

**Do Adolescents with Hearing Loss Use Social Media and the Internet Differently from  
Their Hearing Peers?**

**Short title: Social media and adolescents with hearing loss**

Deniz Tuz<sup>1</sup>, Busra Altin<sup>2</sup>, Merve Ozbal Batuk<sup>2</sup>

<sup>1</sup> Department of Audiology, Faculty of Health Sciences, Ege University, İzmir, Turkey

<sup>2</sup> Department of Audiology, Faculty of Healthy Sciences, Hacettepe University, Ankara,  
Turkey

**Dr. Deniz Tuz<sup>1</sup>, PhD (Aud) (Corresponding Author)**

Department of Audiology, Faculty of Health Sciences, Ege University, İzmir, Turkey.

E-mail: [tuzdenizz@gmail.com](mailto:tuzdenizz@gmail.com). ORCID ID: 0000-0002-9265-2940

**Dr. Büşra Altın<sup>2</sup>, PhD (Aud)**

*Department of Audiology, Faculty of Health Sciences, Hacettepe University, 06100, Ankara,*

*Turkey* e-mail: [ody.busra@gmail.com](mailto:ody.busra@gmail.com)

*Mobile Phone:* +90 0505 4137885 ORCID ID: 0000-0002-7032-5658

**Dr. Merve Batuk<sup>2</sup>, PhD (Aud)**

*Department of Audiology, Faculty of Health Sciences, Hacettepe University, 06100, Ankara,*

*Turkey,* e-mail: [merveozbal@hotmail.com](mailto:merveozbal@hotmail.com) ORCID ID: 0000-0003-4771-8127

**Abstract:**

**Objectives:** The aim of this study is to compare the internet and social media use of teenagers with hearing loss (HL) to their normal hearing (NH) peers.

**Methods:** Study included 27 hearing-impaired and 27 NH peers (12-18 years). The Social Media Attitude Scale (SMAS), Internet Use Purposes Scale (IPUS), UCLA Loneliness Scale (UCLA), and Problematic Internet Use Scale (PIUS) were used to compare HL and NH groups.

**Results:** The social isolation subscale and SMAS total score differed between groups ( $p=0.001$ ,  $p=0.048$ ). IPUS education subscale differences were statistically significant ( $p=0.042$ ). Negative consequences ( $p=0.007$ ), excessive use ( $p=0.021$ ), and PIUS total score ( $p=0.005$ ) differed significantly. UCLA had a moderate negative connection with PIUS's social benefit/comfort subscale and total score ( $r=0.369$ ,  $p=0.006$ ;  $r=-0.309$ ,  $p=0.023$ ).

**Conclusions:** While adolescents with HL have limited online educational resources, problematic internet use is a concern. When overused, the internet can reduce loneliness but can also have harmful consequences.

**Keywords:** Internet Use, Internet, Hearing Loss, Cochlear Implants, Hearing Aids

## 1. Introduction

As an alternative to the physical world, where face-to-face communication is essential, the Internet provides a platform for widespread participation in various activities such as socializing, meeting, conversing, learning, and shopping in a more comfortable and secure environment. Social media, the most popular of these methods, commonly described as web-based technologies or software applications that allow for connection, communication, and share multimedia-based content through online communication channels.<sup>1,2</sup>

From a technological standpoint, social media allows users to create new profiles, make friends, create content, and create pages and groups while remaining behind the keyboard. They do not need to engage in face-to-face communication.<sup>3</sup> Indeed, people who are dissatisfied with their physical characteristics, such as height and weight, or who suffer from voice disorders have stated in previous studies that they feel more comfortable, confident, and "normal" when communicating online.<sup>4, 5</sup> It is also known that people with hearing loss have a similar tendency.<sup>6</sup>

Even though the prevalence of hearing loss increases with age, it remains one of childhood's most important and frequently encountered problems.<sup>7, 8</sup> It is thought that globally 34 million children have hearing problems, affecting their quality of life.<sup>9</sup>

Generally, the effectiveness of the interventions such as hearing aid, cochlear implant may change depending on the type and degree of hearing loss, the choice of intervention, and the accuracy of the fitting strategies. While some interventions can help children to achieve the communication and academic skills of their peers with normal hearing, in some cases, the children do not use their devices effectively, or hearing close to normal hearing cannot be achieved. Aside from these issues, the appearance of devices can cause embarrassment, depression, exclusion, and social isolation in the individual.<sup>10</sup>

Hearing-impaired people can use the Internet for various purposes, including communication, learning, teaching, education, and participation in online psychotherapy support groups and sign language communication. They can socialize on platforms like e-mail, forums, and social media, just like people with normal hearing, without specifying their health conditions.<sup>4,6</sup> This is an important area of research as internet and social media use have become increasingly prevalent among adolescents, and it is important to understand how hearing loss may impact their use and behaviors online. This study can provide valuable insights into potential differences or challenges that may arise by comparing the internet and social media use of adolescents with hearing loss to their normal peers.

