Determining the relationship between loneliness and internet addiction among adolescents during the covid-19 pandemic in Turkey

Arzu Sarıalioğlu [a,*], Tutku Atay [b], Duygu Arıkan [a]

[a] Department of Child Health and Diseases Nursing, Atatürk University, Erzurum, Turkey
[b] Department of Medical Microbiology, Atatürk University, Erzurum, Turkey

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ABSTRACT

Purpose: This study was conducted to determine the relationship between the levels of loneliness adolescents feel during the pandemic, and their respective levels of internet addiction.

Design and methods: The sample of the study consists of 482 adolescents who volunteered to participate in the study. All participants had the cognitive competence to express themselves, and had access to the Internet. Participants filled out a Google Docs form including the "Descriptive Information Form", "ULS-SF" and "IASA", which were used to collect data.

Results: As a result of the multiple regression analysis, it was found that family income, mothers' education status, fathers' education status, the duration of Internet use before and during the pandemic, and the total score of ULS-SF had statistically significant effects on the total score of IASA ($p < 0.05$).

Conclusions: It was concluded that adolescents' internet addiction increases with the increasing level of loneliness. Adolescents who reported feeling moderately lonely had a low level of Internet addiction. There were certain variables that were also found to be influential on adolescents' average levels of loneliness and Internet addiction during the Covid-19 pandemic.

Practice implications: Protecting adolescents' mental health during the pandemic is dependent on taking measures to reduce the risks, while strengthening the protective factors. These protective factors include providing adolescents the access to the appropriate information resources and encouraging the rational use of the Internet, which will support the individual and the individual's social development.

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Introduction

Adolescence is defined as the transition period from childhood to adulthood, which is a rapid and continuous development phase that includes biological, psychological, mental, and social development, and maturation. During this transition, adolescents enter a different period in terms of physical, sexual, social, and emotional changes. They may feel different due to the changes they experience in these developmental areas, and often have difficulties in communicating with their family and the individuals around them (Yavuzer, 2016).

Loneliness is a universal and complex emotion arising from being subjectively or objectively alone and/or perceiving oneself alone in society (Kahyaoğlu et al., 2016). The two types of loneliness are social and emotional. Social loneliness can be defined in terms of a lack of social communication, or not belonging to a group that participates in activities together. Emotional loneliness, on the other hand, is the inability to establish close and intimate relationships with other individuals. In this context, individuals tend to retreat into their shell and become lonely when their social relations are not at a desired level. The feeling of loneliness can be experienced at every stage of life; however, the feelings may get more intense, especially in adolescence and young adulthood (Ümmet & Ekşi, 2016). In fact, most students reported feeling alone at home during the COVID-19 pandemic (Karataş, 2020). It is further suggested that adolescents are more likely to spend time on the Internet because of social loneliness (Çakır & Oğuz, 2017). It is thought that adolescents who cannot receive the necessary social support become increasingly lonely, and spend too much time on the Internet to deal with their feelings. Consequently, it leads to an addictive use of the Internet (Büyükşahin & Yıldız, 2017). Studies in the literature also report that loneliness is an important factor in the development of Internet addiction (Anlı, 2018; Kaynak et al., 2018).

Addiction is defined as abnormal behaviors that negatively affect the biological, mental, and physical functions and daily life activities of the

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person, disrupting their balance. Internet addiction, in particular, is a type of digital addiction (Güleç et al., 2015). Internet addiction has become a critical problem in recent years, with 88 to 98% of adolescents using the Internet at home or at school. Internet addiction has become an important risk factor, especially for adolescents between the ages of 12 and 18 (Kuss et al., 2013). In this sense, as excessive internet use pushes people to loneliness, on the other hand, loneliness pushes people to use the internet more (Meral & Bahar, 2016). The excessive use of technological devices during the COVID-19 outbreak was found to significantly increase the likelihood of Internet addiction, especially as the usage time increases (Winther & Byrne, 2020).

The COVID-19 virus that emerged in December 2019 in Wuhan has affected countless people, and become a threat to public health all over the world (Lee, 2020). In response to the virus, protective measures have been taken against the pandemic in Turkey, like the rest of the world. As a result of these measures, adolescents have been negatively affected by the introduction of curfews in addition to the stress of the COVID-19 pandemic. It is argued that the development of adolescents will inevitably be affected by such a period of social limitations and restrictions (Yektaş, 2020).

