

# Social and psychiatric effects of Covid-19 pandemic and distance learning on high school students: A cross-sectional web-based survey

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## ABSTRACT

We investigated the socio-psychological effects of both the pandemic and distance learning on high school students in Turkey and Denmark. We aimed to assess whether there were any differences between students attending public or private schools in Turkey, and between two countries having different approaches to the pandemic and considerable socio-cultural and economic differences. We conducted a web-based questionnaire study in a cross-sectional design using the Survey Monkey Platform and sent it out via social media to high school students in Turkey and Denmark. The survey collected socio-demographic data, several variables associated with pandemic and distance education and their effects on social life and psychological well-being. Additionally, emotional health was assessed using the Positive and Negative Affects Schedule. We studied 565 (mean age:  $16.5 \pm 1.0$ ) Turkish and 92 (mean age:  $17.7 \pm 1.0$ ) Danish students, of whom the majority were female adolescents (63% vs 76%). Students educated in public (47.6%) and private high schools (52.4%) were nearly similar in number in the Turkish group, whereas in the Danish sample almost all students were from public schools (98.9%). Turkish students were significantly more likely to be compliant with the pandemic-related restrictions. Besides that, there were significant socio-economic disparities between Turkish and Danish students and also within Turkey between public and private school students. Turkish online education system was significantly less adequate and satisfactory compared to the Danish system. These were even worse for those who were attending public schools in Turkey. Regardless of the socio-economic differences, the majority of the students in both countries have been negatively affected by the pandemic and related restrictions and had a negative opinion about distance education. This was also true for the PANAS scores. The total scores of PANAS were similar between Turkish and Danish students (PA:  $27.0 \pm 7.6$  versus  $25.8 \pm 5.6$ ; NA:  $24.8 \pm 7.5$  versus  $24.5 \pm 7.3$ ) and also within Turkey between public and private school students (PA:  $26.8 \pm 7.5$  versus  $27.1 \pm 7.6$ ; NA:  $24.7 \pm 7.2$  versus  $25.0 \pm 7.8$ ). While female students were significantly more severely affected in the Turkish group, no such gender differences were observed in the Danish group. Additionally, considerable portion of the students in Turkey and Denmark expressed loneliness (55.2% vs 59.8%,  $p < 0.706$ ), boredom (71.2% vs 58.7%,  $p = 0.019$ ) and anxiety towards the future (61.4% vs 22.8%,  $p < 0.001$ ). Decreased physical activity, sleep problems, eating disorders and domestic abuse were other complaints. In conclusion, adolescents from both countries have been severely affected by the pandemic and its related restrictions and expressed negative views about distance education. Turkish online education system seemed to be less satisfactory when compared to the Danish system. Within Turkey, public school students had significantly more disadvantages compared to those attending private schools. Despite the fact that there were several socio-economic inequalities among students, in general, there were no robust significant differences regarding the psychological status and opinion about distance learning, indicating a global worsening of emotional status during the pandemic.

**Keywords:** COVID-19, education, adolescents, distance learning, psychology, sleep problems, eating problems, domestic abuse, positive and negative affect, PANAS, web-based survey, Turkey.

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## INTRODUCTION

On March 11, 2020, the World Health Organization declared the pandemic status of a new type of coronavirus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) infection (COVID-19) (Huang et al., 2020). Many countries around the globe responded with unprecedented public health measures to control the spread of the infection. The first case of COVID-19 in Turkey was identified on March 11, 2020 (Sağlık Bakanlığı, 2020). The Turkish Government issued several regulations to control the spread of the virus. All schools were closed as of March 16 (Education RoTMoN, 2020). The closure was eventually extended to continue until the school year ended. In April 2020, a total curfew was declared for people younger than 20 years of age until early June. As of September 8, mask-wearing became mandatory in all public areas (Anadolu Agency, 2020). Turkey shifted into distance learning in mid-March. During this time, the Ministry of Education led distance learning through the Education Informatics Network (known as EBA in Turkey) using television broadcasts and online lessons on their websites which were no more than 2 hours/day (Eğitim Bilişim Ağı, 2020). The education in public schools became heavily dependent on the EBA, compared to this; private schools (and certain more resourceful public schools) continued their curriculum through their own systems with more frequent classes and more technological equipment.

