THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' ATTITUDES TOWARD ONLINE EDUCATION AND THEIR STRESS DURING COVID-19 PANDEMIC

Dr. Hale OGEL-BALABAN
ORCID: 0000-0002-3554-5989
Psychology Department
Bahcesehir University
Istanbul, TURKIYE

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ABSTRACT

The aim of the study was to examine the relationship between university students' stress level and their attitude toward online education forced during the COVID-19 pandemic. Furthermore, it analyzed the relationship between the use of online education instruments and attitude. Two hundred eighty-three university students enrolled in the Turkish universities completed demographic information form, use of online education instruments form, attitude toward online education scale and perceived stress scale. Correlational analyses showed that the frequency of following synchronous and asynchronous lectures, working on online course materials and attending to online discussions and meetings with the lecturers and advisors were positively related to the perceived effectiveness of online education and its perception as a means to feel connected. They also demonstrated that the stress level was negatively related to the perceived effectiveness of online education, its perception as a means to feel connected, the frequency of following synchronous video lectures and the frequency of attending to online discussions. Regression analysis demonstrated the predictive effect of the perceived effectiveness of online education on stress level. These findings were discussed in terms of their implications particularly for future emergency education programs and generally for online education.

Keywords: Online education, attitude, COVID-19, stress.

INTRODUCTION

Starting in December 2019 in Wuhan, China, the coronavirus disease (COVID-19) caused by SARS-COV2 creates a massive global health crisis (Chen Wang et al., 2020). On December 30, 2019, the first cluster of pneumonia patients was reported to the World Health Organizations (WHO) and one month later WHO announced the COVID-19 outbreak as a public health emergency of international concern, and in March 2020 it declared COVID-19 pandemic (WHO, 2020). In a short period of time, COVID-19 surpassed previous recent pandemics such as SARS and MERS in terms of the number of the total reported cases and mortality rate (Murphy, 2020). On June 5th the total number of cases reported by WHO was 6.515.796 worldwide. COVID-19 is transmitted from person to person through direct physical contact or coughing or sneezing (Rothan et al., 2020) and the symptoms occur after an incubation period lasting approximately 5.2 days (Li et al., 2020). The physical symptoms of COVID-19 include fever, cough, sore throat, breathing difficulty, vomiting and diarrhea (Carlos et al., 2020; Huang et al., 2020). In severe cases, cardiac injury, respiratory failure and acute respiratory distress are also observed (Holshue et al., 2020). COVID-19 does not only influence physical health, but also psychological health.

Because of the fact that pandemics are threatening to the survival of the human beings, they induce fear in individuals (LeDoux, 2012; Mobbs et al., 2015). During COVID-19, individuals fear from getting infected, having contact with contaminated surfaces and being close to others who might be infected. Fear of infection might lead to avoiding others and withdrawing from daily routines (Polizzi et al., 2020). Individuals have

also concerns about health of their beloved ones, especially older ones or the ones with any physical disease (Fiorillo & Gorwood, 2020). To reduce the transmission of COVID-19, governments implemented several strategies such as social distancing, isolation and quarantine (Devi, 2020). These strategies themselves and how they are communicated to the society might also increase fear responses (Brooks et al. 2020; Devi, 2020; van Bavel et al., 2020). Moreover, as a result of social distancing, individuals become apart from their family members, friends, coworkers, work spaces and educational institutions. They get also withdrawn from comforting activities and routines such as going to restaurants, meeting with friends or going to gyms which leads to the loss of sense of security, safety and stability (Polizzi et al.; 2020; van Bavel et al. , 2020). Furthermore, they switch daily between uncertainty and hope about the course of the pandemic and the socio-economic changes (Buheji et al., 2020). All of these fear-inducing experiences have consequences on psychological well-being. One of these consequences is the increase in the stress level.

