

## RESEARCH ARTICLE

• 2025 Article No: 16

# Relationship between the Use of Mobile Applications and Social Functioning in Patients with Schizophrenia



Emine Ilgın HOŞGELEN<sup>1</sup>, Berna Binnur AKDEDE<sup>2</sup>, Köksal ALPTEKİN<sup>3</sup>

## ABSTRACT

**Objectives:** The aim of this study is to examine the prevalence of digital technology tool use in individuals with schizophrenia or schizoaffective disorder in Turkey, as well as evaluating the association between the use and psychosocial functionality and clinical symptoms.

**Method:** Data were collected from 100 patients who were diagnosed with schizophrenia or schizoaffective disorder based on the DSM-5 criteria. The use of technology was evaluated with a questionnaire developed for this study. The level of psychosocial functioning was assessed using the Personal and Social Performance Scale (PSP), and the positive and negative symptom severity was evaluated using the Positive and Negative Syndrome Scale (PANSS).

**Results:** The digital technology users were significantly younger than the non-users. The majority of patients own a mobile phone (86%) and a computer (67%). Furthermore, 61% of patients used mobile applications, with Facebook and WhatsApp being the most popular social media platforms (48%). Patients who used digital technology tools had higher PSP scores. Furthermore, patients who used digital technology tools had significantly lower scores in PANSS negative subscale. There was no difference in PANSS positive subscale scores between digital technology tool users and non-users.

**Conclusion:** Patients diagnosed with schizophrenia may benefit from mobile applications and social media tools that can help them participate in daily activities and improve their overall well-being.

**Keywords:** Schizophrenia, Social Functioning, Negative Symptoms, Digital Technology, Social Media, İnternet

## INTRODUCTION

Digital technology involves various technologies, including software applications and communication networks, as well as mobile phones, personal computers, and the Internet, which are used to electronically process, store, and transmit information (Mahmood and Rehman 2023). Examples of digital technology also include mobile applications, social media, and messaging applications. In recent years, the use of digital technology tools has been playing an increasingly important role in human life. Mobile devices, internet access, and applications have become an integral part of daily life and social interactions. While there are data on how often the general population uses digital technology tools (Pew Research Center 2021), there is a scarce number of findings on the frequency and prevalence of this technology use by patients with schizophrenia who are in a disadvantaged group.

Findings of previous studies indicate that the individuals diagnosed with schizophrenia use computers, social networking sites, and text messaging less than the general population (Miller et al. 2015, Wong et al. 2020). A recent study reported that 85% of patients with psychosis have internet access, 70% of them have a mobile phone, and 37% of patients with chronic psychosis have social media accounts, but only 45% of those use their social media accounts (Bonet et al. 2018). A study based on online survey conducted with schizophrenia patients showed that 89% of participants owned a personal computer, 54% owned a smartphone, 31% used text messaging, and 29% spent time on social networks (Gay et al. 2016). However, this study was conducted online, and the participants consisted of people who had access to the internet and technological devices. Although patients with schizophrenia find surfing the internet a useful activity (42%), only 29% find social networking sites useful (Gay

**How to cite:** Hoşgelen EI, Akdede BB, Alptekin K. (2025) Relationship between the Use of Mobile Applications and Social Functioning in Patients with Schizophrenia. *Türk Psikiyatr Derg* 36:16. <https://doi.org/10.5080/u27385>

**Received:** 31.07.2023, **Accepted:** 20.11.2023, **Available Online Date:** 25.04.2024

<sup>1</sup>Psychologist, <sup>2,3</sup>Prof., Department of Neurosciences, Graduate School of Health Sciences, Dokuz Eylül University; <sup>2,3</sup>Prof., Department of Psychiatry, School of Medicine, Dokuz Eylül University, İzmir, Turkey.

**e-mail:** [ilginhosgelen@gmail.com](mailto:ilginhosgelen@gmail.com)

et al. 2016). Patients use the internet to share information, obtain shared useful information, provide emotional support, participate in forums created to cope with mental health illnesses, and access accurate information in mental health-related forums (Žaja et al. 2022).

The advantages provided by the internet, mobile applications, and social media include establishing social connections, social participation, obtaining information, entertainment (Khan et al. 2014), strengthening existing social networks, peer support, and changing self-presentation (Reid and Weigle 2014). In recent years, research has indicated that having digital technology tools and actively using them is also beneficial for patients with schizophrenia. Studies reveal that schizophrenia patients who utilize mobile phones demonstrate enhanced cognitive functions and better skills in domains related to functional outcomes, such as interpersonal relations, personal care skills, physical functionality, social acceptance, social life skills, and work skills, compared with patients who do not use mobile phones (Depp et al. 2016). Moreover, there is a significant relationship between social media use and negative symptom severity (Rekhi et al. 2019). Interactive messaging helps individuals with schizophrenia improve social functioning (Rekhi et al. 2019). Applications designed specifically for individuals with schizophrenia contribute to symptom alleviation (Ben-Zeev et al. 2014), increase motivation (Granholm et al. 2020), encourage physical exercise (Naslund et al. 2015), and help cope with psychosocial difficulties associated with schizophrenia (Simões De Almeida et al. 2019).

