



Research article

The association of perceived sociability and social intelligence with loneliness in online learning among nursing students[☆]

Cemile Savci^{a,*}, Ayse Cil Akinci^{a,b}, Furkan Keles^a

^a Department of Nursing, Faculty of Health Sciences, Istanbul Medeniyet University, Istanbul, Turkey

^b School of Nursing, Loma Linda University, CA, USA

ARTICLE INFO

Keywords:

COVID-19

Loneliness

Nursing student

Online learning

Perceived sociability

Social intelligence

ABSTRACT

Background: As a result of the decrease in socialization levels in computer-supported collaborative learning settings and/or interactions in social environments during the Coronavirus Disease 2019 (COVID-19) pandemic, the adverse influence on the social intelligence development of nursing students could trigger loneliness.

Objectives: The aim of this study was to evaluate the association of perceived sociability and social intelligence on loneliness in online learning among nursing students in Turkey.

Design: Descriptive, correlational and predictive study.

Setting and participants: A total of 246 nursing students in the Nursing Department of a state university in the Istanbul province of Turkey were included.

Methods: Data were collected using the Participant Information Form, Sociability Scale, UCLA Loneliness Scale-8 (ULS-8) for the Adolescents, and Tromso Social Intelligence Scale (TSIS) between November 2020 and December 2020. A multiple linear regression analysis was performed to identify predictors of loneliness. A *p* value of <0.05 was considered statistically significant.

Results: The total mean Sociability Scale score was 23.54 ± 7.51 (range: 10–46). The total mean TSIS score was 74.15 ± 9.98 (range: 46–105) and the total mean ULS-8 was 13.91 ± 4.98 (range: 7–27). Perceived sociability in online learning ($\beta = -0.321, p < .001$), and social intelligence ($\beta = -0.347, p < .001$) were significant negative predictors ($R^2 = 0.269, p < .001$) of loneliness.

Conclusion: Perceived sociability in online learning and social intelligence was associated with the level of loneliness of this population during online learning.

1. Introduction

The World Health Organization (WHO) declared the Coronavirus Disease 2019 (COVID-19) as a pandemic on March 11, 2020 (Adnan and Anwar, 2020; Huang et al., 2020; WHO, 2020). The COVID-19 pandemic has dramatically affected all aspects of life including an unprecedented disruption in healthcare systems, economic activity, work life, social life, and academic life. A variety of restrictions have been implemented for public health across the world. Closing schools and attending online/distance learning are among the major restrictions. In many countries, schools were closed at the beginning of the pandemic, and electronic learning on digital platforms became available to maintain social distancing while continuing education without interruption. In the

scope of such measures, on March 23, 2020 the Higher Education Board of Turkey decided to initiate a remote learning process in universities (Telli and Altun, 2020).

Distance learning became the best option to carry out education during the pandemic. Distance learning is teaching and planned learning activities using online/digital learning platforms. These activities occur in a different place from the teaching and require special methods of communication, special instructional techniques, and special institutional organization (Moore and Kearsley, 2012). Educational institutions play a critical role in the socialization of students, and sociability has been adversely affected during the pandemic due to social distancing and the widespread use of online learning, making students vulnerable to loneliness (Bozkurt, 2020; Hoffart et al., 2020; Telli and

[☆] Note: Research has not been published in Turkey or abroad, in Turkish or any other language, or has not been sent to a journal for publication. It has not been previously communicated at a congress.

* Corresponding author at: Medeniyet Üniversitesi, Atalar Mah., Şehit Hakan Kurban Cad., 34862 Kartal/Istanbul, Turkey.

E-mail addresses: cemile.savci@medeniyet.edu.tr (C. Savci), ayse.cilakinci@medeniyet.edu.tr (A. Cil Akinci), furkan.keles@medeniyet.edu.tr (F. Keles).

<https://doi.org/10.1016/j.nedt.2021.105226>

Received 18 April 2021; Received in revised form 25 October 2021; Accepted 14 November 2021

Available online 22 November 2021

0260-6917/© 2021 Elsevier Ltd. All rights reserved.

Altun, 2020). Loneliness was also a common experience among nursing students during the pandemic and 89.27% experienced moderate to severe loneliness (Labrague et al., 2021). Weiss (1973) defines loneliness as the lack of social interactions desired by the individual or as the lack of sincerity and affinity in the current relationships of the individual. Although the pandemic restrictions often increase the feeling of loneliness (Labrague et al., 2021), it is not the case for every individual. A study conducted with university students prior to the pandemic reported a negative correlation between social intelligence and loneliness (Dogan and Cetin, 2006). Social intelligence is described as the ability of individuals to interpret relationships with other individuals, establish emotional connections, cooperate, and utilize social interaction skills (Albrecht, 2006). Social intelligence develops over time from experiences with family members and others and learning from successes and failures in social settings. Although the exact effect of distance learning on social intelligence among undergraduate students is unclear, a study showed that students frequently experienced social intelligence components and they could express themselves effectively and cared and established empathy with others in online course settings (Meyer and Jones, 2012).