This research aims to address the inconsistencies in existing literature regarding social media usage patterns among individuals with hearing loss compared to those with normal hearing. While some studies suggest similarities in social media involvement between deaf and hard of hearing people and their hearing counterparts,<sup>2, 11</sup> One study demonstrate differences impacted by the presence of deafness or degree of hearing loss.<sup>12</sup> In light of these differences, our study aims to compares the internet and social media use of adolescents with implants and hearing aids, as well as those who do not rely on sign language, to that of their normally hearing peers.

## **2. Materials and methods**

The Ethics Committee of Hacettepe University approved this study (GO 21/158). The study was conducted by the Helsinki Declaration, and all participants and caregivers provided written consent forms.

### ***2.1. Participants***

Participants in this study included 27 hearing-impaired and 27 normal-hearing peers between the ages of 12 and 18. The inclusion criteria for the study group were as follows: (1) having a diagnosis of mild to profound hearing loss and using a cochlear implant (CI) or hearing aid (HA), (2) having received a hearing loss diagnosis before the age of four, (3) using a hearing device regularly and benefiting from it, (4) having a pure tone average of 50 dB or better with a hearing device, (5) being a native Turkish speaker, and (6) not having any additional diagnosed disabilities.

The inclusion criteria for the control group were as follows: 1) having normal tympanometric findings, 2) having 20 dB HL or better hearing sensitivity at audiometric test frequencies of 250, 500, 1000, 2000, 4000, and 6000 Hz, and speech discrimination scores above 90%, 3) being between the ages of 12-18, 4) being a native Turkish language, and 5) not having any additional diagnosed disability.

### ***2.2. Study design:***

Individuals who met the inclusion criteria for the study group were identified among individuals with hearing loss who were routinely followed up on in our clinic. Individuals with normal hearing who met the inclusion criteria were found among those who applied to the Audiology Clinic for various reasons (hoarseness, dizziness, etc.) for the control group. The study was explained to all participants, and materials were sent via e-mail between March and September 2021. Informed consent was obtained from all subjects and their caregivers.

### ***2.3. Materials***

### ***Social Media Attitude***

The Social Media Attitude Scale (SMAS) was developed by Otrar and Argın (2015) to assess middle and high school students' attitudes toward social media, considering both its advantages and disadvantages.<sup>13</sup> The Alpha value of SMAS was calculated as 0.85. The scale comprises 23 items categorized into four sub-dimensions. The sub-dimension of social competence (6 positive items) includes questions about the desire to express oneself, to be noticed, and to gain prestige. The sub-dimension of the need for sharing (8 positive items) refers to sharing on social media sites, being aware of the shares, and evaluating the claims. The sub-dimension of relationships with teachers 3 positive items assesses communication with teachers on social media and satisfaction. Finally, the social isolation sub-dimension (6 negative items) addresses social media's impact on isolating individuals from their surroundings and diminishing their focus on lessons (reverse coding). A high scale score indicates that students who answered the scale items have positive attitudes toward social media. The scale's lowest score is 23, and its highest is 115.

### ***Purposes of Internet Use***

Akar (2017) developed the Internet Use Purposes Scale (IPUS) to assess adolescents' internet usage motivations, encompassing communication, entertainment, and information-seeking purposes. This validated scale comprises five sub-dimensions with a total of 29 items.<sup>14</sup> Cronbach's alpha reliability coefficients for the scale's subdimensions range from 0,70 to 0,89. The overall Cronbach's alpha reliability coefficient is 0,86. Within the Education sub-dimension, questions pertain to activities like homework and researching unfamiliar course topics. The Entertainment sub-dimension addresses activities such as watching movies, serials, and playing video games. Psychological Needs includes questions about alleviating loneliness and making new friends. Socialization sub-dimension items involve activities like talking with friends and watching videos on video-sharing sites. Lastly, the Information Access sub-

dimension encompasses activities like staying updated on news and learning new technologies. The students were questioned about their agreement with the internet use purposes listed in the scale sub-dimensions. The scale responses range from 1 to 5, with one being "I strongly disagree" and five being "I strongly agree." A high score indicates that the internet usage purpose in the sub-dimension is strong.