Stress is defined as a state of imbalance aroused because of the individual's perception of the demands of the environment or the threats to his/her well-being to be higher than his/her ability to cope with these challenges (Lazarus, 1966; Lazarus & Folkman, 1974). Headaches, back and neck pain, changes in sleeping and eating patterns, worsening of chronic health problems, gastrointestinal problems, forgetfulness, decreased energy level and concentration, and increased use of alcohol and drugs are some of the frequently observed stress syndromes (Monroe & Slavich, 2016). Previous research has demonstrated that these symptoms are experienced during pandemics (Buheji et al., 2020; Devi, 2020). Lee et al. (2007) showed that SARS survivors suffered from stress during the outbreak. Similarly, Rabelo et al. (2016) reported stress and other psychological problems among the Ebola survivors. Stress responses were also reported during the H1N1 pandemic (McCauley et al., 2013; Taha et al., 2014). Brooks et al. (2020) reviewed previous literature on the psychological impact of quarantine on the psychological well-being of Ebola, Sars, H1N1 and other pandemics and concluded that not only the infection itself, but also the quarantine because of being infected leads to long-lasting stress syndromes. Sim et al. (2010) emphasized the importance of studying the psychological impact of infectious diseases on non-infected general population considering the high prevalence of psychological disorders among individuals who had life threatening experiences. During SARS, they reported high psychological morbidity rate including stress symptoms in non-infected individuals. These studies imply that studying the stress symptoms during COVID-19 is essential. In a very recent study, Cuiyan Wang et al. (2020) studied the psychological well-being in the general population in China within the first two weeks of the COVID-19 outbreak. Eight percent of their participants reported moderate to severe stress symptoms. The severity was found to be related to some individual factors. One of these individual factors is being a student.

After the outbreak of COVID-19, social distancing strategies have been implemented to reduce the transmission of the virus. One of these strategies was closing the educational institutions (Murphy, 2020; Cuiyan Wang et al., 2020). On July 17, UNESCO (2020) reported 140 countries implementing countrywide closure of educational institutions. Cuiyan Wang et al. (2020) claimed that this strategy created uncertainty and concerns about academic progression which might have influenced psychological well-being of the students negatively. Online learning systems instead of traditional face-to-face classes were adapted in a short period of time and this might have brought further challenges for the students. Online learning systems require integration of technology into education by the institutions, their teaching staff and students (Ali, 2020). The lack of resources for this integration might interfere with the effectiveness of online education. The education institutions might not have technological infrastructure to support the online platforms (Ali, 2020; Nadeak 2020). The teaching staff might not be ready to use the technological devices and online platforms. Even if they are ready, the curriculum might not be easily adapted to the online platforms and the practical requirements of the course cannot be implemented (Harsha & Bai, 2020). They should be provided training and support (Ali, 2020; Vrasidas, 2015). Moreover, although students might be regular users of technological devices, they may not have enough knowledge and technology skills to use online platforms (Ali, 2020). There might be a discrepancy between what young individuals are believed to do with technology and their actual technology knowledge (Ali, 2020). Furthermore, even if they are knowledgeable enough to use technology for online education, they might not have mobile devices and strong internet connectivity required for the online courses (Harsha & Bai, 2020). All of these intricacies might create a negative attitude toward online education and trigger more stress in students.

On the other hand, online education might provide some means to cope with stress during COVID-19. Working on meaningful tasks, being creative, engaging in mentally challenging activities, having purposes and planning to achieve goals are claimed to be among the ways of coping with stress (Buheji et al., 2020; Devi, 2020; Polizzi et al., 2020). These activities provide a sense of control and achievement (Polizzi et al., 2020). They help to recover from negative experiences, free-up cognitive resources to deal with changing situations and reduce the effect of stress (Bonanno et al., 2010; Fredrickson et al., 2003). Engaging in online education, students have mentally challenging tasks such as assignments, projects and exams. They have to make plans for them and work actively on them. All of these activities provide to the students purposes and a sense of control which might help them to cope with stress. Staying connected with others is another strategy to manage stress level (Buheji et al., 2020; Polizzi et al., 2020). Through online education, students stay in contact with their lecturers and classmates. They have discussions with their lecturers or conduct group projects with their classmates. In these activities, they exchange knowledge, express empathy, work for a common goal, share resources and engage in prosocial behaviors. All of these might establish a positive attitude and facilitate coping with stress.

Considering both the possible positive and negative effects of online education on students, it can be claimed that how the students' perceive online education might be an important factor related to their psychological well-being. Having positive attitudes toward online education might decrease their stress level whereas perceiving online education negatively might intensify their stress. Testing this relationship, the main aim of the present study was to examine this relationship between university students' attitude toward online education and their stress level. Moreover, considering the effect of the experience on the perception of technology assisted learning (e.g. Abbad et al., 2009; Abdullah & Ward, 2016; Lee et al., 2013) the present study also analyzed whether the frequency of using online education tools by university students is related to their attitude toward online education and their stress level. The study was conducted with university students in Turkey.