For adolescents, social limitations mean being deprived of both school and leisure activities with which they structure their day and their peer groups, and where they express themselves and receive support in dealing with problems. In adolescents, the decreased social interaction and peer support, increased loneliness, the uncertainty and nervousness caused by the pandemic, the fear of being contracted with the virus, the increased attention to negative developments, and being increasingly affected by sources of misinformation contribute to stress-induced reactions such as depression and anxiety (Oosterhoff & Palmer, 2020; Wanger, 2020). The fact that such limitations are experienced in a period when the need for individuality and autonomy is felt strongly increases the possibility of entering a power struggle with authority figures and adults, since the decisions are made outside of their control. In the meantime, the increasing conflict with adults means that the adolescent cannot make enough use of the social and emotional support resources other than what is provided by their peers (Kanbur & Akgül, 2020).

Among the most common problems experienced during the pandemic by adolescents are the loss of school day routines and the time spent with peers. These problems include the increasing time spent alone at home, disruption of sleeping habits, increased screen exposure, excessive Internet use, inappropriate eating habits, decreased physical activity, attention and concentration problems, decreases in academic achievement as a result of decreased motivation, increased domestic conflict and violence, inability to cope with negative emotions (e.g. boredom, anger, and anxiety), increased emotional reactivity and disrupted emotion regulation skills (Gghosh et al., 2020; Lee, 2020).

The decrease in face-to-face communication and social interactions with the pandemic led to the intensive use of the Internet for socializing and leisure activities. Consequently, the increased screen time and problematic Internet use during the pandemic have emerged as another critical problem. The risks encountered in the digital environment have also increased as a result of prolonged screen time, increasing use of digital devices for socializing, entertainment and games, and the decreased school and parental supervision (Fegert et al., 2020; Ferrara et al., 2021).

In studies conducted with adolescents during the pandemic, it was reported that the frequency and duration of technological device usage have increased. This, in turn, increased the risk of Internet addiction in adolescents who used to have appropriate Internet using behavior, less feelings of loneliness, and less screen time before the pandemic (Branquinho et al., 2020; Dong et al., 2020; Orgiles et al., 2020).

Although the use of the Internet makes life easier, especially during the pandemic, and it seems to be the best method available to continue children's education, the risks it brings are just as substantial. In today's world, children use the Internet for 6 to 7 h a day in order to continue their distance education, in addition to their usual Internet usage.

Moreover, it is known that the introduction of technological devices early in childhood, the continuing habit of the harmful use of technological devices during adolescence and adulthood, and the long-term Internet use can cause deteriorations in sleep quality, obesity, negative emotional and social development, and difficulties in emotion regulation, in addition to the threat of addiction. It is yet unclear how using these devices in different positions for a long time affects the posture of children; however, it is likely that it will cause postural disorders, chronic pain, anomalies, or discomfort as well in the following years (Balcı et al., 2021).

The following questions were explored in this study

- What is the level of loneliness adolescents feel during the Covid-19 pandemic?
- What is adolescents' level of Internet addiction during the Covid-19 pandemic?
- What are the factors affecting the loneliness and Internet addiction levels of adolescents during the Covid-19 pandemic?
- Is there a relationship between the level of loneliness adolescents feel and their level of Internet addiction during the Covid-19 pandemic?

Method

Design

This study was carried out as a descriptive-correlational study with the participation of adolescents living in Erzurum, Turkey who were contacted electronically between April and May of 2021.

Sample and setting

Adolescents living in Erzurum, Turkey constituted the population of the study. The sample of the study consists of 482 adolescents who volunteered to participate in the study. All participants had the cognitive competence to express themselves, and had access to the Internet. Participants filled out a Google Docs for data collection. As a result of the G.Power 3.1.9.2 power analysis, the effect size of the study was determined to be 0.331, the power was determined as 95%, and the α type error estimation was 0.05. These values indicate that the sample size is sufficient (Çapık, 2014).

Research inclusion criteria included: a) aged between 10 and 18; b) have the cognitive competence to express themselves; c) have Internet access; and d) uses Whatsapp. The exclusion criteria of the study were: a) age is not within the age range; b) have cognitive limitations; c) do no have access to the Internet; and d) does not us Whatsapp.

Measures

Descriptive Information Form, UCLA Loneliness Scale-Short Form, and Internet Addiction Scale for Adolescents were used to collect the data of the study.

Descriptive information form

The questionnaire was prepared by the researchers in accordance with the related literature (Anlı, 2018; Çakıcı, 2020; Çakır & Oğuz, 2017; Gülaçtı, 2020; Yiğit, 2019), and contained questions for determining the personal characteristics of the adolescents (age, gender, income status, parents' education status, etc.). In addition, there were questions on loneliness and the internet use during the Covid-19 pandemic period.

