7% of physicians⁴¹ in Turkey were found to have symptoms of depression during the pandemic. Karahan Yılmaz and Eskici⁴² reported that 56.6% of participants from general population potentially had moderate to severe depression symptoms during the pandemic period, whereas Özdin and Bayrak Özdin⁴³ found that the rate of depression was 23.6% among participants with similar characteristics. Importantly, female gender stood out as a common risk factor for negative psychological outcomes during the pandemic across these studies.

Some additional limitations of this study require consideration. The cross-sectional design prevented us from performing a good comparison with the pre-pandemic profile of the participants and objectively determining the effect of COVID-19 on the parameters of interest. Another shortcoming is that, although relatively large in size, the sample was drawn from a single HEI, suggesting that the results may not be generalizable to all students in İstanbul.

Our findings highlight the need for a multidimensional perspective in understanding the complex impacts of COVID-19 on the

well-being of higher-education students. Having potentially significant depressive symptoms was predicted by loneliness, female gender, frequency of binge drinking, and COVID-19-related academic stress, whereas an easily accessible and supportive social network is presented as a protective factor against depression in our sample. Our results also highlight the need for HEIs to take appropriate social and mental health interventions, tailored to fit the specific requirements of the COVID-19-related measures. To reduce social loneliness, online campus outreach programs may be introduced to encourage student interactions through digital gatherings based on the characteristics of youth groups. Counseling services should also improve their contact, especially for isolated, stressed students, helping them develop more supportive social networks as one way of handling their stress. Considering that the current findings are specific to the initial phase of COVID-19 and the impacts are becoming increasingly devastating, follow-up studies are needed in the near future to address the young adults' changing needs and struggles during the ongoing pandemic.

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Informed Consent: Informed consent was obtained from the individuals who participated in this study.

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Supplementary Table 1. Correlations Between Components of COVID-19-Related Academic Stress, and Academic Satisfaction (n = 1943)

			1	2	3	4	5	6	7	8
Academic Stress	1. My university/college workload has significantly increased since the COVID-19 outbreak.	<i>rs</i>	1.000							
		<i>p</i>	.							
	2. I know less about what is expected of me in the different course modules/units since the COVID-19 outbreak.	<i>rs</i>	0.318^c	1.000						
		<i>p</i>	<.001	.						
Academic Stress	3. I am concerned that I will not be able to successfully complete the academic year due to the COVID-19 outbreak.	<i>rs</i>	0.326^c	0.515^c	1.000					
		<i>p</i>	<.001	<.001	.					
	4. The change in teaching methods resulting from the COVID-19 outbreak has caused me significant stress.	<i>rs</i>	0.355^c	0.451^c	0.604^c	1.000				
		<i>p</i>	<.001	<.001	<.001	.				
Academic Satisfaction	5. The university/college provides poorer quality of education during the COVID-19 outbreak as before.	<i>rs</i>	0.180^c	0.425^c	0.428^c	0.507^c	1.000			
		<i>p</i>	<.001	<.001	<.001	<.001	.			
	6. The university/college has sufficiently informed me about the changes that were implemented due to the COVID-19 outbreak.	<i>rs</i>	-0.079^b	-0.294^c	-0.255^c	-0.256^c	-0.331^c	1.000		
		<i>p</i>	.001	<.001	<.001	<.001	<.001	.		
Academic Satisfaction	7. I am satisfied with the way my university/college has implemented protective measures concerning the COVID-19 outbreak.	<i>rs</i>	-0.057^a	-0.182^c	-0.180^c	-0.200^c	-0.287^c	0.489^c	1.000	
		<i>p</i>	.012	<.001	<.001	<.001	<.001	<.001	.	
	8. I feel I can talk to a member of the university/college staff (e.g., professor, student counsellor) about my concerns due to the COVID-19 outbreak.	<i>rs</i>	-0.142^c	-0.315^c	-0.290^c	-0.258^c	-0.319^c	0.418^c	0.332^c	1.000
		<i>p</i>	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.

Significant correlations are shown in bold font. ^a*P* < .05; ^b*P* < .01; ^c*P* < .001. COVID-19, Coronavirus Disease 2019.