While a study assessing loneliness in nursing students during the pandemic was encountered (Labrague et al., 2021), no studies evaluating the association of perceived socialization and social intelligence in online learning with loneliness were encountered. Decreasing socialization levels of nursing students in online learning settings and/or decreasing interactions in social environments might negatively affect social intelligence development, triggering loneliness. Recognition of factors affecting loneliness in the online learning setting would enable planning and application of incentives directed towards decreasing/removing loneliness.

We aimed to evaluate the association of perceived sociability and social intelligence with loneliness in online learning among nursing students during the pandemic. In this study, the following questions were addressed: i) What are the socialization, social intelligence, and loneliness levels of nursing students in online learning settings during the pandemic?; ii) Is there any relationship between the level of sociability, social intelligence, and loneliness during online learning?; iii) Are sociability and social intelligence predictors of loneliness during online learning?

2. Methods

2.1. Study design and study population

This descriptive, correlational and predictive study was conducted in the Health Sciences, Nursing Department of a state university in the Istanbul province of Turkey between November 2020 and December 2020. The population of the study consisted of 350 volunteer nursing students ≥ 18 years. The sample size was calculated as 183 students using a known population sample size formula at a 95% confidence level and with a 0.05 sampling error. The study was completed with 246 undergraduate nursing students (70.2% of the population).

2.2. Data collection tools

In the collection of study data, a 'Participant Information Form' prepared by the authors in line with the literature (Adedoyin and Soykan, 2020; Cauberghe et al., 2020; Roskvist et al., 2020; Subedi et al., 2020; Wei and Chou, 2020; Dogan and Cetin, 2006) (see Supplementary material). Additionally, 'The Sociability Scale' was used to measure the degree of socialization perceived in the Computer-Supported Collaborative Learning (CSCL) environment, 'Tromso Social Intelligence Scale' to assess social intelligence, and 'UCLA Loneliness Scale (ULS-8) – For Adolescents' to measure loneliness.

The Participant Information Form included 14 items regarding descriptive characteristics of the participants including age, sex, class/

year, residency, internet and social media use before and after COVID-19, interpersonal relationships before and after the pandemic, past experience with online interactions, preferred type of interaction, and satisfaction with online interactions.

The Sociability Scale is a self-reporting questionnaire originally developed by Kreijns et al. (2007) to assess the perceived sociability of CSCL environments. The validity and reliability studies of the scale in the Turkish population were conducted by Bardakci (2010). It uses a 5-point Likert-type scale consisting of 10 items under a single factor. All items contribute to the total score. The maximum score is 50 and the minimum score is 10. Higher scores indicate a favorable perceived sociability level via online learning. The Cronbach alpha internal consistency coefficient (ICC) of the Turkish version of the scale was 0.82 (Bardakci, 2010). In the present study, the ICC was 0.90.

The Tromso Social Intelligence Scale (TSIS) is a self-report measure originally developed by Silvera et al. (2001) to evaluate three areas of social intelligence: social information processing (SIP), social skills (SS), and social awareness (SA). The validity and reliability studies of the scale in the Turkish population were performed by Dogan and Cetin (2009). It consists of 21 items. In the SIP subscale, the ability to understand verbal and non-verbal messages regarding human interactions, empathizing, and reading hidden messages, as well as explicit messages are evaluated. In the SS subscale, the basic communication skills (i.e., active listening, acting boldly, and establishing, maintaining, and breaking up a relationship) are measured. In the SA subscale, the ability of active behavior according to the situation, place, and time is assessed. It uses a 5-point Likert-type scale with a minimum score of 21 and a maximum score of 105. Higher scores indicate a higher level of social intelligence. In the SIP subscale, minimum and maximum scores are 8 and 40, respectively. In the SS subscale, minimum and maximum scores are 6 and 30, respectively. In the SA subscale, minimum and maximum scores are 7 and 35, respectively. The Cronbach alpha ICC of the Turkish version was 0.75 with 0.76, 0.83, and 0.71 for the SIP, SS, and SA subscales, respectively (Dogan and Cetin, 2009). In the present study, the Cronbach alpha ICC of the scale was 0.84 with 0.82, 0.78, and 0.77 for the SIP, SS, and SA subscales, respectively.

The ULS-8 for the adolescents was originally developed by Hays and DiMatteo (1987) to evaluate loneliness. The validity and reliability studies of the scale in the Turkish population were carried out by Yildiz and Duy (2014). It consists of eight items and uses a 4-point Likert-type scale. The maximum score is 32 and the minimum score is 8. Higher scores indicate a greater level of perceived loneliness. The Cronbach alpha ICC of the Turkish version of the scale was 0.94 (Yildiz and Duy, 2014). In the present study, the Cronbach alpha ICC was 0.87.

