



The examination of the relationships among digital addiction, loneliness, shyness, and social anxiety in adolescents

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Título: El examen de las relaciones entre adicción digital, soledad, timidez y ansiedad social en adolescentes.

Resumen: La adicción digital, que se determina como un problema común entre los adolescentes en los últimos años, afecta negativamente la vida de los adolescentes en muchos aspectos. El objetivo del estudio es examinar las relaciones entre la adicción digital, la soledad, la timidez y la ansiedad social de los adolescentes. Gate se reunió con adolescentes que completaron la Escala de adicción digital, la versión corta de la Escala de soledad de UCLA, la Escala de timidez y la Escala de gravedad del trastorno de ansiedad social DSM-5 - Formulario infantil. Las hipótesis sugeridas se han probado utilizando los datos recopilados de 991 adolescentes y un análisis de regresión jerárquica. Los resultados de la investigación encontraron una relación positiva y significativa entre la adicción digital, la soledad, la timidez y la ansiedad social entre los adolescentes. Además, los hallazgos muestran que la adicción digital, la soledad y la timidez predicen la ansiedad social. Los resultados obtenidos demuestran que la adicción digital, la soledad y la timidez tienen efecto sobre la ansiedad social. Según los hallazgos, se sugiere aplicar diversas intervenciones educativas por parte de profesionales de la salud mental a adolescentes que presenten signos de adicción digital, soledad, timidez y ansiedad social.

Palabras clave: Adicción digital. Soledad. Timidez. Ansiedad social.

Abstract: Digital addiction, which is determined as a common problem among adolescents in the last years, affects the lives of adolescents negatively in terms of many aspects. The aim of the study is to examine the relationships between adolescents' digital addiction, loneliness, shyness and social anxiety. Gate gathered from adolescents who completed Digital Addiction Scale, Short Form of UCLA Loneliness Scale, Shyness Scale, and DSM-5 Social Anxiety Disorder Severity Scale - Child Form. The suggested hypotheses have been tested using the data gathered from 991 adolescents and hierarchical regression analysis. The research findings found a positive and significant relationship between digital addiction, loneliness, shyness and social anxiety among adolescents. Furthermore, the findings show that digital addiction, loneliness, and shyness predict social anxiety. The results obtained prove that digital addiction, loneliness and shyness have an effect on social anxiety. According to the findings, it is suggested to apply various educational interventions by mental health professionals to adolescents who show signs of digital addiction, loneliness, shyness, and social anxiety.

Keywords: Digital addiction. Loneliness. Shyness. Social anxiety.

Introduction

In our age, with the advancement of today's technology, the use of technological tools has become indispensable for adolescents. While technology aids living conditions, it also comprises new risks. Various addiction concepts can have a particularly negative impact on adolescents' life. One of these is digital addiction. Today, which we call the digital age, access to stimuli and digital tools is easier. Along with the constantly evolving technology to make life easier, adolescents feel as if they cannot live without it. The reason why young people spend more time on the Internet and digital tools is the constantly evolving new devices, learning and entertainment environment, software and applications for them. Programme for International Student Assessment (PI-SA) results show that the average time spent on the internet outside school hours in OECD countries between 2012 and 2018 increased by approximately 9 hours a week (OECD, 2019). This increase continues with the rise of e-learning worldwide after COVID-19, which has had a profound impact on education, although research has been reported to cause problems such as health, domestic violence, drugs, suicide, loneliness and alcohol (Ramkissoon, 2021).

The constant use of digital tools such as computers and smartphones, as well as the games and social media platforms included in these tools, lead to digital addiction. Digital addiction is a concept that encompasses the whole problem of internet addiction, game addiction and social media addiction (Christakis, 2019). As technology continues to evolve, it is necessary to conceptualize and analyze dependence on digital tools. Digital addiction should not be called just internet addiction. Because it contains game and social media addictions on computers and smart phones (Kesici, et al., 2018). Digital addiction does not only involve internet use. Therefore, apart from online addiction, there are situations such as game addiction that the individual uses via offline digital devices (Basel et al., 2020). Studies show that individuals with digital addiction negatively affect their health, cause deterioration in their working situations, classes and social activities, and cause personal and family problems (Dahl & Bergmark, 2020). In the research they conducted, Karaer & Akdemir (2019) found that adolescents with internet addiction have lower perceptions of social support and experience more problems with communication, identifying, and regulating emotions. Researchers have conducted studies to associate digital addiction with health problems such as mental health (Kuss et al., 2017) and physical health (Yeap et al., 2015). In this context, we suggest that adolescents with digital addiction may have higher levels of social anxiety. Within this context, adolescents' social anxiety levels can be lowered and they can be psychologically resilient when psychological support is provided by mental health profession-

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als. Although there are studies examining the relationship between digital addiction and social anxiety in the literature, there are still unexplained gaps in the way digital addiction affects social anxiety. Other variables besides digital addiction can affect social anxiety. Therefore, the present study examines the predictive role of digital addiction, shyness and loneliness on social anxiety in the adolescent population.