In Turkey, the first case with COVID-19 was reported on March 10, 2020 by the Ministry of Health and the first death of a patient infected with COVID-19 on March 15. On June 15, the total number of cases was reported to be 178.239 and the total number of deaths to be 4.807 (Turkish Ministry of Health, 2020). As a policy to reduce the transmission of the pandemic, the Turkish government first announced one-week-long break for the educational institutions and then started the period of online education on March 23 (Turkish Ministry of Education, n.d.). Depending on their technological infrastructure, the universities in Turkey implemented various strategies for online education. The present study covered these strategies and their relationship to undergraduate students' attitude toward online education and their psychological well-being.

METHOD

Participants

Two hundred eighty-seven undergraduate students were recruited through snowball sampling. Four participants reported that their universities did not start online education, so they were excluded from the study and analyses were conducted with the data from 283 participants (227 female, 80.2%). The mean age of participants was 22.13 years (SD_{age} = 1.55, *Min* = 18, *Max* = 28). One hundred fourteen participants were students at the university in which the author is lecturing. The remaining participants were students at 52 different universities across Turkey. At the time of data collection, 60% of the participants were living in Istanbul, and the remaining participants were living in 28 different cities in Turkey. The demographic characteristics of the participants were presented in Table 1.

Table 1. Demographic characteristics of the participants (N = 283)

Variable	n	%
Relationship status		
Single	175	61.84
In a relationship	108	38.16
Perceived financial status		
Good	167	59.01
Mediocre	108	38.16
Poor	8	2.83
Living condition before COVID-19		
With family members	170	60.07
In dormitory	25	8.83
With friends	44	15.55
Alone	44	15.55
Living condition after COVID-19		
With family members	256	90.46
In dormitory	---	---
With friends	17	6.01
Alone	10	3.53

Measures

Demographic Information Form

The demographic information form includes questions about the age, the gender, the perceived financial status, the university, the grade point average, and where and with whom the participants were living before and after COVID-19 outbreak.

Use of Online Education Instruments Form

The use of online education instruments form consists of questions about the extent of the participants' use of different tools provided by their universities for online education. It includes questions about whether the universities provided online education tools such as synchronous video or audio lectures during which the students can interact with the lecturer and with each other; asynchronous recorded video or audio lectures during which there is no interaction between the students and lecturers; online library resources and course materials such as lecture notes; online discussion sessions with the lecturers and classmates; and video and audio meetings with the advisors. It also measures the frequency of participants' use of the available instruments on a 4-point Likert scale ranging from 1- never to 4- very frequently. The list of the instruments was created by checking the means used by different universities for online education through their websites.

Attitude toward Online Education Scale

This scale is constructed for the present study to analyze the attitude of university students toward online education during COVID-19 days. It includes eight items on the effectiveness of online education (e.g. 'Online education is as effective as face-to-face education', 'Online education provides me opportunities

to learn on my own pace') and three items on feeling connected through online education (e.g. 'Online education makes me feel connected to my friends'). Items were rated on a 5-point Likert scale ranging from 1-I don't agree to 5- I certainly agree. A principal component analysis (PCA) was run on the 11 items with orthogonal rotation (Varimax). The Kaiser-Meyer-Olkin measure confirmed the sampling adequacy for the analysis, KMO = .92 (Field, 2009). Bartlett's test of sphericity demonstrated that correlations between the items were sufficient for PCA, $\chi^2(55) = 1455.43$, $p < .001$. There were two components with eigenvalues over Kaiser's criterion of 1 explaining in combination 61.52 % of the variance. The scree plot verified these two components. Three items which cross-loaded in the factor matrix were excluded. Two factors were identified. The first component consisting of 5 items represented the perceived effectiveness of online education. It had an internal consistency with a Cronbach's α of .85. The second component representing the perception of online education as a means to feel connected had 3 items. Its internal consistency was .71. The mean scores of the items in each component formed the score for that component (the perceived effectiveness of online education score and the perceived connectedness through online education score). The higher scores indicated positive attitude.

Perceived Stress Scale

The perceived stress scale was developed by Cohen, Kamarck and Mermelstein (1983) to measure stress level in different circumstances. It was adapted to Turkish by Eskin, Harlak, Demirkiran and Dereboy (2013). It includes 14 items rated on a 5-point Likert scale ranging from 1(never) to 5 (very frequently). The sum of the scores on all items formed the stress score ranging between 14 and 70. Higher scores indicate higher stress level. In the adaptation study, its internal consistency was .84; and the test-retest reliability was .87. In the present study, the internal consistency was found to be .88.