UCLA loneliness scale-short form (ULS-SF)

The UCLA Loneliness Scale was originally developed by Hays and DiMatteo (1987). The validity and reliability analysis of the scale was conducted by Yıldız and Duy (2014), and the Cronbach's alpha

coefficient of the scale was found to be 0.74. The scale is a four-point Likert type scale consisting of seven questions with the answers of "(1) Never, (2) Rarely, (3) Sometimes, and (4) Often". The 5th item of the scale is reverse scored. The general loneliness score is obtained by adding the numerical equivalents of the answers given to the items. While the lowest score that can be obtained from the scale is 7, the highest possible score is 28. Accordingly, a low score indicates that the felt level of loneliness is low, and a high score indicates that the felt level of loneliness is high. In this study, the Cronbach alpha coefficient of the scale was found to be 0.73, which shows the reliability of the scale.

Internet addiction scale for adolescents (IASA)

Internet Addiction Scale for Adolescents (IASA) was developed by Taş (2019). The scale is a five-point Likert-type scale consisting of nine questions with the answers of "(1) Never, (2) Rarely, (3) Sometimes, (4) Often, and (5) Always". There are no reverse items on the scale. A high score indicates that the level of Internet addiction is high, and vice versa. The Cronbach's alpha coefficient of the scale was previously found to be 0.81 (Taş, 2019). In this study, the Cronbach alpha coefficient of the scale was found to be 0.88, which shows the reliability of the scale.

Data collection

After obtaining legal permissions, the questionnaire link including Sociodemographic Characteristics Form, UCLA Loneliness Scale Short Form, and Internet Addiction Scale for Adolescents was created by the researchers using Google Forms. The questionnaire link was sent to the WhatsApp groups used by the participants and the participants were asked to fill out the questionnaire. In line with the snowball method, the participants were asked to share the questionnaire link with other adolescents. Completing the questionnaires took an average of 10 to 15 min. Repeated entries were prevented and data security was ensured by clicking the send only once button from the Google Docs settings.

Data analysis

The data obtained from the study were analyzed in the SPSS 20 packaged software. Descriptive statistics and mean values, as well as Kurtosis and skewness coefficients for the determination of compliance of data to normal distribution, were used to analyze the data. Independent groups *t*-test and ANOVA were used for normal distributions, and the Kruskal Wallis test was used in non-normal distributions. The Pearson correlation analysis, multiple regression analysis and the Cronbach's alpha coefficient calculation were used to analyze the data. The Tukey HSD and Dunnett's C-tests were further applied to determine the source of the difference in groups. The threshold for the level of significance was accepted as $p < 0.05$.

Ethical considerations

Permissions for using the scales were obtained from the developers of the scales before starting the study. In order to conduct the research, the ethics committee permission was obtained from the Human Research Ethics Committee, as well as written permission from the Ministry of Health.

Before starting the study, in line with the principle of "Respect for Autonomy", the participants were informed that they were free to participate in the study and stop any time. Additionally, in line with the principle of "Confidentiality and the Protection of Confidentiality", the participants were informed that their information would be kept confidential. Informed consent was obtained from the participants electronically. Those who were willing to participate in the study were included in the study. Since individual rights must be protected in the research,

the Human Rights Declaration of Helsinki was adhered to during the study.

Results

The descriptive characteristics of the participants revealed that 36.5% (n = 176) of the participants were in the 13–15 years age group, 52.7% (n = 254) were female, 64.3% (n = 310) had 1 to 3 siblings, 81.7% (n = 394) were living in a nuclear family, 71.4% (n = 344) were living in the city center, 78% (n = 376) had social security, 53.5% (n = 258) had a moderate level of family income, 49.4% (n = 248) of the mothers had primary school degree and 80.5% (n = 388) of them were unemployed, and 41.9% (n = 202) of the fathers had a faculty degree and 48.1% (n = 232) of them were working as officers (Table 1).

It was further found that 41.9% (n = 202) of the adolescents defined their level of academic success as "good". In terms of Internet use, 55.6% (n = 268) of the adolescents reported using the Internet for 0 to 2 h a day before the pandemic and 67.4% (n = 163) used the Internet for homework before the pandemic. However, responses to more recent questions revealed that 51.4% (n = 248) of the adolescents have been using the Internet for 6 h or more during the pandemic, and that 82.2% (n = 199) have been using the Internet for homework during the pandemic. Moreover, 72.7% (n = 176) of the adolescents communicated with their friends by phone, and 67.4% (n = 163) used the Internet to relieve loneliness during the pandemic (Table 1).