### ***Problematic Internet Usage***

Ceyhan et al.(2007) created the Problematic Internet Use Scale (PIUS) which The Alpha value was calculated as 0.93.<sup>15</sup> The PIUS is a validated scale that measures assess different facets of individuals' internet usage behavior and the corresponding psychological implications, including potential negative consequences, social benefits, and excessive use tendencies.

PIUS included 33 items and three sub-categories. The negative consequences of internet use subscale evaluates the adverse outcomes and potential drawbacks arising from individuals' internet use. It assesses behaviors and attitudes related to online interactions and their impact on individuals' offline lives. The social benefit/social comfort sub-scale focuses on gauging the extent to which individuals turn to the internet for comfort and social support, particularly during times of emotional distress or when faced with personal problems. Finally, The Excessive Use Subscale seeks to identify instances of internet overuse and its potential consequences on individuals' daily lives. It examines respondents' perceptions of disparities between their online and offline lives. The scoring range for the scale is between 33 and 165, with higher scores indicative of potentially unhealthy internet usage, associated with adverse effects on one's life and an increased susceptibility to internet addiction.

### ***Loneliness Status***

The UCLA Loneliness Scale is a validated instrument designed to measure feelings of social isolation and disconnection.<sup>16</sup> The Turkish version of the scale, which underwent validity and reliability assessments conducted by Demir (1989), was employed in this study.<sup>17</sup> Internal

consistency (Cronbach alpha) was found to be 0,96. The scale comprises 20 items, each describing situations reflecting thoughts and feelings concerning social relations. Respondents use a 4-point scale (1 = never; 4 = often) to report the frequency of their experiences with these situations. The scale consists of ten positive items, indicating the absence of semantic loneliness, and ten negative items, suggesting the presence of semantic loneliness. The scale yields a maximum score of 80 and a minimum score of 20. A high score is regarded as indicating that loneliness is felt more intensely.

#### ***2.4. Statistical Analysis***

IBM SPSS statistics 25.00 analysis program was used for statistical evaluation. The data distribution was analyzed using the Kolmogorov-Smirnov test, histograms, and QQ-plots. Independent Samples T-test was used for between-group comparisons. Categorical variables were compared between groups using Chi-square Test. Finally, the Pearson test was used to examine the relationship between UCLA and other questioners.

The statistical program G-power 3.1 (Universitat Dusseldorf, Germany) was used to calculate the sample size.<sup>18</sup> When the literature is examined, it has been reported that there is a significant difference between the internet usage habits of children with hearing loss and hearing peers, with an effect size of 1.0 (Cohen's d).<sup>4</sup> Therefore, it was predicted that a similar level of difference would be detected between the problematic internet usage habits of the case and control groups in our study, and it was calculated that 27 cases should be included in each group to detect this difference with 95% power and a 5% type 1 error rate.



### 3. Results

The demographics and clinical characteristics of participants are shown in Table 1. Study and control groups had similar characteristics regarding gender, age, and educational status of subjects. In addition, there was no significant difference between the groups regarding daily internet usage time and internet usage days per week.

A significant difference was found between the groups in the social isolation subscale and the total score of SMAS (respectively,  $t = -3.381$ ,  $p = 0.001$ ;  $t = -2.022$ ,  $p = 0.048$ ). This difference was caused by individuals in the study group scoring lower than those in the control groups. There was no significant difference in the other subscales of SMAS.

While there was a statistically significant difference between the groups in terms of the education subscale of IPUS ( $t = -2.087$ ,  $p = 0.042$ ), there was no significant difference in the other subscales of IPUS. Individuals in the study group scored lower than those in the control on education subscale.

There was no significant difference between the groups in the PIUS social benefit/social comfort subscale. However, there were significant differences on the negative consequences subscale ( $t = 2.821$ ,  $p = 0.007$ ), the excessive use subscale ( $t = 2.382$ ,  $p = 0.021$ ), and the total score ( $t = 2.292$ ,  $p = 0.005$ ). This difference was caused by individuals in the study group scoring higher than those in the control groups.