The first case of COVID-19 was identified in Denmark on February 27, 2020 (Authority, 2020). Denmark was one of the European countries that introduced lockdown measures at the earliest. In mid-March, primary schools, universities, libraries, indoor cultural institutions and similar places were closed. A month later, the government embarked on its gradual reopening by letting the youngest children go back to school and eased the restrictions. No curfew was imposed during the pandemic and as of August 22, wearing face masks became compulsory only on public transport (Reuters, 2020). Students received distance education for only 11 weeks. At the end of May, all grades returned to school with the warning to self-protect. Distance education has been led through Aula and EdTech Donor in Denmark (Bank, 2020). Aula is the common communication platform for staff, parents and students in primary schools and daycare facilities. EdTech Donor is a website that provides a guide to different solutions that Denmark's EdTech suppliers have made available to respond to COVID-19, with resources to support teaching, learning and training (Bank, 2020).

The closure of schools and switching to online education had a considerable impact on the daily life of adolescents. Beltekin and Kuyulu (2020) suggested that distance learning is not as effective as face-to-face education, it is insufficient in terms of efficiency for students, and technical problems in the system negatively affect students. Kilinçel et al. (2020) argued that the closure of schools and home quarantine during a pandemic causes anxiety and

loneliness in young people. Elmer et al. (2020) put forth that COVID-19-specific worries and isolation in social networks were associated with negative mental health trajectories. Ali et al. (2012) suggested that female students had worse mental health trajectories when controlling for stressors related to COVID-19. Socioeconomic status had significant effects on the learning habits of children. Resources such as books, computers, the availability of the internet, and having a study room are essential for students' success (Roberts et al., 2005). We hypothesized that the impact would be greater among economically disadvantaged adolescents. While current data indicate that adolescents' psychological status and motivation are negatively affected by the pandemic and online education (Beltekin and Kuyulu, 2020; Kılınçel et al., 2020; Cao et al., 2020; Smirni et al., 2020; Zhou et al., 2020; Zhang et al., 2020; Wang et al., 2020; Qi et al., 2020; Zhou et al., 2020), to the best of our knowledge, data on cross-cultural differences and whether there are any differences between public versus private school students are largely missing. Therefore, in this study, we aimed to analyze the effects of both the pandemic and distance learning on the social and psychological status of high school students in Turkey, with special emphasis to see whether attending public or private school systems had an effect. Also as a control group, we studied high school students from Denmark, an European Union country with significant socio-cultural and economical differences and a different approach to the pandemic compared to Turkey.

## METHODS

### Study design

#### *Identification of the participants*

The survey was sent out to high school students (Grades 9, 10, 11 and 12 for Turkey, Grades 9, 10, and 11 for Denmark) via WhatsApp and Instagram. Snowball sampling was used by asking students to send the survey link to their peers via their social media. We did not make a sample size analysis. However, as one of the study objectives was to compare public and private schools we intended to reach at least 100 students each attending public and private schools.

#### *Survey and data collection*

We conducted our research through a web-based survey created by the Survey Monkey software (SurveyMonkey, San Mateo, CA, USA). The survey ran from July 3 to August 31, 2020. The online survey contained two parts.

The first part included a total of 54 questions that were related to socio-demographics, COVID-19, restrictions, distance learning and the psycho-social impact of the pandemic and lockdown. The second part included an evaluation of emotional status. We evaluated the negative and positive emotions of the subjects using the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988) which was translated and validated into both Turkish and Danish (Gençöz, 2000; Sapiezynski et al., 2019).

### Positive and negative affect schedule

Emotional status was assessed by using the Positive and Negative Affect Schedule (PANAS), which consisted of 20 items, ten of which are used to measure Positive Affects (PA) and the other ten to measure Negative Affects (NA). The schedule involves rating the effects on a Likert scale of 1 to 5 to indicate the extent of how much they felt this effect: 1 through 5 corresponds to very slightly or not at all, a little, moderately, quite a bit, and extremely, respectively. The total score of each Positive or Negative Effects category is obtained by adding all scores that would give a total score ranging between 10 and 50.

### Ethical statement

The study was conducted between July 3 and August 31. The study was approved by the Ministry of Health (08T14\_39\_03) and the Ministry of Education (59090411-20-E.10217175) in Turkey. The ethical committee of Cerrahpasa Medical School at Istanbul University-Cerrahpasa also approved the study (12/10/2020-134020). Electronic informed consent was presented on the first page of the survey citing that the survey is voluntary and participants could withdraw from the survey at any time.

### Statistical analysis

Numeric results were shown as mean  $\pm$  standard

deviation, and categorical results were shown as numbers (percentage). Normality distribution of the numeric variables was tested by the Shapiro Wilk test. The Mann-Whitney U test was used for comparison of Positive Affects and Negative Affects by, gender (male versus female), and whether students or family members/close acquaintances have COVID-19 (no versus yes). Those who identified themselves as 'unidentified gender' were excluded from the gender analysis because of the small numbers. Categorical data were compared by using the Chi-square test (Pearson, Yates, or Fisher Exact test). Relationships between Positive Affects and Negative Affects with gender, maternal and paternal education, type of school, grade, age, and income level were investigated using Spearman correlation coefficient. The reliability of the PANAS was assessed with Cronbach's alpha coefficient. IBM SPSS Statistics for Windows, v.20.0 (IBM Corp., Armonk, NY, USA) was used in statistical analysis.  $P < 0.05$  was considered statistically significant.