The minimum mean score of the adolescents in the ULS-SF was 7, and their maximum mean score in the ULS-SF was 25. The general mean score of the scale was 14.38 ± 4.42. The minimum mean score in the IASA was 9 and the maximum mean score in the IASA was 25. The general mean score of the scale was 22.21 ± 8.14.

Table 2 compares the ULS-SF and IASA mean scores of the adolescents in terms of their descriptive characteristics. The examination of the ULS-SF reveals no significant differences in the variables of age, gender, family type, place of residence, number of siblings, social security status, father's occupation, and the duration of Internet use before and during the pandemic in terms of mean scores ($p > 0.05$). However, family income, mother's education and employment status, fathers' education status, and school success were found to be significant factors on the ULS-SF mean scores ($p < 0.05$).

The examination of IASA reveals no significant differences in the variables of age, gender, family type, place of residence, social security status, number of siblings, mother's employment status, and father's occupation in terms of mean scores ($p > 0.05$). However, the effects of family income, mother's and father's education status, school success, and the duration of Internet use before and during the pandemic were found to be significant factors on the means scores of the IASA ($p < 0.05$).

A statistically positive, low-level significant relationship was found between the levels of loneliness the adolescents have been feeling during the Covid-19 pandemic and their respective levels of Internet addiction. According to this relationship, as the level of loneliness increases, the level of Internet addiction increases (Table 3).

According to the results of the regression analysis in Table 4, the significance level corresponding to the F value shows that the model established is statistically significant ($F = 8.673; p < 0.05$). Considering the beta coefficient value, t-value and significance level of the independent variable, it can be stated that family income, mother's education status, fathers' education status, the duration of Internet use before and during the pandemic, and the total score of ULS-SF had statistically significant effects on the total score of IASA ($t = -2.611, p < 0.05; t = 1.837, p < 0.05; t = 2.437, p < 0.05; t = 3.873, p < 0.05; t = 5.733, p < 0.05; t = 3.826, p < 0.05$; respectively). The family income, mother's education status, fathers' education status, the duration of Internet use before and during the pandemic, and the total score of ULS-SF explained 17.2% of the change in the total score of IASA (Revised $R^2 = 0.172$).

Table 1

Distribution of the Adolescents in terms of Their Descriptive Characteristics.

Descriptive characteristic	n (482)	%
Age		
10–12 age	58	12
13–15 age	176	36.5
16–18 age	248	51.5
Gender		
Female	254	52.7
Male	228	47.3
Number of siblings		
0	16	3.3
1–3	310	64.3
4 and above	156	32.4
Family type		
Nuclear family	394	81.7
Extended family	88	18.3
Living place		
City center	344	71.4
District	80	16.6
Village	58	12
Social security status		
Available	376	78
No	106	22
Family income		
Less than expenditure	134	27.8
Equal income and expenditure	258	53.5
More than expenditure	90	18.7
Mother's education status		
Primary school	248	49.4
Secondary school	142	29.5
Faculty	92	19.1
Father's education status		
Primary school	92	19.1
Secondary school	188	39
Faculty	202	41.9
Mother's employment status		
Unemployed	388	80.5
Employed	94	19.5
Father's occupation		
Unemployed	44	9.1
Civil servant/worker	232	48.1
Self-employment	144	29.9
Retired	62	12.9
School success status		
Bad	18	3.7
Middle	172	35.7
Good	202	41.9
Very good	90	18.7
Internet usage time before the pandemic period		
0–2 h	268	55.6
3–5 h	172	35.7
6 h and more	42	8.7
*The purpose of using the internet before the pandemic period		
Homework	163	67.4
Game	97	40.1
Social media	133	55
Music, movies	108	44.6
Internet usage time during the pandemic period		
0–2 h	52	10.8
3–5 h	182	37.8
6 h and more	248	51.4
*The purpose of using the internet during the pandemic period		
Homework	199	82.2
Game	104	43
Social media	121	50
Music, movies	119	49.2
*Communication with friends during the pandemic period		
Meeting at home	76	31.6
Meeting outside	102	42.2
Telephone	176	72.7
Social media	140	57.9
*What are you doing to relieve loneliness during the pandemic period?		
Reading books	114	47.1
To watch TV	110	45.5
Internet	163	67.4
Listen to music	133	55

Table 1 (continued)

Descriptive characteristic	n (482)	%
Play a game	114	47.1
Activity with family or siblings	96	39.7

* More than one option answered.