Loneliness and Social Anxiety

The negative feelings of people arising from not being able to meet their expectations in their social relations satisfactorily are explained by the concept of loneliness. This state of loneliness is classified as an internalized problematic behavior of the individual (Blossom & Apsche, 2013). Depression and social anxiety are common internalization problems in adolescence and these concepts are highly related to the concept of loneliness (Epkins & Heckler 2011). Generally, loneliness peaks in adolescence and is associated with various maladaptive behaviors both physical (Hawkley & Capitano, 2015) and psychological (Heinrich & Gullone 2006). When the characteristics of lonely adolescents were reviewed in the literature, it was reported that they experience problems with initiating and maintaining social interaction (Twenge et al., 2021). Apart from this, it is stated that lonely adolescents avoid participating in social activities and their subjective well-being levels are low (Ellis et al., 2020; Karagöz & Ramkissoon, 2023). Additionally, loneliness and social anxiety might stress the link between loneliness and social anxiety, and suicidality (Serafini et al., 2020). The important link between immune-inflammatory abnormalities, substance use, and psychiatric conditions related to suicidal behavior cannot be ignored (Serafini et al., 2012). In this context, loneliness might have an impact on social anxiety during adolescence. Indeed, Danneel et al. (2019) in their research mention the fact that loneliness in adolescence increases social anxiety. Similarly, in another research conducted with adolescents, it is stated that loneliness positively predicts social anxiety (Maes et al., 2019). All these studies demonstrate that social anxiety might be affected by loneliness.

Shyness and Social Anxiety

Shyness, which is another variable in the current study, is a concept defined as a tendency towards experiencing discomfort, tension, and awkwardness in situations in the presence of a stranger (Cheek & Buss, 1981). High levels of shyness might lead to academic and social instability by negatively affecting adolescents' cognitive, emotional, and behavioral performance (Ponti & Tani, 2015). Adolescents with shy feelings tend to avoid social interactions. This avoidance behavior hinders finding social support and the development of social skills. Shyness might cause adolescents to be more vulnerable to problems such as peer rejection, being the victim of bullying, and internalization (Coplan et al., 2016). There are studies showing that shyness in adolescents has a

direct impact on social anxiety (Zeytinoglu et al., 2021). Blöte et al. (2019) claim that shy adolescents have higher levels of social anxiety. In Spence and Rapee's developmental model (2016), it is stated that social anxiety emerges with weak social skills, and negative peer reactions followed by shy behaviors under the influence of personal and environmental factors such as negative social cognitions. Furthermore, there is proof that there are connections between shyness, negative social cognitions, and social anxiety. In all these studies, it is indicated that adolescents with high levels of shyness have also higher levels of social anxiety. Finally, it can be said that the level of shyness significantly affects the level of social anxiety.

Current Study

Research show that digital addiction causes isolation and increases loneliness (Peper & Harvey, 2018). Zhao et al. (2018) argue that loneliness in adolescence is related to shyness and there is a positive relationship between them. As such, it can be said that lonely adolescents have higher levels of shyness. Moreover, given the fact that loneliness affects adolescents socially, shyness levels might positively predict social anxiety.

Digital addiction might have negative effects on adolescents. In this context, to protect and maintain the psychological well-being of adolescents, it is crucial to examine the concept of digital addiction. The current study focuses on understanding prevention strategies better in order to lower the effects of digital addiction to a minimum. Although there are studies showing the relationship between these variables in the literature, there is no study that examines all of them together. As such, the main objective of this study is to analyze the predictive roles of digital addiction, loneliness, and shyness on social anxiety.

Method

Participants and Process

The participants consist of 991 students from different high schools with 523 female students (52.8%) and 468 male students (47.2%). The age of the high school students participating in the research ranges between 15-17 (Mean = 16.4 SD = 1.2). 181 (18.3 %) of the participants are 15 years old, 541 (54.6 %) are 16 years old and 269 (27.1 %) are 17 years old.