2.3. Ethical considerations

The study was approved by the local Ethics Committee (04.11.2020/41) and conducted in accordance with the principles of the Declaration of Helsinki. Study data were collected online using Google Form. The survey link/Google Form was shared with the participants via e-mail. In the e-mail, participants were informed about the purpose of the study and those that marked the "I agree with participating in the survey" expression at the top of the Google Form were requested to fill out the form.

2.4. Statistical analysis

Statistical analysis was performed using SPSS version 22.0 software (IBM Corp., Armonk, NY, USA). Continuous variables were expressed in mean $\pm$ standard deviation (SD) or median (min-max) values, whereas categorical variables were expressed in number and frequency, where applicable. The normality assumption was checked using the skewness and kurtosis values. As the distribution was normal, an independent samples *t*-test, one-way analysis of variance (ANOVA), and Bonferroni corrections for *post-hoc* analysis were used to compare total and subscale

scores. The Pearson correlation coefficient was calculated to analyze correlations between two normally distributed quantitative variables. A multiple linear regression analysis was performed to identify predictors of loneliness. A p value of <0.05 was considered statistically significant.

3. Results

Of the 246 undergraduate nursing students, 43 were males and 203 were females. The mean age was 20.02 ± 1.97 (range, 18 to 34) years. A total of 44.7% of participants were living in the metropolitan area and the mean number of family members was 5.00 ± 1.86 (range, 1 to 12). The mean daily duration of Internet use was 3.39 ± 2.19 (range, 1 to 16) hours before the pandemic and 6.38 ± 2.73 (range, 1 to 16) hours after the pandemic. The mean daily time spent on social media was 2.33 ± 1.68 (range, 1 to 10) hours before the pandemic and 3.88 ± 2.32 (range, 1 to 16) hours after the pandemic (Table 1).

Before the pandemic, the majority of the participants had no difficulty in interpersonal relationships (64.2%), face-to-face interactions (59.8%), and domestic relationships (58.1%), while physical contact and social activities were limited in 63.4% and 56.9% of the participants, respectively. After the pandemic, the majority of the participants experienced difficulties in interpersonal relationships (79.3%) and face-to-face interactions (95.5%) with remarkable restrictions in physical contact (98.8%) and social activities (95.9%). The majority of the participants (65.0%) were familiar with the online tools before the pandemic and face-to-face interaction was the preferred interaction method for 62.2% of them. A total of 27.2% of participants were dissatisfied with the online learning, while 35.0% were somewhat satisfied (Table 1).

The total mean Sociability Scale score was 23.54 ± 7.51 (range, 10 to 46). The total mean TSIS score was 74.15 ± 9.98 (range, 46 to 105) and the total mean ULS-8 was 13.91 ± 4.98 (range, 7 to 27). The mean SIP, SS, and SA subscale scores of the TSIS were 28.09 ± 4.87 (range, 12 to 40), 20.62 ± 4.26 (range, 6 to 30), and 25.43 ± 4.51 (range, 12 to 35), respectively (Table 2).

There was a negative significant correlation between the total mean scores of Sociability Scale and ULS-8 ($r = -0.392$, $p < .05$). A negative significant correlation was observed between the total mean ULS-8 scores and SS ($r = -0.468$, $p < .05$) and SA ($r = -0.361$, $p < .05$) subscale scores of the TSIS (Table 3).

The total mean ULS-8 scores of male participants versus female participants and of first-year students versus second-year students were significantly higher ($p < .05$). The mean ULS-8 scores were also significantly higher among the participants who experienced difficulties in interpersonal and domestic relationships and had fewer face-to-face interactions and social activities before the pandemic ($p < .05$). Similarly, the mean ULS-8 scores were significantly higher among the participants who experienced difficulties in interpersonal and domestic relationships after the pandemic ($p < .05$). The mean ULS-8 scores were significantly higher among the participants who were dissatisfied with online learning than satisfied, somewhat satisfied, and neither satisfied nor dissatisfied ($p < .05$) (Table 4).

Perceived sociability in online learning ($\beta = -0.321$, $p < .001$) and social intelligence ($\beta = -0.347$, $p < .001$) were significant negative predictors ($F = 44.684$, $p < .001$) of loneliness. The total variance in loneliness explained by these two variables was 27% ($R^2 = 0.269$, $p < .001$) (Table 5).

4. Discussion

In this study, the mean daily time spent on social media was 2.33 ± 1.68 h before the pandemic and 3.88 ± 2.32 h after the pandemic. Studies conducted in Wuhan, where the first case of COVID-19 was identified, showed that children and adolescents experienced serious consequences due to physical inactivity and limited social interactions (Cauberghe et al., 2020; Xiang et al., 2020) and used social media tools

Table 1

Participants' characteristics ($n = 246$).