Table 2

Comparison of the ULS-SF and IASA Mean Scores of the Adolescents in terms of Their Descriptive Characteristics.

Descriptive Characteristics	ULS-SF	IASA
	$X \pm SD$	$X \pm SD$
	Test and p	Test and p
Age		
10–12 age	13.48 ± 3.40	20.68 ± 7.91
13–15 age	14.12 ± 4.63	21.82 ± 8.51
16–18 age	14.77 ± 4.45	22.83 ± 7.89
	F = 2.482	F = 1.949
	p = 0.085	p = 0.144
Gender		
Female	14.29 ± 4.47	21.94 ± 7.44
Male	14.47 ± 4.37	22.50 ± 8.86
	t = −0.432	t = −0.751
	p = 0.666	p = 0.453
Number of siblings		
0	12.25 ± 2.56	21.25 ± 9.19
1–3	14.52 ± 4.64	21.72 ± 8.21
4 and above	14.32 ± 4.07	23.26 ± 7.84
	KW = 4.422	KW = 4.333
	p = 0.110	p = 0.115
Family type		
Nuclear family	14.38 ± 4.38	22.06 ± 8.25
Extended family	14.36 ± 4.62	22.86 ± 7.62
	t = 0.042	t = −0.830
	p = 0.966	p = 0.407
Living place		
City center	14.47 ± 4.62	22.65 ± 8.30
District	14.20 ± 3.93	22.30 ± 8.61
Village	14.10 ± 3.89	21.03 ± 6.36
	F = 0.251	F = 0.745
	p = 0.778	p = 0.475
Social security status		
Available	14.07 ± 4.41	22.22 ± 7.99
No	14.45 ± 4.33	22.16 ± 8.70
	t = −2.841	t = 0.060
	p = 0.053	p = 0.952
Family income		
Less than expenditure[a]	14.85 ± 4.68	19.93 ± 6.91
Equal income and expenditure[b]	14.48 ± 4.40	21.61 ± 8.38
More than expenditure[c]	13.37 ± 3.96	23.31 ± 8.24
	F = 3.170	F = 6.404
	p = 0.043	**p = 0.002**
	a > c*	b > a*
	b > c*	c > b*
Mother's education status		
Primary school[a]	14.87 ± 4.55	21.32 ± 7.79
Secondary school[b]	13.91 ± 4.31	23.00 ± 8.45
Faculty[c]	13.76 ± 4.12	23.25 ± 8.41
	F = 3.288	F = 3.097
	p = 0.380	**p = 0.046**
	b > c*	c > b*
Father's education status		
Primary school[a]	15.10 ± 4.27	20.04 ± 7.32
Secondary school[b]	13.95 ± 4.36	22.37 ± 8.88
Faculty[c]	13.84 ± 4.69	23.04 ± 7.62
	F = 4.202	F = 4.427
	p = 0.016	**p = 0.012**
	b > c*	c > b*
Mother's employment status		
Unemployed	13.48 ± 3.96	22.36 ± 8.04
Employed	14.59 ± 4.51	21.57 ± 8.56
	t = 2.187	t = 0.845
	p = 0.029	p = 0.399

Table 2 (continued)

Descriptive Characteristics	ULS-SF	IASA
	$X \pm SD$	$X \pm SD$
	Test and p	Test and p
Father's occupation		
Unemployed	13.81 ± 3.98	22.22 ± 7.88
Civil servant/worker	14.43 ± 4.60	21.91 ± 6.92
Self-employment	14.19 ± 4.04	22.59 ± 9.83
Retired	15.03 ± 4.88	22.41 ± 8.38
	$F = 0.778$	$F = 0.223$
	$p = 0.506$	$p = 0.880$
School success status		
Bad[a]	20.11 ± 2.80	27.66 ± 8.11
Middle[b]	15.32 ± 4.01	24.27 ± 8.24
Good[c]	14.19 ± 4.40	21.61 ± 7.64
Very good[d]	11.84 ± 3.82	18.13 ± 7.04
	$KW = 34.373$	$KW = 16.590$
	p = 0.000	**p = 0.000**
	a-b-c > d[**]	a-b-c > d[**]
Internet usage time before the pandemic period		
0–2 hours[a]	14.03 ± 4.32	20.79 ± 8.18
3–5 hours[b]	14.76 ± 4.96	22.95 ± 7.20
6 h and more[c]	14.82 ± 4.41	28.23 ± 8.50
	$F = 1.837$	$F = 17.395$
	$p = 0.160$	**p = 0.000**
		b-c > a[*]
Internet usage time during the pandemic period		
0–2 h	13.30 ± 3.72	16.65 ± 6.19
3–5 h	14.19 ± 4.41	20.90 ± 6.84
6 h and more	14.74 ± 4.53	24.33 ± 8.63
	$F = 2.525$	$F = 25.225$
	$p = 0.081$	**p = 0.000**
		b-c > a[*]