The data of the research was obtained from May 2022-October 2022. All of the participants are made up of adolescents continuing their education in public schools. Before the collection of data, official permission was obtained from the Istanbul Provincial Directorate of National Education. At the same time, ethical approval was obtained by Marmara University Scientific Research and Ethics Evaluation Committee. Informed consent form was obtained from all participants before data collection. Informed consent gives information about the purpose of the research and reassures parents that the participation of their children in the research is voluntary and they can

withdraw from the research any time they want. Furthermore, the informed consent clearly states that there are no obtrusive questions and that the responses of the children will be kept anonymous and confidential. Also, the researchers explained the purpose of the study to the participants verbally and emphasized that they have the right to withdraw from the research, that there are no right or wrong answers, and that the responses are untraceable. Answering scale questions was done face to face during normal class hours and took about 30 minutes.

Data Collection Tools

Digital Addiction Scale.- The scale developed by Arslan et al (2015) aims to measure the digital addiction levels of high school and university students. The scale, which consists of 29 items in total, is scored on a point of 5 (1: Strongly Disagree, 5: Strongly Agree). In the construct validity analysis of the scale, it is reported that the model presents a good fit. In the current study, the Cronbach alpha reliability coefficient was calculated as .90.

Short Form of UCLA Loneliness Scale.- UCLA Loneliness Scale was developed by Russell et al. (1980) to evaluate the general loneliness level of an individual, and the adaptation of the scale to Turkish was conducted by Yıldız & Duy (2014). The scale, which is made up of 7 items in total, has one dimension and the scale items are scored on a point of 4 (1=Never, 4=Always). In the construct validity analysis of the scale, it is reported that the model presents a good fit. In the current study, the Cronbach alpha reliability coefficient was calculated as .77.

Shyness Scale.- The scale developed by Cheek & Bus (1981) to evaluate the individuals' shyness levels was adapted to Turkish by Güngör (2001). The scale was increased to 20 items by adding seven items after the studies conducted by Güngör (2001). The scale which has a one-factor structure is scored on a point of 5 (1=Strongly Disagree, 5: Strongly Agree). In the construct validity analysis of the scale, it is reported that the model presents a good fit between the model and the data. The Cronbach's alpha reliability coefficient was found to be 0.89 during the adaptation stage of the scale. In the current study, the Cronbach alpha reliability coefficient was calculated as .90.

DSM-5 Social Anxiety Disorder Severity Scale - Child Form.- DSM-5 Social Anxiety Disorder Severity Scale - Child Form Sarmaz et al. (2017) was developed to assess the severity of social anxiety symptoms in children and adolescents. It has a single factor structure. It is evaluated out of 5 points (1: Never, 5: Always). In the construct validity analysis of the scale, the model fit shows a good fit. The Cronbach alpha reliability coefficient for this study was calculated as .84.

Data Analysis

In the current research, the relationships among digital addiction, loneliness, shyness, and social anxiety has been examined. First, the correlations between descriptive statistics and variables have been calculated. Then hierarchical multiple re-

gression analysis has been conducted to determine the predictive roles of digital addiction, loneliness, and shyness on social anxiety. Before starting the regression analysis, statistical pre-suppositions were examined. The variable inflation values were detected as 1.01-1.19, tolerance values as .67- .98, and Durbin Watson value as 1,59. Findings indicate that there is no multicollinearity and residual problem. So, it is seen that all assumptions match Field's (2013) suggestions.

Results

Descriptive Statistics

Correlations between variables, descriptive statistics and reliability coefficients for the scales used are given in Table 1. As expected, it has been determined that social anxiety has positive relationships with digital addiction ($r = .328, p < .001$), loneliness ($r = .351, p < .001$), and shyness ($r = .487, p < .001$). Moreover, it is seen that digital addiction has positive relationships with loneliness ($r = .466, p < .001$) and shyness ($r = .463, p < .001$). Finally, loneliness was found to be positively correlated with shyness ($r = .506, p < .001$).

Table 1

Descriptive statistics and correlations for the study variables.