Procedure

The present study was approved by the Ethical Committee of the author's institution. The participants were contacted through e-mails or online announcements between April 20, 2020 and May, 1 2020. The consent form and the questionnaires were presented to the participants online via a survey software in the following order: the demographic information form, the use of online education instruments form, the attitude toward online education scale and the perceived stress scale. The completion of all the scales was anonymous and took approximately 10 minutes.

Data Analyses

The present study had a correlational design. All statistical analyses were performed with SPSS 24. Prior to analyses, the assumptions of the normality of the sampling distribution were tested and found to be satisfied (Tabachnick & Fidell, 2014). Due to the fact that the skewness and kurtosis values of all variables were below the critical limits, no transformation was undertaken (Field, 2009; Tabachnick & Fidell, 2014). First, descriptive statistics were run for the frequency of the use of online education instruments, the perceived effectiveness of online education score, the perceived connectedness through online education score, and the stress score. Then, to analyze the relationship between the use of online education tools, the attitude toward online education and the stress level, correlational analyses were conducted with the frequency of the use of online education tools, the perceived effectiveness of online education score, the perceived connectedness through online education score, and the stress score. Lastly, to identify the predictors of the stess level, a regression analysis was run with the stress score as the criterion and the variables correlated with it as the predictors.

FINDINGS

Table 2 presents the frequency of the use of online education instruments.

Table 2. Frequencies of the use of the online education instruments

Variable	n	%	M	SD
Synchronous lectures				
With video	266	94.00	3.24	.82
With audio	196	69.30	2.67	.94
Asynchronous lectures				
With video	258	91.2	2.88	.95
With audio	191	67.5	2.65	1.02
Online resources				
Library	243	85.90	2.11	1.03
Lecture material	261	92.2	2.70	1.03
Online discussion	226	79.9	2.56	1.06
Online video meeting	168	59.4	2.15	1.09
Online audio meeting	201	71	2.36	1.04
Meeting with advisor				
Video meeting	169	59.7	2.02	1.13
Audio meeting	190	67.1	2.02	1.06

Table 3 displays the descriptive statistics for the stress score measured with the Perceived Stress Scale, the perceived effectiveness of online education score and the perceived connectedness through online education score measured with the Attitude toward Online Education Scale.

Table 3. Descriptive statistics for the stress score, the perceived effectiveness of online education score and the perceived connectedness through online education score

Variable	M	SD	Min	Max
Stress score	45.05	7.84	19	69
Effectiveness score	2.49	.93	1	5
Connectedness score	3.23	.91	1	5

Table 4 shows the Pearson's correlation coefficients between the use of the online education instruments, the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score), and the stress score.

The perceived effectiveness of online education score was found to be positively correlated with the frequency of following the synchronous lectures (with video and audio), the frequency of following asynchronous lectures (with video and audio), the frequency of using online library resources, the frequency of using online lecture materials, the frequency of attending to online discussions with lecturers and classmates, and the frequency of meeting with advisors. The perceived connectedness through online education score was shown to be positively correlated with the frequency of following synchronous and asynchronous lectures with video, the frequency of using online lecture materials, the frequency of attending to online discussions, the frequency of attending to audio meetings with the lecturers, and the frequency of meeting with the advisors. The stress score was found to correlate negatively with the frequency of attending to synchronous video lectures and the frequency of attending to online discussions with the lecturers and classmates.

Table 4. Correlations between the frequency of the use of the online education instruments, the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score) and the stress score

Variable	Effectiveness	Connectedness	Stress
Synchronous lectures			
With video	.22***	.24***	-.17**
With audio	.22**	.13	.03
Asynchronous lectures			
With video	.15*	.15*	.06
With audio	.15*	.07	-.02
Online resources			
Library	.16*	.11	-.05
Lecture material	.24***	.15**	-.07
Online discussion	.20**	.14*	-.16*
Online video meeting	.12	.15	-.05
Online audio meeting	.11	.19**	.14
Meeting with advisor			
Video meeting	.22**	.16*	-.12
Audio meeting	.16*	.14*	-.13

Note. $^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$

In addition, Table 5 presents the Pearson's correlation coefficients between the stress score and the attitude toward online education scores. The stress score was found to be negatively correlated with the perceived effectiveness of online education score and the perceived connectedness through online education score.