## RESULTS

### Demographic and socio-economic characteristics

A total of 565 (196 M/ 358 F/ 11 unidentified gender, mean age:  $16.5 \pm 1.0$ ) Turkish students and a total of 92 (21 M/70 F/1 unidentified gender), mean age:  $17.7 \pm 1.0$ ) Danish students were included in the study. The majority of the respondents were females (63.4% Turkish/ 76.1% Danish) (Table 1). Among Turkish students, 12<sup>th</sup> grade students were less likely to fill in the questionnaire. Students educated in public (47.6%) and private high schools (52.4%) were nearly similar in number in the Turkish group, whereas in the Danish sample almost all students were from public schools (98.9%). Moreover, family income loss during the pandemic among the families was frequent among Turkish students (28.7%). The household number was  $< 5$  in the majority of households. Students have filled up spending their free time on social media mostly, with the majority of students (65.4% Turkish/ 54.4% Danish) spending more than 4 hours on social media.

**Table 1.** Demographic and socio-economic characteristics.

n (%)	Turkish students, n = 565	Danish students, n = 92	P
Gender			0.059
Male	196 (34.7)	21 (22.8)	
Female	358 (63.4)	70 (76.1)	
Undefined	11 (1.9)	1 (1.1)	
Mean age $\pm$ SD	$16.52 \pm 1.05$	$17.73 \pm 1.09$	$< 0.001$
High school grade			NA
9	172 (30.4)	31 (33.7)	

**Table 1.** Continues.

10	152 (26.9)	32 (34.8)	
11	171 (30.3)	29 (31.5)	
12	70 (12.4)		
Type of high school			<0.001
Public	269 (47.6)	91 (98.9)	
Private	296 (52.4)	1 (1.1)	
Maternal educational status			<0.001
University/higher education	301 (53.3)	71 (77.2)	
High school/middle school	172 (30.4)	13 (14.1)	
Primary school	83 (14.7)	7 (7.6)	
Uneducated	9 (1.6)	1 (1.1)	
Paternal educational status			0.044
University/higher education	324 (57.4)	67 (72.8)	
High school/middle school	177 (31.3)	19 (20.7)	
Primary school	61 (10.8)	6 (6.5)	
Uneducated	3 (0.5)	0 (0.0)	
Monthly household income			NA
	Undefined:157 (27.8%)	Undefined/:25 (27.2%)	
	>10.000 TL:145 (25.7%)	>80.000DKK:32 (34.8%)	
	5000-10.000 TL:135 (23.9%)	40.000 - 80.000 DKK:21 (22.8%)	
	2500-5000 TL:101 (17.9%)	20.000 - 40.000 DKK:10 (10.9%)	
	<2500 TL: 27 (4.8%)	<20.000 DKK: 4 (4.4%)	
Changes in family income during the pandemic			<0.001
There has been loss	162 (28.7)	20 (21.7)	
It did not change	198 (35.0)	56 (60.9)	
I do not know	205 (36.3)	16 (17.4)	
Household number			0.15
4-Jan	421 (74.5)	61 (66.3)	
7-May	140 (24.8)	31 (33.7)	
>7	4 (0.7)	0 (0.0)	
How did you spend your time (select all that apply)?			
Social media	484 (85.7)	78 (84.8)	0.824
Education	361 (63.9)	72 (78.3)	0.007
Reading	304(53.8)	36 (39.1)	0.009
Sports	283(51.0)	40 (43.5)	0.24
Hobbies	390(69.0)	61 (66.3)	0.602
Family	333(58.9)	50 (54.4)	0.408
How long did you browse social media (daily)?			0.009
<1 hour	34 (6.0)	12 (13.0)	
1-3 hour	167 (29.6)	30 (32.6)	
>4 hour	364 (65.4)	50 (54.4)	

TL: Turkish lira, DKK: Danish krone.

## COVID-19 knowledge, risk factors, restrictions, and precautions

The majority of the Turkish students declared that they were sufficiently well-informed (73.1%) and strongly following precautions (86.6%). Whereas these numbers were significantly lower among Danish students, with 59.8% of them reporting being sufficiently informed and only 15.2% adhering to the precaution at all times. Those who had a family member who had to leave the house

during the pandemic at least a couple of times a week were significantly less among Turkish students (65.3%) compared to Danish students (80.5%). More Turkish students (10.8%) had an individual older than 65 years old at home than Danish students (7.6%). While none of the Danish students had contracted the virus, 12% had reported that a family member or a close acquaintance had been diagnosed with the disease. On the other hand, a small group of Turkish students (0.4%) and their family members (2.7%) had contracted COVID-19 (Table 2).