There was no significant difference between the groups regarding the UCLA score ( $t = -0.525$ ,  $p = 0.602$ ). Table 2 displays the results of all comparisons.

In study group, There was a negative and moderate relationship between UCLA and the Social benefit/social comfort subscale and total score of PIUS (respectively,  $r = -0.369$ ,  $p = 0.006$ ;  $r = -0.309$ ,  $p = 0.023$ ). On the other hand, a significant positive and moderate relationship was found between UCLA and the Socialization sub-dimension of IPUS ( $r = 0.360$ ,  $p = 0.007$ ).

## **4. Discussion**

This study compared social media attitude, purposes of internet use, problematic internet usage and loneliness status of adolescents with hearing loss and normal hearing.

According to our findings, adolescents with normal hearing have more positive attitudes toward social media and use the internet for educational purposes than their hearing-impaired peers. The second significant finding was that teenagers with hearing impairment use the internet for entertainment, socialization, and psychological well-being, similar to their peers with normal hearing. However, the research has also shown that adolescents with hearing loss have a higher risk of developing problematic internet usage and experiencing negative consequences. At the same time, those who feel more isolated tend to use the internet for socializing purposes.

### ***4.1 Social Media Attitude***

Social engagement is a motivating strategy encouraging teenagers to actively use the Internet.<sup>19</sup> When we examined the teenagers' attitudes toward social media, we found no significant differences between adolescents with normal hearing and those with hearing loss in terms of social competence, relationships with teachers and the need for sharing attitudes towards social media. Nevertheless, our study results indicate that adolescents with normal hearing experience less social isolation than their hearing-impaired peers, as reflected in their SMAS scores. This result is consistent with the findings of Patel et al. (2021) who conducted a systematic review demonstrating that hearing impairment is associated with a higher prevalence of social isolation and loneliness.<sup>20</sup>

### ***4.2 Purposes of Internet Use***

The internet has evolved into a versatile platform for those who are deaf or have hearing loss, providing a variety of opportunities ranging from educational opportunities to online support groups and sign language-based communication. While the internet has many benefits,

it also has limitations, most notably the potential of encountering misinformation, which is a concern for this generation.<sup>21</sup>

The balance between educational and social pursuits is an important consideration in the context of internet usage among people with hearing loss. Disruptions in this balance can have a major influence on academic achievement and learning behavior.<sup>22</sup> Our findings support this hypothesis, demonstrating that teenagers with hearing loss utilize the internet for entertainment, socializing, access information and psychological well-being at levels comparable to their peers. However, there is a distinct difference in educational internet use, with children with normal hearing making greater use of online resources for educational purposes. The difference may be linked to children with normal hearing having greater access to auditory information, which helps in their comprehension of online auditory resources.

The restricted use of the internet for educational reasons among people with hearing loss is an interesting finding in our study. The problem may be attributed in part to the absence of elements such as subtitles created specifically for this group in educational resources, a gap that remains in our country.<sup>23</sup> Individuals with hearing loss can benefit greatly from the inclusion of online educational materials with captions or sign language interpretation, which can dramatically improve understanding of complicated topics and facilitate content consumption. In support of this notion, Kruger and Steyn (2014) highlighted the positive association between reading subtitles and academic achievement, implying that subtitles could give advantages in an academic setting.<sup>24</sup> Furthermore, Chan et al.'s study emphasizes the importance of the language used in subtitles, demonstrating that learners who read subtitles in their first language can improve their academic performance.<sup>25</sup> As a result, providing accessible educational resources, such as subtitles and sign language interpretation, can be critical in fostering academic inclusion for those with hearing impairment.

With differences in internet usage purpose, people with hearing loss have a stronger tendency for personal and group contact online than their peers.<sup>2</sup> Importantly, our study found no significant differences in daily internet usage time and frequency of internet use per week between the hearing loss group and their peers. These findings are consistent with recent research by Thorén et al., who found that individuals with hearing loss and their age-matched counterparts use computers and the internet at comparable rates.<sup>26</sup> This consistency in findings highlights the potential of technology as an effective tool for bridging the knowledge and communication gap between those with hearing loss and the general population.