Variable	Mean $\pm$ SD	Min-Max
Age (year)	20.02 ± 1.97	18–34
	n	%
Sex		
Male	43	17.5
Female	203	82.5
Class/year		
1	87	35.4
2	71	28.9
3	40	16.3
4	48	19.5
Residency		
Village/town	27	11.0
District	71	28.9
Province	38	15.4
Metropolitan city	110	44.7
	Mean $\pm$ SD	Min-Max
Number of person(s) living with	5.00 ± 1.86	1–12
Duration of Internet use before the pandemic (hour/day)	3.39 ± 2.19	1–16
Duration of Internet use after the pandemic (hour/day)	6.38 ± 2.73	1–16
Time spent on social media before the pandemic (hour/day)	2.33 ± 1.68	1–10
Time spent on social media after the pandemic (hour/day)	3.88 ± 2.32	1–16
	Yes n (%)	No n (%)
Interpersonal relationships before the pandemic		
Difficulty in interpersonal relationships	88 (35.8)	158 (64.2)
Limited face-to-face interaction	99 (40.2)	147 (59.8)
Limited physical contact	156 (63.4)	90 (36.6)
Difficulty in domestic relationships	103 (41.9)	143 (58.1)
Limited social activities	140 (56.9)	106 (43.1)
Interpersonal relationships after the pandemic		
Difficulty in interpersonal relationships	195 (79.3)	51 (20.7)
Decreased face-to-face interaction	235 (95.5)	11 (4.5)
Decreased physical contact	243 (98.8)	3 (1.2)
Difficulty in domestic relationships	163 (66.3)	83 (33.7)
Limited social activities	236 (95.9)	10 (4.1)
Past experience with online interaction		
Yes	160	65.0
No	86	35.0
Preferred type of interaction		
Face-to-face	153	62.2
Online	40	16.3
Both	53	21.5
Satisfaction level during/from online learning		
Dissatisfied	67	27.2
Somewhat satisfied	86	35.0
Neither satisfied nor dissatisfied	66	26.8
Satisfied	25	10.2
Very satisfied	2	0.8

Data are given in mean $\pm$ SD, range values, or number and percentage, unless otherwise stated. SD: standard deviation.

to cope with low mood and negative thoughts as a form of escapism (Cauberghe et al., 2020). In a study, Fernandes et al. (2020) found the mean daily time spent on social media was 5.37 ± 3.72 h before the pandemic and 7.81 ± 6.86 h after the pandemic. In another study, Boursier et al. (2020) reported that 7.4% of the participants were spending >4 h daily on social media before the pandemic, while this rate increased 21.2% after the pandemic. Consequently, the findings of this study once again verified that the pandemic increased social media use.

In the present study, face-to-face interaction was the preferred method for 62.2% of the participants whereas 27.2% of participants were dissatisfied with the online learning and 35.0% were somewhat satisfied. In a previous study, Paechter and Maier (2010) reported that

Table 2

Distribution of Sociability Scale, TSIS, and ULS-8 scores (n = 246).

		Min	Max	Mean $\pm$ SD
Sociability scale	Total	10.00	46.00	23.54 $\pm$ 7.51
TSIS	Social information processing	12.00	40.00	28.09 $\pm$ 4.87
	Social skills	6.00	30.00	20.62 $\pm$ 4.26
	Social awareness	12.00	35.00	25.43 $\pm$ 4.51
	Total	46.00	105.00	74.15 $\pm$ 9.98
ULS-8	Total	7.00	27.00	13.91 $\pm$ 4.98

Data are given in mean $\pm$ SD and range values, unless otherwise stated. SD: standard deviation. TSIS: Tromso Social Intelligence Scale; ULS-8: UCLA Loneliness Scale-8.

Table 3

Correlation between ULS-8 scores, TSIS, and sociability scale (n = 246).

		TSIS				Sociability scale
		Social information processing	Social skills	Social awareness	Total	Total
ULS-8	<i>r</i>	-0.101	-0.468	-0.361	-0.412	-0.392
	<i>p</i>	0.114	0.000**	0.000**	0.000**	0.000**

Pearson correlation analysis. ** $p < .01$. ULS-8: UCLA Loneliness Scale-8; TSIS: Tromso Social Intelligence Scale.

students mostly preferred online learning with specific teaching materials for healthy communication in which a shared understanding was derived and interpersonal relationships were established. On the other hand, [Adnan and Anwar \(2020\)](#) found that the majority of students (71.4%) appreciated traditional teaching methods more than online learning and that traditional methods were more motivating. In a meta-analysis including over 1000 published articles comparing traditional versus online learning between 1996 and 2008, [Means et al. \(2009\)](#) concluded that, although online learning had certain advantages over traditional learning practices, a hybrid learning model combining face-to-face and online teaching seemed to be the most effective method. Of note, the effectiveness of online learning may vary depending on the lecture and discipline. [Roskvist et al. \(2020\)](#) reported that medical students were satisfied with online learning to grasp theoretical knowledge of the field via Zoom videos, live broadcasts, and webinars. However, [Abbasi et al. \(2020\)](#) showed that nearly half of the health sciences students preferred the hybrid learning model (classroom and clinical setting and online learning). Theoretical knowledge and clinical skills are the major inseparable components of health sciences education, such as medicine and nursing. In general, nursing education programs encompass online learning via virtual simulations and videos to teach cognitive readiness and psychomotor skills; however, applied domains should be supported with face-to-face courses. In a study conducted in 11 developed and developing countries during the pandemic, 60% of the students reported that occupational skills could be most effectively achieved in the clinical and laboratory settings ([Abbasi et al., 2020](#)). In this study, the majority of the students were satisfied with online learning; however, this method was insufficient to obtain clinical and technical skills. Based on these findings, although online learning seems to be effective to reach cognitive objectives, theoretical knowledge should be reinforced in the clinical and laboratory settings for nursing students.