**Table 2.** Questions about COVID-19 knowledge, risk factors, restrictions and precautions.

n (%)	Turkish students, n = 565	Danish students, n = 92	P
How much information do you have about COVID-19?			0.001
Sufficient	413 (73.1)	55 (59.8)	
Moderate	143 (25.3)	33 (35.9)	
Not enough	3 (0.5)	4 (4.4)	
Not interested	6 (1.1)	0 (0.0)	
How much did you follow the precautions (social distancing, washing hands, etc)?			<0.0001
Always	489 (86.6)	14 (15.2)	
Sometimes	66 (11.7)	75 (81.5)	
Rarely	6 (1.1)	3 (3.3)	
Never	4 (0.7)	0 (0.0)	
Have you been diagnosed with COVID-19?			<0.001
Yes	2 (0.4)	0	
No	482 (85.3)	92 (100.0)	
I don't know	81 (14.3)	0	
Has any of your family members/or close acquaintances got diagnosed with COVID-19?			<0001
Yes	15 (2.7)	11 (12.0)	
No	487 (86.3)	81 (88.0)	
I don't know	62 (11.0)		
How often have your family members left the house during the pandemic?			0.012
Almost everyday	153 (27.1)	34 (37.0)	
A couple times a week	216 (38.2)	40 (43.5)	
Rarely	196 (34.7)	18 (19.5)	
Were there individuals older than 65 years at home?			0.352
Yes	61 (10.8)	7 (7.6)	
No	504 (89.2)	85 (92.4)	

## Variables associated with distance learning

The majority of the students did not have difficulty obtaining adequate technological equipment and study

areas. While 73.6% of the Turkish students had their own technological devices and 13.8% faced connection issues often, all of the Danish students had their own technological devices, and only 8.7% faced connection

issues often. Turkish students had received less frequent online education compared to Danish students (daily schedule: 73.4% versus 91.3%). The demand for compensatory education to complete the second semester of the curriculum was significantly higher among Turkish students compared to Danish students (61.6% versus 18.5%). Despite these disparities across countries, online education created emotional stress and decreased

motivation similarly in the majority of both Turkish and Danish students. In both groups, approximately half of the students thought that their mental status was negatively affected without going to school every day. Finally, the majority in both countries would have chosen face-to-face education if everything was to be normal (84.9% versus 95.6%) (Table 3).

**Table 3.** Technical problems, academic efficacy and psychological effects of distance learning.

n (%)	Turkish students, n = 565	Danish students, n = 92	P
Did you have a suitable study area?			0.002
Yes	522 (92.4)	76 (82.6)	
No	43 (7.6)	16 (17.4)	
Did you have your own technological devices?			<0.001
Yes	416 (73.6)	92 (100)	
Yes, shared device	96 (17.0)	0 (0)	
No, I had to use my phone	51 (9.0)	0 (0)	
No	2 (0.4)	0 (0)	
How often did you face connection issues			0.041
Never	102 (18.1)	8 (8.7)	
Rarely	171 (30.3)	32 (34.8)	
Sometimes	214 (37.9)	44 (47.8)	
Often	78 (13.8)	8 (8.7)	
How often did your school do online classes?			<0.001
Every day (>4 classes)	330 (58.4)	58 (63.0)	
Every day (<3 classes)	85 (15.0)	26 (28.3)	
A couple times a week	109 (19.3)	8 (8.7)	
Very rarely/never	41 (7.3)	0 (0)	
Do you think you need compensatory education for the second semester curriculum?			<0.001
Yes	348 (61.6)	17 (18.5)	
No	217 (38.4)	75 (81.5)	
Did online education create emotional stress?			0.111
It did not	125 (22.1)	27 (29.5)	
Very little	120 (21.2)	23 (25.0)	
Moderately	158 (28.0)	26 (28.3)	
Very much	162 (28.7)	16 (17.4)	
How did online education affect your motivation?			0.085
It increased	41 (7.3)	6 (6.5)	
It did not change	158 (28.0)	16 (17.4)	
It decreased	366 (64.8)	70 (76.1)	
Did you enjoy distant learning?			0.473
I enjoyed it very much	43 (7.6)	7 (7.6)	