ULS-SF:UCLA Loneliness Scale-Short Form IASA: Internet Addiction Scale for Adolescents.
[*] Tukey HSD test.
[**] Dunnett's-C test.

According to these relationships, the model presented the following results, and the respective beta coefficients: A 1-unit increase in the family income variable led to a decrease of 1.495 ($\beta = -1.495$) in the total score of IASA, a 1-unit increase in the mother's education status led to an increase of 1.162 ($\beta = 1.162$), a 1-unit increase in the fathers' education status led to an increase of 1.425 ($\beta = 1.425$), 1-unit increase in the duration of Internet use before the pandemic led to an increase of 2.175 ($\beta = 2.175$), a 1-unit increase in the duration of Internet use during the pandemic led to an increase of 3.147 ($\beta = 3.147$), and a 1-unit increase in the ULS-SF total score led to an increase of 0.301 ($\beta = 0.301$). There was no autocorrelation problem in the established model. The Durbin-W was between 1.5 and 2.5 (DW = 2.07).

Discussion

As excessive internet use pushes people to loneliness, on the other hand, loneliness pushes people to use the internet more (Meral & Bahar, 2016). Studies in the literature report that loneliness is an important factor in the development of Internet addiction (Anlı, 2018; Kaynak et al., 2018). It was found that excessive use of technological devices during the COVID-19 outbreak has significantly increased the likelihood

Table 3
Examination of the Relationship between ULS-SF and IASA.

		IASA
ULS-SF	r	0.212
	p	**0.000**
	n	482

ULS-SF:UCLA Loneliness Scale-Short Form IASA: Internet Addiction Scale for Adolescents.

of Internet addiction, especially as the duration of use increases (Winther & Byrne, 2020).

In the current study, it was found that adolescents have been feeling moderately lonely during the Covid-19 pandemic. In similar studies conducted by Yiğit, Arslan, and Çakır & Oğuz, adolescents were found to feel moderately lonely as well. Protective measures taken against the pandemic such as the closing of schools, social restrictions and curfews which deprived adolescents of interactions with their peers (Kanbur & Akgül, 2020; Oosterhoff & Palmer, 2020; Wanger, 2020; Yektaş, 2020). In this study, it was further found that the fact that adolescents feel moderately lonely is related to decreased peer interaction and increased isolation. A comforting aspect of these findings is that adolescents have not been feeling high levels of loneliness during the pandemic.

An interesting finding in this regard was that the average loneliness scores of adolescents whose mothers are working were found to be higher, which was different from the previous studies, which found no difference in the loneliness scores of adolescents based on the working status of their mothers (Boz, 2021; Yiğit, 2019). The findings of this study, however, found that the adolescents whose mothers are unemployed have been feeling less lonely during the Covid-19 pandemic as they spend more time with their mothers at home.

Furthermore, in this study, the loneliness score averages of adolescents with low family income were found to be higher. This was consistent with the existing literature considering a recent study by Madsen et al. (2019) found that socioeconomic status is inversely proportional to the level of felt loneliness. Similarly, in Çakıcı's study, the loneliness score averages of adolescents with low family income was also found to be higher. In this study, the low level of loneliness of adolescents with high income may have been due to the wider circle of friends they have as they had the chance to be more active in different social and sports activities before the pandemic.

Another result of this study was that the loneliness score averages of adolescents whose mothers' education status was low were found to be higher. Similarly, in Çakıcı's study, the loneliness scale score averages of adolescents whose mothers' education status was low were found to be higher. Several studies found no statistically significant relationship between the mothers' education status and the level of adolescent loneliness (Gülaçtı, 2020; Yiğit, 2019). The fact that the adolescents whose mothers' education level is high have been feeling less lonely during the Covid-19 pandemic may be a result of the extra knowledge these mothers have regarding the characteristics of adolescence. Their positive effect on their children's loneliness may be interpreted in terms of their ability to communicate with their children, and support them accordingly.