Variables	M	SD	α	1	2	3	4
1.Digital addiction	2.87	.82	.89	-	.466**	.463**	.328**
2.Loneliness	3.04	.88	.77		-	.506**	.351**
3.Shyness	2.96	.96	.84			-	.487**
4.Social anxiety	2.41	.94	.74				-

** $p < .01$

Regression analysis

In the regression analysis, multiple hierarchical regression analysis was calculated to predict social anxiety. Study variables were included in the model in four stages. First, gender and age, and then digital addiction, loneliness and shyness variables were included in the model, respectively (see Table 2). The findings for each variable in the model are presented in Table 2. According to this, digital addiction, loneliness, and shyness explain 26% of the variance in social anxiety and the model was found to be significant ($p < .001$).

After controlling for gender and age variables, digital addiction was first included in the model and it was found that it explained 11% of the variance in predicting social anxiety ($R^2 = .111$, Adjusted $R^2 = .108$). Later, loneliness was added to the model and it was found that it explained 5% of the variance ($\Delta R^2 = .050$). Lastly; shyness, which explains 10% of the variance, was entered into the model in the fourth step ($\Delta R^2 = .101$). Finally, however, it was found that digital addiction ($\beta = .09, p < .001$), loneliness ($\beta = .11, p < .001$), and shyness ($\beta = .38, p < .01$) significantly predict social anxiety.

Table 2
Results of hierarchical regression analysis predicting the level of social anxiety

Variable	Model 1				Model 2				Model 3				Model 4			
	B	SE	β	t	B	SE	β	t	B	SE	β	t	B	SE	β	t
Gender	-.11	0.72	-0.06	-1.97*	-0.10	0.05	-0.05	-1.81	-0.09	0.05	-0.05	-1.76	-0.08	0.05	-0.04	-1.70
Age	-0.04	0.04	-0.03	-1.03	-.00	0.04	-.00	-0.08	0.01	0.04	0.01	0.035	0.01	0.03	0.01	0.47
Digital add.					0.37	0.03	0.32	10.83**	0.24	0.03	0.21	6.35**	0.11	0.03	0.09	3.03*
Loneliness									0.27	0.03	0.25	7.66**	0.11	0.03	0.11	3.30**
Shyness													0.37	0.03	0.38	11.59**
R ²	0.00				0.11				0.16				0.26			
Adj R ²	0.00				0.10				0.15				0.25			
SE	0.94				0.86				0.86				0.81			
F (dfn, dfd)	2.41(2,988)				40.91(3,987)				47.17(4,986)				69.73(5,985)			

Note: * $p < .05$, ** $p < .01$, digital add., = digital addiction.

Discussion

The aim of the current study was to examine the predictive relationships between adolescents' digital addiction, loneliness, shyness, and social anxiety. The findings determined that digital addiction, loneliness, and shyness were significant predictors of social anxiety in adolescents. Digital addiction has various negative impacts on adolescent's lives from academic success to depression (Berte et al., 2021). Moreover, digital addiction is a concept associated with impulsiveness, lack of control, negative emotions, and problems with adapting to school (Kuss & Billieux, 2017). Additionally, digital addiction in adolescents affects social anxiety negatively (Başdaş & Özbey, 2020). Studies on social anxiety imply that social anxiety emerges during adolescence and if precautions are not taken, some adolescents might be at risk of developing a debilitating condition during their transition to young adulthood. Examining these concepts, which affect the lives of adolescents physically and mentally, as well as socially and emotionally with different variables, can help to explain the concepts of digital addiction and social anxiety more clearly and guide mental health professionals.

Firstly, it was concluded that digital addiction significantly and positively predicts social anxiety. This finding provides important findings for mental health professionals to help us understand the relationship between digital addiction and social anxiety in adolescents and to reduce the negative effects of digital addiction. When the relevant literature is examined, it is seen that there are studies supporting the current research findings. For example, Karaca et al. (2020) states that digital game addiction is a risk factor for social anxiety in adolescents and that there is a positive correlation between high digital addiction and social anxiety. Again, Kong et al. (2020) states that there is a positive relationship between mobile phone addiction and social anxiety in adolescents. Current research findings support previous findings and point out that digital addiction is a factor that alienates adolescents from social life.

Another finding of the study is that adolescents with high levels of digital addiction exhibit more social avoidant behaviors. Studies indicate that adolescents with digital addiction enact social avoidance more frequently (Başdaş & Özbey, 2020). When the literature is examined, it is seen that different studies support the current research findings. Wang et al. (2019) state that mobile game addiction in adolescents is positively associat-

ed with social anxiety, depression, and loneliness. A similar study by Dong et al. (2019) again indicates that internet addiction and social anxiety are related to each other. A study conducted Bian et al. (2014) states that the higher the loneliness and shyness scores of individuals, the higher the probability of being a smartphone addict. All these findings support the current research results and indicate that there is a positive relationship between digital addiction and shyness, and that adolescents with high digital addiction show more shy behaviors.