**Table 3.** Continues.

I enjoyed it moderately	248 (43.9)	33 (35.9)	
I did not enjoyed it	185 (32.7)	37 (40.2)	
I hated it	89 (15.8)	15 (16.3)	
How did the lack of presence in school every day affect your mental health?			0.202
It got better	131 (23.2)	19 (20.7)	
It did not change	135 (23.9)	30 (32.6)	
It worsened	299 (52.9)	43 (46.7)	
If everything was to be normal, which one would you choose?*(n =564)			0.005
Distance learning	85 (15.1)	4 (4.4)	
Normal school	479 (84.9)	88 (95.6)	

### Social and psychological effects of the COVID-19 pandemic or its restrictions

The majority of both Turkish and Danish students expressed loneliness, did not enjoy staying home, expressed a decrease in their physical activity and reported changes in their eating habits. Moreover, sleep disturbances were observed in about half of the students in both groups. Turkish students seemed to be more worried about their plans 'to study abroad.' Similarly, the

feelings of "boredom of life", "anxiety towards the future" and the idea of "becoming more mature with the pandemic" were significantly more common among Turkish students. Students in both countries thought that in the long term the economy and social life would be affected by the pandemic, while this was more pronounced among the Danish students. Finally, both Turkish and Danish students reported domestic physical (9.9% versus 9.8) and emotional abuse (36.3 versus 37.0%) (Table 4).

**Table 4.** The social and psychological effects of COVID-19 pandemic or its restrictions.

n (%)	Turkish students, n = 565	Danish students, n = 92	P
Did your plans get affected if you are planning on studying abroad?			0.04
Yes	124 (21.9)	11 (12.0)	
No	149 (26.4)	33 (35.9)	
I am not thinking of studying abroad	292 (51.7)	48 (52.2)	
In the future do you think the pandemic will still affect the economy?			0.016
Yes	164 (29.0)	34 (37.0)	
No	237 (42.0)	24 (26.0)	
Undecided	164 (29.0)	34 (37.0)	
What do you think about the long-term social effects of the pandemic?			0.181
It scares me/ makes me anxious	272 (48.1)	50 (54.4)	
I think that the world will be a better place	130 (23.0)	24 (26.1)	
I don't think that it will affect a lot	163 (28.9)	18 (19.5)	
How did your anxiety about your future get affected?			<0.001
It increased	347 (61.4)	21 (22.8)	
It did not change	204 (36.1)	67 (72.8)	
It decreased	14 (2.5)	4 (4.4)	
How did your feeling of loneliness get affected?			0.706
It felt less lonely	37 (6.6)	5 (5.4)	

**Table 4.** Continues.

It did not change	216 (38.2)	32 (34.8)	
I felt more lonely	312 (55.2)	55 (59.8)	
How did your boredom of life get affected?			0.019
It got better	42 (7.4)	6 (6.5)	
It did not change	121 (21.4)	32 (34.8)	
It worsened	402 (71.2)	54 (58.7)	
Did the pandemic make you more mature /helped you grow?			<0.001
Yes	260 (46.0)	22 (23.9)	
No	211 (37.4)	44 (47.8)	
Undecided	94 (16.6)	26 (28.3)	
Did you enjoy spending time at home during the pandemic?			0.063
Yes	185 (32.7)	32 (34.8)	
No	198 (35.1)	41 (44.6)	
Undecided	182 (32.2)	19 (20.6)	
How did your physical activity get affected?			0.296
It increased	112 (19.8)	24 (26.1)	
It didn't change	120 (21.2)	21 (22.8)	
It decreased	333 (59.0)	47 (51.1)	
How did your eating habits get affected?			0.193
I started eating more/irregularly	238 (42.1)	40 (43.5)	
It didn't change	170 (30.1)	32 (34.8)	
I started eating less	157 (27.8)	20 (21.7)	
Did you have problems with falling asleep?			0.313
Very troubled	173 (30.6)	21 (22.8)	
Little troubled	153 (27.1)	30 (32.6)	
It didn't change	195 (34.5)	36 (39.1)	
I started to sleep easier	44 (7.8)	5 (5.4)	
How often did your sleep get divided?			0.269
Very often	99 (17.5)	10 (10.9)	
Sometimes	219 (38.8)	40 (43.5)	
Never	247 (43.7)	42 (45.6)	
Did the domestic physical abuse at home increase?			0.005
Yes	56 (9.9)	9 (9.8)	
No	476 (84.3)	69 (75.0)	
Undecided	33 (5.8)	14 (15.2)	
Did the domestic emotional abuse at home increase?			0.582
Yes	205 (36.3)	34 (37.0)	
No	300 (53.1)	45 (48.9)	
Undecided	60 (10.6)	13 (14.1)	

**PANAS scores**

The majority of the students who participated in the survey had completely fulfilled the PANAS scale (Turkish sample:

89%, 503: 168 M/ 326 F/ 9 undefined gender; Danish sample: 79%, 73: 18 M/ 54 F/ 1 undefined gender). Cronbach's alpha coefficients of the PANAS were calculated as 0.81 for the negative subscale and

0.82 for the positive subscale indicating good reliability.