In the present study, the total mean Sociability Scale score was 23.54 $\pm$ 7.51. The concept of sociability in online communities was first described by [Preece \(2000\)](#). According to [Preece \(2000\)](#), usability and

Table 4

Comparison of ULS-8 scores according to characteristics of the participants (n = 246).

Variable		ULS-8	
		Mean $\pm$ SD	t/F p
Sex			
Male ¹		15.74 $\pm$ 5.48	$t = 2.6750$
Female ²		13.53 $\pm$ 4.80	.008* 1 > 2
Class/year			
1		14.90 $\pm$ 4.98	F = 4.2180
2		12.57 $\pm$ 4.58	.006* 1 > 2
3		15.12 $\pm$ 5.58	
4		13.10 $\pm$ 4.52	
Interpersonal relationships before the pandemic			
Difficulty in interpersonal relationships	Yes ¹	15.59 $\pm$ 4.97	$t = 2.2780$
	No ²	12.98 $\pm$ 4.76	.024* 1 > 2
Limited face-to-face interaction	Yes ¹	14.81 $\pm$ 5.35	$t = 2.2780$
	No ²	13.31 $\pm$ 4.64	.024* 1 > 2
Limited physical contact	Yes ¹	14.25 $\pm$ 4.93	1.401.163
	No ²	13.33 $\pm$ 5.04	
Difficulty in domestic relationships	Yes ¹	15.40 $\pm$ 4.95	$t = 41000$
	No ²	12.84 $\pm$ 4.74	.000* 1 > 2
Limited social activities	Yes ¹	14.81 $\pm$ 5.02	$t = 3.3010$
	No ²	12.73 $\pm$ 4.70	.001* 1 > 2
Interpersonal relationships after the pandemic			
Difficulty in interpersonal relationships	Yes ¹	14.56 $\pm$ 4.82	$t = 4.1280$
	No ²	11.43 $\pm$ 4.85	.000* 1 > 2
Decreased face-to-face interaction	Yes ¹	14.04 $\pm$ 4.99	$t = 1.8080$
	No ²	11.27 $\pm$ 4.22	.072
Decreased physical contact	Yes ¹	13.92 $\pm$ 4.97	$t = 0.0880$
	No ²	13.66 $\pm$ 7.02	.930
Difficulty in domestic relationships	Yes ¹	14.83 $\pm$ 4.82	$t = 4.167$
	No ²	12.12 $\pm$ 4.84	0.000* 1 > 2
Limited social activities	Yes ¹	13.92 $\pm$ 5.03	$t = 0.1410$
	No ²	13.70 $\pm$ 3.86	.888
Satisfaction level with online learning			
Dissatisfied ¹		16.41 $\pm$ 5.02	F = 7.3280
Somewhat satisfied ²		13.68 $\pm$ 4.83	.000* 1 > 4, 1 > 3, 1 > 2
Neither satisfied nor dissatisfied ³		12.40 $\pm$ 4.09	
Satisfied ⁴		12.24 $\pm$ 5.25	
Very satisfied ⁵		11.00 $\pm$ 5.65	

t = Independent t-test, F = ANOVA (one-way analysis of variance), Post-hoc test (Bonferroni correction), * $p < .05$. Data are given in mean $\pm$ SD values, unless otherwise stated. SD: standard deviation; ULS-8: UCLA Loneliness Scale-8.

Table 5

Multiple linear regression analysis for predictors of loneliness.

ULS-8	R^2	ΔR^2	β	p	$F p$
Perceived sociability in online learning	0.269	0.263	-0.321	0.000**	44.6840
Social intelligence			0.347	.000**	.000**

** $p < .001$, ULS-8: UCLA Loneliness Scale-8.

sociability were the key determinants of the success of an online tool. In this study, Zoom as an online learning tool and Edmodo as a learning management platform were used. Zoom offers breakout rooms that are split from the main Zoom meeting to allow sociability of the students and to maintain pair discussions between the student and lecturer. Edmodo is a free social learning platform that not only allows lecturers to share course materials and students to access the course content, but also offers collaboration and communication between students and lecturers. Fenton (2016) suggested that Edmodo was a distinct learning management platform and might be useful as a complementary tool to traditional learning. In the present study, the mean Sociability Scale score was moderate among the undergraduate nursing students. This finding of the study demonstrates that despite learning tools and management systems used during distance learning activities enabling student socialization, the socialization levels of students were not very high.