The current study found that the loneliness score averages of adolescents whose fathers' education level is low were similar to those in Çakıcı's study that explored the association of fathers' education level with measurement of adolescent loneliness. In addition, mean loneliness scores of adolescents with poor academic success levels were found to be higher as reported in Yiğit's study. The finding that adolescents with low levels of academic success feel lonelier was interpreted in terms of the adverse effect of low success levels on their communication with their family. Moreover, it is further argued that the low levels of academic success may negatively affect social relationships with friends.

The results of the current study also showed that, overall, adolescents had low levels of Internet addiction during the Covid-19 pandemic. Several studies found the adolescent Internet addiction level was found to be low (Anlı, 2018; Boz, 2021). It was recently found that the excessive use of technological devices during the COVID-19 outbreak has significantly increased the likelihood of Internet addiction, especially as the duration of use increases (Winther & Byrne, 2020). Protective measures against the Covid-19 pandemic such as schools' transition to distance education, social restrictions, and curfews have led to an increase in screen exposure, and increased Internet use in adolescents

Table 4

Multiple Regression Results on the Effect of Descriptive Characteristics on the IASA Total Score.

Model	β	Std. Error	Beta	t	p	Partial	Part	Tolerance	VIF
Age	−0.424	0.545	−0.036	−0.777	0.438	−0.036	−0.032	0.800	1.250
Gender	0.034	0.690	0.002	0.049	0.961	0.002	0.002	0.960	1.041
Living place	0.335	0.525	0.029	0.637	0.524	0.029	0.026	0.857	1.167
Family type	1.147	0.911	0.054	1.260	0.208	0.058	0.052	0.921	1.086
Social security status	0.554	0.919	0.028	0.603	0.547	0.028	0.025	0.788	1.270
Family income	−1.495	0.573	−0.124	−2.611	0.009	−0.120	−0.108	0.762	1.313
Mother's education status	1.162	0.633	0.111	1.837	0.047	0.085	0.076	0.474	2.109
Father's education status	1.425	0.585	0.131	2.437	0.015	0.112	0.101	0.598	1.673
Mother's employment status	−1.948	1.022	−0.095	−1.906	0.057	−0.088	−0.079	0.695	1.438
Father's occupition	0.491	0.424	0.050	1.160	0.247	0.054	0.048	0.923	1.083
Internet usage time before the pandemic period	2.175	0.562	0.174	3.873	0.000	0.176	1.161	0.854	1.171
Internet usage time during the pandemic period	3.147	0.549	0.261	5.733	0.000	0.256	0.238	0.828	1.208
ULS-SF Total	0.301	0.079	0.164	3.826	0.000	0.174	0.159	0.940	1.064

ULS-SF: UCLA Loneliness Scale-Short Form IASA: Internet Addiction Scale for Adolescents.
R: 0.441 R^2: 0.172 F:8.673 $p < 0.05$ Durbin Watson:2.070.

(Balcı et al., 2021; Dong et al., 2020; Fegert et al., 2020; Ferrara et al., 2021). In a study conducted in Taiwan, the Internet addiction levels of middle school students were found to be high during the COVID-19 pandemic (Lin, 2020). All in all, it is a pleasing finding that adolescents do not have a high level of Internet addiction during the Covid-19 pandemic.

In this study, the average Internet addiction scores of adolescents with high family income were found to be higher. More specifically, the result of the the regression analysis showed that the family income status variable had a significant relationship with internet addiction. Uludağ et al. (2016), Yayan et al. (2019), and Malak et al. (2017) similarly found that as the family income of adolescents increased, their level of Internet addiction also increased. It can be stated that the high level of income makes it easier to access technological devices and the Internet, which increases the risk of Internet addiction.

In this study, the average Internet addiction scores of adolescents whose mothers' education status was high were found to be higher. Our regression analysis supports this finding. In studies conducted by Koyuncu, Özdemir and Gülaçtı, it was found that as the education level of the mother increased, the level of Internet addiction increased as well. The high education levels of the mothers imply that that they are working mothers. Considering the fact that the pandemic caused a transition to home-based working, it can be argued that the increasing number of responsibilities imposed on mothers with high education levels has pushed adolescents into Internet addiction.

As for the effect of fathers' education status, in this study, the average Internet addiction scores of adolescents whose fathers' education status was high were also found to be higher. Our regression analysis supports this result. As reported in the Özdemir study, as the education level of the father increased, the rate of Internet addiction of the adolescent increased as well (Özdemir, Bülbül, Balcı and Türköz, 2020). The findings of the current study are similar to the findings of Özdemir's study (Arslan, 2020).