The total scores of PANAS were similar between Turkish and Danish students. When countries were separately analyzed, the total score of positive affects was significantly higher among males ( $p < 0.01$ ), whereas that of the negative score was significantly higher among females ( $p < 0.01$ ) in the Turkish group (Table 5). On the other hand, there were no such gender differences in the Danish group. When males and females were separately analyzed, the positive affects score was calculated significantly higher among Turkish male students compared

to Danish counterparts, besides that, no significant difference between the two countries was observed.

We made a brief literature review of studies investigating PANAS in the adolescent population and presented their main results in Table 6 (Roberts et al., 1998; Allan et al., 2015; Ortuño-Sierra et al., 2019; Staes et al., 2003; Heubeck and Boulter, 2020). All studies were done among apparently healthy adolescents before the COVID-19 pandemic. Compared to the previous studies, in our study, total PA values were lower whereas NA values were higher.

**Table 5.** Comparison of positive and negative affects.

		<b>Turkish students (503: 168 M/ 326 F/ 9 undefined gender*)</b>	<b>Danish students (73: 18 M/ 54 F/ 1 undefined gender*)</b>	<b>P</b>
Total	Positive Affects	26.95 ± 7.59	25.82 ± 5.63	0.217
	Negative Affects	24.84 ± 7.52	24.45 ± 7.32	0.742
Male	Positive Affects	29.11 ± 7.61†	25.00 ± 5.78§	0.026
	Negative Affects	22.21 ± 6.96‡	22.67 ± 7.28¶	0.827
Female	Positive Affects	25.92 ± 7.33†	26.13 ± 5.65§	0.767
	Negative Affects	26.20 ± 7.38‡	25.00 ± 7.37¶	0.293

\*: Those who identified themselves as 'unidentified gender' were included in total calculations of Positive and Negative Affects, however, were excluded from the gender analysis

†: Turkish students: male vs female Positive Affects:  $p < 0.001$

‡: Turkish students: male vs female Negative Affects:  $p < 0.001$

§: Danish students: male vs female Positive Affects:  $p = 0.575$

¶: Danish students: male vs female Negative Affects:  $p = 0.206$ .

**Table 6.** Review of the literature related with PANAS in adolescents.

<b>First author</b>	<b>Year of publication</b>	<b>Country</b>	<b>Participants, n (Male, %)</b>	<b>Age, years</b>	<b>PA</b>	<b>NA</b>
Roberts K.R.	1998	USA	126 (36)	15.7 ± 2.2	33.2 ± 8.6	14.6 ± 7.7
Allan N.P.	2015	USA	608 (52.3)	15.45 ± 1.09	35.26 ± 10.46	20.02 ± 8.86
Ortuño-Sierra J.	2019	Spain	1032 (51.5)	11.91 ± 1.37	38.46 ± 6.13	22.91 ± 6.82
Staes F	2003	Belgium	620 (46.9)	17.1 ± 0.68	35 (32-37)	22 (17-27)
				(back pain)	(back pain)	(back pain)
				17.1 ± 0.64	35 (31-38)	20 (16-23)
				(no back pain)	(no back pain)	(no back pain)
Heubeck B.G.	2020	Australia	1431 (100)	14.62 ± 1.73	35.06 ± 6.21	20.84 ± 6.81
Seyahi LS	Not defined	Turkey	565 (34.7)	16.52 ± 1.05	26.95 ± 7.59	24.84 ± 7.52
		Denmark	92 (22.8)	17.73 ± 1.09	25.82 ± 5.63	24.45 ± 7.32

Data are expressed as mean ± SD

Positive and Negative Affect Schedule (PANAS).

PA: Positive Affects; NA: Negative Affects.

## Variables associated with PANAS

Being female (only Turkish group), the knowledge about

COVID-19 (only Turkish group), having been diagnosed with COVID-19 or having a friend or a family relative infected with COVID-19 (only Danish group), increased

daily social media use (only Turkish group) and lower income group (only Turkish group) was found to be associated with PANAS scores (data not shown).