#### ***4.3 Problematic Internet Usage***

The increase of internet use and the advancement of digital communication platforms have resulted in problematic internet use, which is characterized by individuals' inability to control their online activities, causing distress and interfering with daily functioning.<sup>27, 28</sup> Wu et al. (2016) conducted a study investigating the prevalence of internet addiction and its association with social support and other related factors among adolescents in China. The findings revealed that the prevalence of internet addiction among adolescents was 10.40%, with boys exhibiting a higher susceptibility than girls. Several significant factors were identified as contributors to internet addiction, including poor self-control, low self-esteem, feelings of loneliness, a lack of parental care, and the pressures of academic demands. Additionally, the study emphasized the protective impact of social support, emphasizing its ability to reduce the risk of internet addiction.<sup>29</sup> Michalczyk's study (2021) extended the investigation of problematic internet use to those with hearing loss, revealing a higher tendency for problematic internet use, a pervasive sense of loneliness, and negative emotional experiences among the participants.<sup>30</sup>

In line with previous research, our study found that adolescents with hearing loss had higher levels of excessive internet use, negative consequences, and total PIUS score than their

counterparts with normal hearing. Notably, there was no significant difference between the two groups on the social benefit or comfort subscale. Excessive internet use resulted in increased social isolation and negative consequences, emphasizing the significance of promoting balanced and appropriate internet and social media use among teenagers. This highlights the importance of advice and support, especially for children with hearing impairments, in ensuring healthy and productive involvement with digital platforms.

Our findings emphasize hearing-impaired adolescents' risk to problematic internet use, emphasizing the importance of designing educational and intervention programs specific to this community. Adolescents with hearing loss who are struggling with internet addiction need the support and encouragement of their parents, teachers, and classmates. Previous study has shown that social support is a protective factor against problematic internet use.<sup>29</sup>

Further research in this area is required to clarify the complex aspects that contribute to problematic internet use, particularly among adolescents with hearing loss. Insights obtained from such investigations can be used to develop specific interventions to address this developing challenge entirely.

#### ***4.4 Loneliness***

Our findings showed that there was no significant difference in feelings of loneliness between adolescents with hearing loss and those with normal hearing. This finding contrasts with the findings of Majorano et al. (2018), who found that teenagers with cochlear implants experienced higher degrees of loneliness than their hearing peers.<sup>31</sup> A scoping study of social isolation and loneliness among hearing-impaired children and adolescents also showed a possible relationship between hearing loss and social isolation, with negative consequences for overall well-being.<sup>20</sup>

Conversely, Adigun (2021) presented a different perspective, demonstrating no significant relationship between social media use and loneliness in hearing-impaired students

32. On a similar subject, Barak and Sadosky (2008) discovered surprising findings, demonstrating that deaf participants with reduced internet use had higher feelings of loneliness and poorer self-esteem than their hearing counterparts. Those who used the internet more frequently, on the other hand, had higher overall well-being.<sup>4</sup>

Our study found that There was a negative relationship between UCLA and the Social benefit/social comfort subscale and total score of PIUS. This shows that the individuals' tendency for internet addiction was connected to lower feelings of loneliness. Furthermore, people who used the internet to get comfort and social support had decreased levels of loneliness. In addition, there was a moderate and positive correlation between the socialization sub-dimension of IPUS and UCLA loneliness score. This suggests that the internet and social media can be important tools for social connection and communication for children, including those with hearing impairment. Individuals who experience higher levels of loneliness tend to use the internet more frequently for socializing purposes, such as chatting with friends and watching videos on video-sharing websites. Based on this data, we can conclude that internet use among our participants reduces feelings of loneliness. However, it is important to note that while the internet may temporarily relieve loneliness, excessive internet use can worsen feelings of isolation and lead to negative consequences such as social withdrawal and decreased face-to-face interactions. There are many ways for adolescents with hearing loss to relieve loneliness and build social connections that do not involve spending much time on the Internet. They can improve their overall well-being and quality of life by seeking social support, engaging in physical activity, learning new skills, and seeking professional help.

#### ***4.5 Strengths and Limitations***

The present study has several strengths, such as the inclusion of the patients using a hearing aid and cochlear implant and the exclusion of the subjects not using amplification

devices. However, there are several limitations of this study. The major limitation of the study is only using the questionnaires and performing them via the online platform. In addition, our analysis was limited to the data documented in patient self-reported information. Another limitation of the study is the absence of consideration for the age at which hearing loss began and also duration of the hearing loss. Future research should concentrate determining the age at which hearing loss begins. This will allow us to more precisely assess the impact of the hearing loss duration on internet usage.