The last finding of the current study is that loneliness predicts social anxiety positively and significantly. Accordingly, it can be stated that adolescents with social anxiety have difficulty in establishing social relationships and experience more loneliness. Previous studies also support the current research findings. For example, Fung et al. (2017) suggest that individuals with high levels of social anxiety avoid establishing social relationships due to social isolation and fear of rejection and are under deep loneliness. Lim et al. (2016) states that social anxiety and loneliness are inseparable, and someone who is afraid that people will criticize him will hesitate to establish social relations and will experience loneliness intensely. Again, studies conducted during the pandemic period show that school closures, social isolation measures, distance education, fear and panic lead adolescents to spend more time on social media, loneliness and social anxiety (Morrissette, 2021). On the other hand, when this finding is evaluated within the framework of studies that point out that social support networks help develop positive attitudes towards life and develop proactive behaviors, the importance of social support networks in the relationship between loneliness and social anxiety draws attention (Ramkissoon, 2022a, 2022b). All these studies demonstrate that digital addiction, loneliness, and shyness predict social anxiety. In other words, digital addiction, shyness, and loneliness have a crucial impact on social anxiety in adolescents. The current study offers a clearer explanation of the social anxiety of adolescents with digital addiction. It especially, guides mental health professionals to help decrease the social anxiety levels of adolescents with digital addiction.

Implications

The current study has demonstrated that digital addiction, loneliness, and shyness have effects on social anxiety. Adolescence is an important period for identity and personality devel-

opment. The present study indicates that digital addiction, loneliness and shyness can increase social anxiety in the process where social relations are important for the mental health of adolescents. In this context, it is evaluated that the conscious use of digital tools by adolescents and supporting their socialization will contribute positively to their mental health. Since digital addiction affects many aspects of adolescents' lives negatively from their eating habits to their tendency to violence (Caner & Evgin, 2021), the findings will help other researchers in the field understand how and which factors affect the social anxiety levels of adolescents with digital addiction. As digital addiction literacy is thought to be a critical component of preventing, identifying, and treating digital addiction; establishing digital addiction literacy through educational initiatives is considered important. Such an approach can help adolescents understand digital addiction and manage it before it becomes a problematic application that requires intervention. It is important to develop school-based intervention programs for social support for adolescents on loneliness and shyness levels. Utilizing counseling approaches rooted in cognitive-behavioral principles (İme & Ümmet, 2023) could prove advantageous for adolescents in addressing issues related to both digital addiction and social anxiety. In addition, psycho-educational programs for families on loneliness and shyness can be created. Thanks to these support activities, the social anxiety levels of adolescents can be reduced.

In light of the research findings, the research of mental health experts on the concepts of loneliness and shyness may be effective in reducing the social anxiety levels of digitally addicted adolescents. Lowering the loneliness and shyness levels of adolescents with digital addiction might help lower their social anxiety levels as well. Finally, it is thought that this study will guide researchers and mental health professionals.

Limitations

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Although the study has important outputs, it can be evaluated with some limitations. First, the adolescents participating in the study consisted of a group that did not have any psychiatric diagnosis. Therefore, it is recommended to conduct similar studies in adolescents diagnosed with digital addiction or social anxiety. Due to the cross-sectional nature of the study, it may cause some problems in expressing the cause-effect relationship between the variables. Therefore, longitudinal or experimental studies can be done in future research. In addition, the scales used to collect study data on limitations are individual reporting tools. This can lead to biased reactions. As a solution, experimental or qualitative research can be done in future research. Another limitation is the use of convenience sampling method in the research, and the research was carried out in public high schools where low-income adolescents live heavily. For this, it is limited in terms of generalizability. Future studies can be retested with different cultures and populations using a different sampling method.

Statements and Declarations

Funding.- This research has not received any funding.

Ethical Approval.- All procedures in the study are in accordance with the ethical standards of the responsible human experiments committee and the 1975 Declaration of Helsinki, which was revised in 2000.

Conflict of interest.- The authors declare that there is no conflict of interest.

Data availability.- Data diagrams created and analyzed during the study are available from the authors upon appropriate request.

Informed consent.- Informed consent was obtained from all participating adolescents and their families.

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