### **Comparison between public and private school students in Turkey**

The number of female students was almost similar in public and private schools (public: 61.0%, private: 65.5%). Parental education level and monthly family income were significantly lower among public school students. Public school students were less likely to have an adequate study room, private technological devices and an undisrupted internet connection compared to private school students (data not shown). Among public school students, the frequency of online classes was significantly low (daily schedule: 53.1% versus 91.9%,  $p < 0.001$ ), the need for supplementary education was significantly higher (66.5% versus 57.1,  $p = 0.021$ ) and the number of those who do not think that they completed the second half of the curriculum was significantly higher (75.5% versus 57.1%,  $p < 0.0001$ ) compared to private school students. Both public and private school students found EBA broadcasts of the Turkish Ministry of Education ineffective (89.1% versus 91.6%). Similarly, the knowledge about COVID-19, compliance with the restrictions, dissatisfaction with distance education and the psychological effects of the pandemic including sleeping and eating problems were similar among those who were educated in public and private schools (data not shown). Furthermore, the PANAS values did not differ between public and private school students (PA:  $26.8 \pm 7.5$  versus  $27.1 \pm 7.6$ ,  $p = 0.570$ ; NA:  $24.7 \pm 7.2$  versus  $25.0 \pm 7.8$ ,  $p = 0.598$ ).

### **DISCUSSION**

In this cross-sectional web-based survey conducted among high school students from two different countries during the summer of 2020 while the COVID-19 outbreak was still going on, we observed that the social and psychological status of the adolescents were heavily affected by the pandemic and that the students were discontent with the distance education and would prefer face to face education when everything returns to normal. These observations were true regardless of the socio-economic differences of the students from Turkey and Denmark as well as within Turkey across public and private schools.

The high school students reported increased feelings of "loneliness" and "boredom", as well as heightened levels of 'anxiety about the future effects of the ongoing COVID-19 pandemic' similar to what has been observed in previous studies (Kılınçel et al., 2020; Cao et al., 2020; Smirni et al., 2020; Zhou et al., 2020; Zhang et al., 2020;

Wang et al., 2020; Qi et al., 2020; Zhou et al., 2020; de Oliveira Araújo et al., 2020; Branquinho et al., 2020; Loades et al., 2020; Zhang et al., 2020; Kecojovic et al., 2020). They also reported lower levels of Positive Affects, and higher levels of negative counterparts, compared to the previous studies investigating adolescents before the pandemic (Roberts et al., 1998; Allan et al., 2015; Ortuño-Sierra et al., 2019; Staes et al., 2003; Heubeck and Boulter, 2020). These findings indicate a worsening emotional status in high school students, as a consequence of the ongoing COVID-19 pandemic.

A significant proportion of the students in both countries reported that after the onset of the pandemic, their physical activity level decreased and that they started eating more or irregularly. These indicate that the pandemic not only has affected the emotional status of students but also altered the contents of daily activities in line with what has been observed in previous studies (Elnaggar et al., 2020; López-Bueno et al., 2020; Ruiz-Roso et al., 2020). Moreover, a noteworthy percentage of the reported severe trouble in falling asleep and fragmented sleep. Very recently, the prevalence of insomnia symptoms during the epidemic was found to be 23.2% among 11,835 adolescents and young adults (Zhou et al., 2020). Insomnia symptoms were associated with depression and anxiety and seemed to be relieved with social support (Zhou et al., 2020). Furthermore, isolation, obligatory stay at home and withdrawal from social life may lead to increased sedentary behaviors and food consumption which could affect sleep (Loades et al., 2020). It has been also suggested that children and adolescents could be also influenced by the changes in family financial situations, health concerns, and uncertainty about the future (Loades et al., 2020). Reduced exposure to sunlight as a result of pandemic-related restrictions may disturb the sleep routine (32). Finally, challenges in distance learning decreased educational motivation, absence of face-to-face contact and excess use of social media could be further factors that may lead to sleep problems (Loades et al., 2020).

It has been suggested that based on previous pandemics experience, there is an increasing concern about increasing domestic violence (Ghosh et al., 2020; Marques et al., 2020). Also, international organizations, social media and communication broadcasts around the world have expressed their growing concern on this matter; however formal data about this issue is scarce. We found that over one-third of the students in both countries reported an increase in domestic emotional abuse, and one-tenth complained of increased domestic physical abuse. This raises concerns about the home environment, becoming an unstable and, probably, traumatic one during the pandemic, which can severely impact some students' emotional well-being by acting as an emotional stressor.

In our study, more Turkish students compared to their Danish counterparts had concerns about their future

affected badly by the pandemic, felt that their plans on studying abroad could be influenced and had worsening feelings of “boredom of life” Also, significantly more Turkish students than the Danish ones reported that they complied with the precautions and that they had sufficient information about the COVID-19. These differences between the Turkish and the Danish students might be due to the socio-cultural and economic differences between the two populations, as well as the significant differences between the pandemic-related measures taken by the two countries as described earlier.