## **5. Conclusions**

Our study highlights significant differences in internet use patterns between adolescents with normal hearing and those with hearing impairment. We found that children with normal hearing have more access to educational resources online, while those with hearing loss may face limitations. Additionally, our research emphasizes the dangers of problematic internet use among hearing-impaired adolescents, underlining the significance of educational activities and social assistance. Furthermore, while internet use can help reduce loneliness among all participants, excessive use can have negative consequences. Therefore, exploring alternative ways for adolescents with hearing loss to build social connections and address feelings of loneliness is important. Our findings have implications for educators and mental health professionals working with adolescents with hearing impairment and suggest a more inclusive educational and social media resource design. Further research is needed to understand better the complex relationship between internet use, loneliness, and well-being in this population.



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**Data availability statement:** The data that support the findings of this study are available from the corresponding author, upon reasonable request.

## **Conflict of Interest Statement**

The Authors declare that there is no conflict of interest.

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**Table 1. Demographic Information of Adolescents in the Groups**

		Study Group	Control Group	Test Statistic	p
Gender N(%)	Female	14 (51,9)	18 (33,3)	1,227	0,268
	Male	13 (48,1)	9 (66,7)		
Age (years)		14,30 ±1,81	14,63±1,94	-0,651	0,518
Child's Educational Status N(%)	middle school	16 (59,3)	11 (40,7)	1,852	0,174
	high school	11 (40,7)	16 (59,3)		
Daily internet access (hours)		3,26 ± 1,97	2,85 ±1,06	0,945	0,351
Weekly internet usage (days)		6,67±0,73	6,78±0,57	-0,618	0,539
Hearing device Usage N(%)	Unilateral CI	6(22,2)			
	Bilateral CI	1 (3,7)			
	Bimodal	14(51,9)			
	Bilateral HA	6(22,2)			
Right Ear Hearing loss Type N(%)	SNHL	24 (88,9)			
	CHL	3 (11,1)			
Left Ear Hearing loss Type N(%)	SNHL	24 (88,9)			
	CHL	3 (11,1)			
Right Ear Hearing loss degree N(%)	Mild HL	1(3,7)			
	Moderate HL	3(11,1)			
	Severe HL	10(37,0)			
	Profound HL	13(48,1)			
Left Ear Hearing loss degree N(%)	Moderate HL	4(14,8)			
	Severe HL	14(51,9)			
	Profound HL	9(33,3)			

**Table 2. Comparison of Variables of the Groups**

Scales	Study Group	Control Group	Test	p
	(n=27)	(n=27)	Statistic	
<b>SMAS (Total)</b>	72.78±12.35	78.56±8.22	-2,022	<b>0,048</b>
Social Competence	17.14±5.27	16.74±4.20	0,314	0,755
Relationships With Teachers	8.62±3.48	7.77±3.32	0,919	0,362
The Need For Sharing	28.03±5.93	30.48±4.24	-1,741	0,88
Social Isolation	18.96±5.55	23.55±4.35	-3,381	<b>0,001</b>
<b>PIUS (Total)</b>	90.93±28.64	71.74±17.022	2,292	<b>0,005</b>
The Excessive Use	21.40±4.94	18.48±4.03	2,382	<b>0,021</b>
Social Benefit/Social Comfort	26.77±9.6	22.33±7.91	1,855	0,069
Negative Consequences	15.66±6.52	11.44±4.23	2,821	<b>0,007</b>
<b>IPUS</b>				
Education	24±8.68	28.67±7.73	-2,087	<b>0,042</b>
Entertainment	20.48±6.26	21.26±4.99	-0,504	0,616
Psychologic Needs	16.74±5.15	15.33±3.84	1,137	0,261
Socialization	15.56±4.20	14.89±3.08	0,664	0,51
Information Access	12.15±3.48	12.93±3.12	-0,864	0,391
<b>UCLA</b>	58.63±7.85	59.89±9.66	-0,525	0,602

SMAS: The Social Media Attitude Scale; IPUS: The Internet Use Purposes Scale; PIUS:

Problematic Internet Use Scale; UCLA: The UCLA Loneliness