The total mean TSIS score was 74.15 ± 9.98 in our study, indicating high scores. This is a promising finding, as it reflects the high level of social intelligence of undergraduate nursing students who are candidates for the nursing profession. Similarly, Kaya et al. (2016) found high social intelligence scores among undergraduate nursing students in their study. Based on students having high social intelligence but low socialization scores in the online setting, the development of new online learning tools and methods ensuring socialization in online settings or supporting distance education with in-person education are suggested.

In the present study, we found a total mean ULS-8 score of 13.91 ± 4.98 . The feeling of loneliness is defined as an unpleasant state emerging due to social isolation and the perceived social needs of an individual that are not being met by the quantity and quality of his/her social relationships (Boursier et al., 2020; Hawkey and Cacioppo, 2010). Loades et al. (2020) showed that nearly half of adolescents and young adults aged between 18 and 24 years felt lonely during the pandemic lockdowns. Cetin and Anuk (2020) found a total mean ULS-8 score of 12.42 ± 4.10 among undergraduate students during the pandemic. In another study, students in online learning settings reported higher levels of perceived loneliness than their peers in face-to-face learning settings (Ali and Smith, 2015). In addition, students in online learning settings complain that their learning experiences lack general interpersonal connections (Driver, 2018). The low ULS-8 scores in this study can be attributed to the relatively high number of persons the students were living with, much more time spent on social media during the pandemic, and cultural characteristics of the Turkish society (e.g., friendly interactions, chatting by phone).

In the present study, as the total Sociability Scale scores increased, the mean ULS-8 scores decreased. Additionally, as the total mean TSIS score increased, the mean ULS-8 scores decreased. According to these study findings, students with high social intelligence and high socialization levels feel less lonely in an online setting. Thus, it is suggested to plan and execute different initiatives supporting social intelligence and socialization in online settings to decrease the loneliness levels of students during nursing education.

The total mean ULS-8 scores of male students versus female students and first-year students versus second-year students were significantly higher. These findings are contradictory to previous findings showing no sexual difference in loneliness or that women are more vulnerable to loneliness than men (Groarke et al., 2020; Lee et al., 2020). Women

often express their emotions more easily and their personalities are more prone to talking, which might have contributed to their low loneliness levels. In the present study, the second-year students were more likely to socialize in online learning, as they became familiar with online learning tools such as Zoom and Edmodo during the spring term of the 2020 academic year and were engaged with peers in the previous year.

In the present study, perceived sociability in online learning and social intelligence were significant negative predictors of loneliness. Persons that perceive that they have low socialization levels in the online learning setting and with low social intelligence are at risk for loneliness. Therefore, the perceived loneliness levels of individuals in online learning settings with low social intelligence and perceived socialization levels should be examined. Social intelligence has an important role in the development of social relationships and skills, and a high level of social intelligence can have a protective effect on loneliness. Lau's study conducted with 1000 young people reports that those with better social skills are less lonely. Because social intelligence and related skills are still developing and reinforced throughout adolescence and early adulthood (Lau, 2016), interventions for social intelligence during these years of life will be more effective. For this reason, new tools and methods should be developed to reduce students' levels of loneliness and to support and facilitate socialization and social intelligence in the online setting.

5. Study limitations and strengths

There are some limitations to this study. This study has a single-center design and includes undergraduate students in the Health Sciences Faculty, Nursing Department of a state university and, therefore, the results cannot be generalized to the overall population. However, no study has examined the association of perceived sociability and social intelligence with loneliness in online learning among nursing students during the COVID-19 pandemic. Therefore, this study is valuable, as it contributes to the body of knowledge on this topic.

6. Conclusion

In the present study, the ULS-8 mean score decreased as the mean scores from the Sociability Scale and total TSIS increased. Undergraduate nursing students had a moderate level of sociability, high level of social intelligence, and low level of loneliness in online learning. Persons with self-reported low socialization levels in the online learning setting and with low social intelligence are at risk for loneliness.

Based on the findings of this study, further research is needed to develop new tools and methods to support and facilitate socialization in the online setting. In addition, assessing students' social intelligence levels prior to undertaking online study could inform educators of the potential risk of loneliness in the student cohort.

Ethical approval

This study was approved by the Social and Humanities Ethics Committee of Istanbul Medeniyet University (No: 04.11.2020/41).

CRedit authorship contribution statement

Conception and design: Cemile SAVCI, Ayse CIL AKINCI, Furkan KELES.

Acquisition of data: Cemile SAVCI, Furkan KELES.

Analysis: Cemile SAVCI, Ayse CIL AKINCI, Furkan KELES.

Interpretation of data: Cemile SAVCI, Ayse CIL AKINCI, Furkan KELES.