On another note, the average Internet addiction scores of adolescents with poor academic success levels were found to be higher. Yayan et al. (2017) found that adolescents with low levels of academic success have higher Internet addiction scale scores as well. Accordingly, studies have shown that Internet addiction has a significant impact on the academic success (Park et al., 2014; Yang et al., 2016). In this study, adolescents with low levels of academic success were found to be more addicted to the Internet, that is, they spent more time on the Internet during the Covid-19 pandemic.

In fact, the average Internet addiction scores of adolescents who have been using the Internet for 6 h or more during the pandemic were found to be higher. It was determined that 55.6% of adolescents had been using the Internet for 0 to 2 h a day before the pandemic, 67.4% had been using the Internet for homework before the pandemic, 51.4% have been using the Internet for 6 h or more during the pandemic, and

finally, 82.2% have been using the Internet for homework during the pandemic. Our regression analysis supports this result as well. It was also previously found in studies conducted by Yayan et al. (2017) and Gülaçtı (2020) that the Internet addiction of adolescents increased as the time spent on the Internet increased. Although the use of the Internet makes life easier, especially during the pandemic, and it seems to be the best method available to continue the children's education, the risks it brings are just as substantial. In today's world, children use the Internet for 6 to 7 h in order to continue their distance education in addition to their usual Internet usage (Balcı et al., 2021). Therefore, the increased amount of time adolescents spend using the Internet during the Covid-19 pandemic is an expected result.

In this study, a significant low-level relationship was found in the positive direction between the levels of loneliness the adolescents have been feeling, and their levels of Internet addiction. The findings of the study suggested that for adolescents, as the level of loneliness increases the level of Internet addiction also increases. In particular, in our regression analysis, it was found that the total ULS-SF score and internet addiction had a significant relationship. There are studies in the literature with similar findings that found a positive relationship between Internet addiction and loneliness in adolescents (Anlı, 2018; Boz, 2021; Gülaçtı, 2020; Parashkouh et al., 2018; Yayan et al., 2019). The relation between loneliness and Internet use is mutually effective in the sense that just as the Internet pushes individuals to loneliness, loneliness pushes individuals into spending more time on the Internet (Meral & Bahar, 2016). In fact, it has been reported in the current study that 67.4% of the adolescent participants used the Internet to relieve the loneliness they have been feeling during the pandemic. Hence, it is argued that when adolescents feel that they cannot meet their social needs, they resort to digital means to satisfy these needs without any obstacles. This is one of the many reasons why the digital environment has become indispensable for adolescents over time, and reached to the point where it leads to dependency and addiction.

Practical implications

Protecting adolescents' mental health during the pandemic is dependent on taking measures to reduce the respective risks, and strengthening the protective factors. These measures include providing adolescents access to the appropriate information resources, encouraging the rational use of the Internet, which will support the individual and the individual's social development alike, conducting educational activities for adolescents and their families to raise awareness on this issue, and providing alternative ways and support groups for peer interaction by reducing isolation and loneliness. In addition, it is recommended that parents are informed of practices that will help them have their adolescent children spend less time online for arbitrary reasons, apart from the time they spent on the Internet for homework

and exams, and that parents are guided towards new ways of communication within the family that are entertaining so as to reach their adolescent children.

Limitations

The results of this research are limited to the adolescents who were reached with the snowball sampling method at a specified time. The only communication medium used for reaching adolescents was via social media, which is another limitation of the study.

Conclusion

Internet addiction among adolescents increase with increasing levels of loneliness. Overall, it has been reported that adolescents are moderately lonely, and have only low levels of Internet addiction. Importantly, it has been determined that certain variables are especially influential on loneliness levels and the Internet addiction scores of adolescents during the Covid-19 pandemic.

Author contributions

1. **Study design:** A.S., D.A.
2. **Data collection:** A.S., T.A., D.A.
3. **Data analysis:** A.S.
4. **Study supervision:** A.S., T.A., D.A.
5. **Manuscript writing:** A.S., T.A., D.A.
6. **Critical revisions for important intellectual content:** A.S., T.A., D.A.

Ethical approval

This study received 14/04/2021 dated and 2021-1/1 numbered approval was taken from Erzurum Atatürk University Faculty of Nursing Ethical Board.

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Authorship statement

All listed authors meet the authorship criteria and that all authors are in the agreement with the content of the manuscript.

Conflict of interests

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pedn.2021.11.011.

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