We observed that there were significant socio-economic disparities defined as parental education and monthly income between Turkish and Danish students and also within Turkey between public and private school students. In line with that, Turkish students were less likely to have private technological equipment and faced connection problems significantly more frequently than Danish students did. Furthermore, the Turkish online education system was significantly less adequate and satisfactory compared to the Danish system implied by the less frequent online classes and high demand for future compensatory education. Using income, parental education level, technological resources and qualified online education, we were able to stratify all study participants into 3 groups: while Turkish students who were attending public schools constituted the most economically disadvantaged group, Danish students were the least. It has to be noted that except for one, all Danish students were educated in public schools, indicating the high standards of the social system in Denmark. These observations indicate a large opportunity gap between students which was probably present before the pandemic became wider with school closures. According to the Turkish Ministry of Education 2017-2018 academic year report, the rate of private high school students among all high school students is 10.4% (Education RoTMoN, 2018). Therefore, one can assume that currently, a great majority of the high school students in Turkey do not receive an effective education. Of note, face-to-face education has not started as of September 6, 2021. Moreover, regardless of the unequal opportunities, we observed that the great majority of the students in both countries disapproved of distance learning (Beltekin and Kuyulu, 2020; Kapasia et al., 2020; Almaiah et al., 2020; Almanthari et al., 2020). Similar to our results, several studies reported that distance learning was not as effective as normal education, might decrease their motivation and can cause anger and frustration (Beltekin and Kuyulu, 2020; Kapasia et al., 2020; Almaiah et al., 2020; Almanthari et al., 2020).

The participants in our study were mostly girls, which was true for both countries. This was similar to what has been observed in previous surveys investigating psychological status during the Covid-19 pandemic (Cao et al., 2020; Smirni et al., 2020; Dumas et al., 2020; Oosterhoff et al., 2020). In line with our observations, being

female, having a lower level of education and income, excess social media use and having been diagnosed with COVID-19 were found to be associated with psychological status (Kılınçel et al., 2020; Cao et al., 2020; Qi et al., 2020; Branquinho et al., 2020; Zhang et al., 2020; Kecojevic et al., 2020; Elnaggar et al., 2020). In our study, PANAS scores of Turkish students indicated that females compared to males were more severely affected. On the other hand, such gender difference was not found in the Danish group. Among female students, both PA and NA scores were similar between Turkish and Danish students. On the other hand, among males, while, NA scores were similar, PA scores were significantly lower among Danish students. While this could be due to the small sample size of the male students in the Danish group, it could also be due to the fact that Danish male students might have been as sensitive as their female counterparts, indicating a cross-cultural difference.

Our study has several limitations. Information bias and lack of longitudinal data are inherent to cross-sectional questionnaire study design. Oversimplification of reality is also one of the limitations of the questionnaire study design because of the multiple-choice questions with preconceived categories. It should be noted that socio-cultural status might also affect an individual's responses. Also, the size of the Danish group was small (1/5<sup>th</sup> of the Turkish group) which could affect statistical calculations. Especially, the male group within the Danish sample was small and this might cause a type 2 error. The effect of social isolation and distance learning might be correlated with the duration. Finally, despite the short duration of data collection, our study groups might not be homogeneous in terms of this effect size. For some time Turkish students have been having distance education while Danish students have already started their semester in class. This fact can cause discrepancies between the Danish survey and Turkish survey outputs.

Some support systems might be helpful for students to cope with psychological problems related to COVID-19 and distance learning. As face-to-face gathering is limited due to pandemic restrictions, online support groups might be helpful. Mental health care workers might provide tele-counselling and parents might behave as positive role models. Governments should support equal opportunity education by providing necessary equipment to families in need. Additionally, hybrid educational models (part-time face-to-face education with infection control measures and part-time online education) might be used to balance the negative effects of online education and the dissemination of the infection.

In conclusion, we found that both the COVID-19 pandemic and distance education had negative effects on the mood status of both Turkish and Danish students. Students reported lower levels of Positive Affects, and higher levels of negative counterparts, compared to the previous studies done prior to the pandemic. Female

students were significantly more severely affected; however, this was true for only the Turkish group. Moreover, students expressed loneliness, boredom and anxiety about the future. Decreased physical activity, sleep problems, eating disorders and domestic abuse were other serious complaints. Despite the fact that there were various socio-economic differences between the students belonging to the two countries, the psychological impact was almost comparable between Turkish and Danish students. Turkish online education system especially that taught by the public schools was not found to be effective. Finally, the great majority in both countries expressed a negative opinion about distance education. Provided that the pandemic and its related restrictions could continue for an indefinite period of time, efficient social welfare measures should be taken by the states and international organizations in order to mitigate its adverse effects.

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