Drafting and/or revising: Cemile SAVCI, Ayse CIL AKINCI.

All authors read and approved the final manuscript.

Declaration of competing interest

The authors declare they have no potential conflict of interest regarding the investigation, authorship, and/or publication of this article.

Acknowledgment

The authors thank all participants involved in this study.

Funding

This study received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.nedt.2021.105226>.

References

- Abbasi, M.S., Ahmed, N., Sajjad, B., Alshahrani, A., Saeed, S., Sarfaraz, S., et al., 2020. E-Learning perception and satisfaction among health sciences students amid the COVID-19 pandemic. *IOS Press* 67 (3), 549–556. <https://doi.org/10.3233/WOR-203308>.
- Adedoyin, O.B., Soykan, E., 2020. Covid-19 pandemic and online learning: the challenges and opportunities. *Interact. Learn. Environ.* 1–13 <https://doi.org/10.1080/10494820.2020.1813180>.
- Adnan, M., Anwar, K., 2020. Online learning amid the COVID-19 pandemic: students' perspectives. *Online Submission* 2 (1), 45–51.
- Albrecht, K., 2006. *Social Intelligence: The New Science of Success*. Jossey-Bass, San Francisco, CA.
- Ali, A., Smith, D., 2015. Comparing social isolation effects on students' attrition in online versus face-to face courses in computer literacy. *Issues Informing Sci. Inf. Technol.* 12, 11–20. <https://doi.org/10.28945/2258>.
- Bardakci, S., 2010. Cevrimici ogrenme ortaminda algılanan sosyallesme olceginin gecerlik ve guvenirlilik calismasi. *Ank. Univ. Egitim Bilimleri Fak. Derg.* 43 (1), 17–40.
- Boursier, V., Gioia, F., Musetti, A., Schimmenti, A., 2020. Facing loneliness and anxiety during the COVID-19 isolation: the role of excessive social media use in a sample of Italian adults. *Front. Psych.* 11, 586222 <https://doi.org/10.3389/fpsy.2020.586222>.
- Bozkurt, A., 2020. Koronavirus (Covid-19) pandemi sureci ve pandemi sonrası dunyada egitime yönelik degerlendirmeler: yeni normal ve yeni eğitim paradigması. *Acikogretim Uygulamaları Arastirmaları Derg.* 6 (3), 112–142.
- Caubergh, V., Van Wesenbeeck, I., De Jans, S., Hudders, L., Ponnet, K., 2020. How adolescents use social media to cope with feelings of loneliness and anxiety during COVID-19 lockdown. *Cyberpsychol. Behav. Soc. Netw.* 24 (4) <https://doi.org/10.1089/cyber.2020.0478>.
- Cetin, C., Anuk, O., 2020. COVID-19 pandemi surecinde yalnızlık ve psikolojik dayanıklılık: bir kamu universitesi ogrencileri orneklendi. *Avrasya Sosyal Ekon. Arastirmaları Derg.* 7 (5), 170–189.
- Dogan, T., Cetin, B., 2006. Universite ogrencilerinin sosyal zeka duzeylerinin depresyon ve bazı degiskenlerle iliskisinin incelenmesi. *Uluslararası İnsan Bilimleri Derg.* 5 (2), 1–18.
- Dogan, T., Cetin, B., 2009. Tromso sosyal zeka ölçeği turkce formunun faktor yapısı, gecerlik ve guvenirlilik calismasi. *Educ. Sci. Theor. Pract.* 7 (1), 241–268.
- Driver, H., 2018. How to alleviate loneliness when you study online. *Online Learning Tips*. <https://onlinelearningtips.com/2018/12/alleviate-loneliness/>.
- Fenton, W., 2016. The best learning management systems (LMS) for 2016. Retrieved 13 March 2016, from. *PCMag*. <http://www.pcmag.com/article2/0,2817,2488347,00.asp>.
- Fernandes, B., Biswas, U.N., Mansukhani, R.T., Casarín, A.V., Essau, C.A., 2020. The impact of COVID-19 lockdown on internet use and escapism in adolescents. *Rev. Psicol. Clín. Niños Adolescentes* 7 (3), 59–65.
- Groarke, J.M., Berry, E., Graham-Wisener, L., McKenna-Plumley, P.E., McGlinchey, E., Armour, C., 2020. Loneliness in the UK during the COVID-19 pandemic: cross-sectional results from the COVID-19 psychological wellbeing study. *PLoS One* 15 (9), e0239698. <https://doi.org/10.1371/journal.pone.0239698>.
- Hawkey, L.C., Cacioppo, J.T., 2010. Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Ann. Behav. Med.* 40 (2), 218–227. <https://doi.org/10.1007/s12160-010-9210-8>.
- Hays, R.D., DiMatteo, M.R., 1987. A short-form measure of loneliness. *J. Pers. Assess.* 51 (1), 69–81.
- Hoffart, A., Johnson, S.U., Ebrahimi, O.V., 2020. Loneliness and social distancing during the COVID-19 pandemic: risk factors and associations with psychopathology. *Front. Psych.* 11, 1297. <https://doi.org/10.3389/fpsy.2020.589127>.
- Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., et al., 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 395 (10223), 497–506.
- Kaya, N., Turan, N., Kamberova, H.A., Cenal, Y., Kahraman, A., Evren, M., 2016. Hemsirelik ogrencilerinin sanat ozelliklerine gore iletisim becerileri ve sosyal zeka duzeyleri. *Koc Univ. Hemsirelikte Egitim Arastirma Derg.* 13 (1), 50–58.
- Kreijns, K., Kirschner, P.A., Jochems, W., Van Buuren, H., 2007. Measuring perceived sociability of computer-supported collaborative learning environments. *Comput. Educ.* 49 (2), 176–192. <https://doi.org/10.1016/j.compedu.2005.05.004>.
- Labrague, L.J., De los Santos, J.A.A., Falguera, C., 2021. Social and emotional loneliness among college students during the COVID-19 pandemic: the predictive role of coping behaviours, social support, and personal resilience. *Perspect. Psychiatr. Care* 57 (4), 1578–1584. <https://doi.org/10.1111/ppc.12721>.
- Lau, J., 2016. *Social Intelligence and the Next Generation*. National Service Citizen, London.
- Lee, C.M., Cadigan, J.M., Rhew, I.C., 2020. Increases in loneliness among young adults during the COVID-19 pandemic and association with increases in mental health problems. *J. Adolesc. Health* 67 (5), 714–717. <https://doi.org/10.1016/j.jadohealth.2020.08.009>.
- Loades, M.E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., 2020. Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J. Am. Acad. Child Adolesc. Psychiatry* 59 (11), 1218–1239. <https://doi.org/10.1016/j.jaac.2020.05.009>.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., Jones, K., 2009. Evaluation of evidence-based practices in online learning: a meta-analysis and review of online learning studies. In: *Project Report*. Centre for Learning Technology, pp. 1–93.
- Meyer, K.A., Jones, S.J., 2012. Do students experience "social intelligence," laughter, and other emotions online? *JALN* 16 (4), 99–111.
- Moore, M., Kearsley, G., 2012. *Distance education: A systems view of online learning*, Third Edition. Wadsworth, Belmont, CA.
- Paechter, M., Maier, B., 2010. Online or face-to-face? Students' experiences and preferences in e-learning. *Internet High. Educ.* 13 (4), 292–297. <https://doi.org/10.1016/j.iheduc.2010.09.004>.
- Preece, J., 2000. Shaping communities: empathy, hostility, lurking, participation. In: *Proceedings of CPSRDIA2000, Shaping the Network Society: The Future of the Public Shape in Cyberspace*. Seattle, USA, pp. 25–34. Seattle, USA.
- Roskvist, R., Eggleton, K., Goodyear-Smith, F., 2020. Provision of e-learning programmes to replace undergraduate medical students' clinical general practice attachments during COVID-19 stand-down. *Educ. Prim. Care* 31 (4), 247–254. <https://doi.org/10.1080/14739879.2020.1772123>.
- Silvera, D., Martinussen, M., Dahl, T.I., 2001. The tromso social intelligence scale, a self-report measure of social intelligence. *Scand. J. Psychol.* 42 (4), 313–319. <https://doi.org/10.1111/1467-9450.00242>.
- Subedi, S., Nayaju, S., Subedi, S., Shah, S.K., Shah, J.M., 2020. Impact of E-learning during COVID-19 pandemic among nursing students and teachers of Nepal. *Int. J. Sci. Healthc. Res.* 5 (3), 68–76.
- Telli, S.G., Altun, D., 2020. Coronavirus ve cevrimici (online) egitimin onlenemeyen yukselisi. *Univ. Arastirmaları Derg.* 3 (1), 25–34. <https://doi.org/10.32329/uad.711110>.
- Wei, H.C., Chou, C., 2020. Online learning performance and satisfaction: do perceptions and readiness matter? *Distance Education* 41 (1), 48–69. <https://doi.org/10.1080/01587919.2020.1724768>.
- Weiss, R.S., 1973. *Loneliness: The Experience of Emotional and Social Isolation*. MIT Press, Cambridge, MA.
- World Health Organization, 2020. Coronavirus disease (COVID-2019) situation reports. Situation report – 64 (29 March 2020). Retrieved from. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>.
- Xiang, Y.T., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T., Ng, C.H., 2020. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry* 7 (3), 228–229. [https://doi.org/10.1016/S2215-0366\(20\)30046-8](https://doi.org/10.1016/S2215-0366(20)30046-8).
- Yildiz, M.A., Duy, B., 2014. Adaptation of the short-form of the UCLA loneliness scale (ULS-8) to urkish for the adolescents. *Dusunen Adam* 27 (3), 194.