Table 5. Correlations between the stress score and the attitude toward online education scores (the perceived effectiveness of online education score and the perceived connectedness through online education score)

Variable	1	2	3
1.Stress score	-		
2.Effectiveness score	-.31***	-	
3.Connectedness score	-.19**	.52***	-

Note. $^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$

As shown in Table 6, regression analysis with the stress score as the criterion; and the frequency of attending to the synchronous video lectures, the frequnecy of attending to the online discussions, the perceived effectiveness of online education score and the perceived connectedness through online education score as the predictors demonstrated that only the perceived effectiveness of online education score predicted negatively the stress score (β = -.26, t = -3.46, p = .001). It explained 13% of the variance in the stress score, $F(4, 212) = 7.59$, p = .000.

Table 6. Predictors of the stress score

Variable	Model B
Constant	55.01***
Effectiveness score	-2.06**
Connectedness score	.78
Synchronous lectures with video	-.20
Online discussion	-.59
R^2	.13
F	7.59***

Note. $^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$

DISCUSSIONS AND CONCLUSION

The aim of the present study was to examine the relationship between the university students' attitude toward online education and their stress level during COVID-19 pandemic. The change in the education system from the traditional face-to-face system to the online system was one of the major challenges for the university students during the COVID-19 days. The present study measured their attitude toward online education in terms of its effectiveness and its function as a tool for connectedness. It demonstrated that perceived effectiveness of online education predicted students' stress level negatively. This finding suggested that considering online education as effective might help university students to deal with the change in the education system more easily and adapt to it more successfully which in turn might contribute to their psychological well-being. On the other hand, perceiving online education as less effective might create difficulties in adapting to the new system and concerns about academic achievement which might increase the stress level of university students.

With the closure of the campuses and other facilities like the dormitories and cafeterias, students might have become isolated. Online education system might provide some means to them to feel socially connected and students who feel connected to others through online education system might be expected to have lower stress level. Supporting this expectation, the present study demonstrated a negative relationship between the perceived connectedness through online education and stress. However, feeling connected to others was not found to predict the stress level. Most of the students in the present study were living with their families who might provide them a sense of connectedness and social support which help them more to deal with their stress. Through online education, they might stay connected with their lecturers, class mates and universities, but these connections might not be the primary source for them to cope with their stress. Another possibility is that feeling connected to others through online education might fulfill the basic psychological need of relatedness and be indirectly related to well-being of students. Supporting this possibility, Holzer et al. (2021) demonstrated the relationship between the satisfaction of the relatedness need, positive emotion and intrinsic learning motivation during the COVID-19 period.

The present study also analyzed the relationship between the use of online education instruments and university students'attitude toward online education. It was found that the frequencies of following synchronous and asynchronous lectures, using online resources like library and lecture materials, attending to online discussion hours with the lecturers and classmates and having meetings with the advisors are positively related to the perception of the effectiveness of online education. The importance of the active interaction with the lecturers and lecture materials for effective online education has been previously demonstrated (Bao, 2020; Demuyakor, 2020). The present study supported this relationship further. Additionally, it suggested that not only these resources but also having active interaction with the academic advisors is also critical for the perceived effectiveness of online education. Moreover, the asynchronous lectures including the recorded videos or audios of the lecturers provide some flexibility to students. They are available to all students for a period of time in which they can learn on their own pace. They are useful especially for students who cannot attend to synchronous lectures. These might create a sense of control and lead to a more positive attitude toward online education. Asynchronous courses were claimed to be a good learning resource, especially for

adult learners and for the times of emergency (Hodges et al., 2020). The present study supported this claim by indicating its positive relationship to the attitude towards online education.

The frequencies of attending to synchronous video lectures, having course materials available online, engaging in online discussions and meeting with the lecturers, classmates and academic advisors were shown to be positively related to the perception of online education as a means to feel connected. One of the challenges of online education is the creation of a sense of connectedness and community

(Seiver & Troja, 2014; Shlossberg & Cunningham, 2016). Besser et al. (2020) claimed that sense of connectedness and belongingness is essential not only for well-being, but also for learning motivation, attention and adaptability of university students during the COVID-19 period. The present study suggested that interactive online education instruments such as online discussions with the lecturers and classmates, synchronous lectures in which the lecturers are visible and interact actively with the students, and meetings with the academic advisors might be useful for the formation of the sense of connectedness. Recently, Holzer et al. (2021) suggested similar online education tools to promote connectedness between students during the pandemic.

Online discussions with the lecturers and synchronous video lectures were found to be negatively related to the stress level of the university students. Sun et al. (2020) mentioned that Chinese university students reported that lecturers provide positive energy to them in their online lectures which help them to deal with stress resulted from quarantine. The findings of the present study supported this relationship further and extended it to a new cultural context.

In general, supporting the previous studies demonstrating the positive relationship between experience with and attitude toward the technology-based education systems (e.g. Abbad et al., 2009; Abdullah & Ward, 2016; Lee et al., 2013), the present findings suggest that the students' use of online education instruments provided by their universities is important for their attitude toward online education. Encouraging students to use these resources might be useful in creating a positive attitude toward online education which might help them to deal with their stress. On the other hand, in a recent study Cicha et al. (2021) demonstrated that the experience of the first-year university students in Poland with the distance learning process has a negative impact on their attitude toward the tools used for it. They attributed this negative relationsip to the constant updates of the online learning platforms and procedures. The contradiction between their findings and those of the present study indicated the need for further research on the relationship between the experience with and the attitude towards online education during the pandemic.

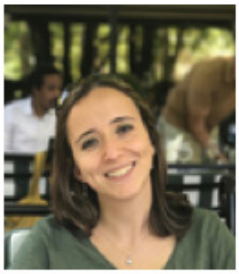
There are only a few studies in literature examining the effect of the pandemics on the education systems (Toquero, 2020). Hodges et al. (2020) stated that the educational systems implemented quickly by the universities as a strategy to prevent the spread of the COVID-19 is different than online education systems in which courses and other educational activities are designed specifically to be online. They called the former one as emergency remote teaching. The findings of the studies examining the educational systems during the COVID-19 pandemic as the present one might provide insight particularly into future emergency remote training programs, but also generally into online education systems. In the past ten years, some of the best universities in the world have changed their teaching methods and increased gradually the number of online courses. It is expected that in 2030, online courses will become more prevalent (Demuyakor, 2020). With this respect, the present study provides clues about the important online education instruments and their relationship to students' attitude toward online education.

The present study has several limitations. First of all, because of the unequal gender distribution in the sample male and female students' stress levels and attitudes cannot be compared although a recent study by Cuiyan Wang et al. (2020) showed that females experience more stress than males during the COVID-19 outbreak. Moreover, the data were collected almost one and a half months after the start of online education from mostly undergraduate students of middle and high socioeconomic background. With time and experience, the level of stress and the attitude toward online education might change. Students from disadvantaged backgrounds might experience financial and technical difficulties to have access to devices, internet connection and software necessary for online education (Alipio, 2020). These possibilities restrict the generalizability of the present findings. In addition, some other factors which might contribute to the students' well-being such as their resilience level and social support available to them, and factors which

might be related to the attitude toward online education such as previous courses taken online, technological problems which make engaging in online education difficult were not included and controlled. Moreover, the present study was a survey research in which data are based on the self-report of the participants and causal relationships can not be derived.

To sum up, examining the effect of COVID-19 pandemic on non-infected individuals is important. The present study focused on one specific group of individuals namely the university students which were reported to constitute one of the risk groups to experience stress during COVID-19 because of the shift from face-to-face education to online education. It demonstrated that having positive attitudes toward the effectiveness of online education is related to lower stress level. Moreover, it suggested that the frequency of the use of online education tools is related to the attitude toward the effectiveness of online education and its perception as a means for connectedness.

BIODATA and CONTACT ADDRESSES of AUTHOR



Dr. Hale OGEL-BALABAN is an assistant professor in the Psychology Department at Bahcesehir University. She received her bachelor's and master's degrees in Psychology from Bogazici University. She completed her Ph.D. in Cognitive Science at the Middle East Technical University. Her research interests include language acquisition, cognitive development, and their interaction. She is also interested in the use of social media and technology by children and adults.

Hale OGEL-BALABAN
Psychology Department, Faculty of Economics, Administrative and Social Sciences
Address: Bahcesehir University, 34353, Istanbul, TURKIYE
Phone: +90 2123815637
E-mail: hale.ogelbalaban@eas.bau.edu.tr

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