Digital technology tools offer individual alternatives and choices to present themselves in a digital community. On these digital platforms, there may be less stigmatization of mental health illnesses compared with face-to-face communication (Brusilovskiy et al. 2016, Highton-Williamson et al. 2015). Therefore, patients with schizophrenia can find a place to express themselves without being subjected to stigma and bullying (Torous and Keshavan 2016) and receive support from their peers (Schrank et al. 2010). Patients may also feel part of a community psychologically, physically, and socially (Snethen and Zook 2016).

In addition to the advantages of digital technology use in patients with schizophrenia, there are also potential negative impacts. For instance, the use of the internet may cause suicidal thoughts or may increase the risk of being influenced by other people who tend to engage in self-harming behavior (Schrank et al. 2010, Torous and Keshavan 2016). Among psychiatric disorders, the term schizophrenia is the most used expression on social media for stigmatization purposes (Robinson et al. 2019). Because of the high number of posts containing negative approach towards schizophrenia (Dikeç et al. 2023), patients may be exposed to posts including stigmatization and negative expressions.

Some individuals diagnosed with schizophrenia avoid using digital technology devices and mobile applications. One of the reasons for this situation is that patients have limited knowledge about the use of these technologies (Abdel-Baki et al. 2017, Athanasopoulou et al. 2017, Torous et al. 2018). Secondly, patients avoid using these tools because of the delusional thought contents due to schizophrenia; it has also been reported that patients have difficulty using these technological tools due to reasons such as economic problems, lack of energy, limited ability to use them, and the need for social isolation (Athanasopoulou et al. 2017, Ben-Zeev 2012). However, despite all these reasons, patients can easily adapt to the use of digital technology tools when they receive adequate training (Ben-Zeev 2012).

Patients' ability to use digital technology tools may be impaired or reduced because of symptoms such as severe delusional thoughts, disorganized behavior, cognitive impairments, and low social functioning. Despite these potential challenges, the use of digital technology tools among patients with schizophrenia has many benefits. These tools are widely used in research for intervention and monitoring purposes and focus on examining changes in patients. However, there is little information available about the clinical, sociodemographic, and social functioning levels of patients who engage in using digital technology tools and those who do not. Understanding the social functioning and clinical symptom characteristics of patients who use and do not use these tools is important to facilitate their adaptation to digital technology tools that can be developed to integrate patients with schizophrenia into online social networks and society in general. It may also offer a new perspective on the needs of people with schizophrenia and help develop interventions that address their clinical symptoms as well as their social network needs.

The objective of this study is to determine the prevalence of use of digital technology tools such as the Internet, mobile applications, gaming, and social media applications, as well as the clinical and psychosocial characteristics of patients who use or do not use these tools. The primary hypothesis of the research is that half of the participants use mobile phones, the Internet, mobile applications, messaging applications, and social media applications. The second hypothesis is that patients who use digital technology tools show better psychosocial functioning and lower clinical symptom severity, including positive and negative symptoms. In this research, mobile phones, computers, the Internet, mobile applications, social media applications, video calls, computer games, and game applications were examined under the title of digital technology tools. This research is the first study to provide data on the use of digital technology tools by patients with schizophrenia in a Turkish sample.

## METHODS

### Sample

Individuals diagnosed within the scope of schizophrenia spectrum and other psychosis disorders based on DSM-5 (American Psychiatric Association 2013) diagnostic criteria are monitored on a regular basis in the Psychosis Outpatient Unit of Dokuz Eylül University Hospital Department of Psychiatry (DEUDP). Between May 2017 and December 2018, 278 patients who were regularly examined in this outpatient unit were evaluated either during their examination or by viewing their records for eligibility criteria. Patients who were eligible to participate in the study and who could be interviewed were informed about the study. Individuals diagnosed with schizophrenia or schizoaffective disorder, between the ages of 18 and 65 years, who could read and write in Turkish, who gave verbal and written informed consent, and who could be oriented for evaluation were included in the study. Having a neurodevelopmental disorder in addition to schizophrenia or schizoaffective disorder, having an additional organic or neurological disorder along with schizophrenia or schizoaffective disorder that could impact psychosocial functionality, not being able to orient themselves in the interview for the study, and having received electroconvulsive therapy (ECT) within the last 6 months were established as exclusion criteria for the study to exclude conditions that could affect technology use associated with neurocognitive functions. Despite being followed up at the psychosis outpatient clinic, a total of 178 patients could not be included in the study for various reasons. These reasons included not meeting the inclusion criteria for one of the diagnoses being monitored at the psychosis clinic (n=24), having an additional organic or neurological disorder alongside schizophrenia (n=11), having a comorbid neurodevelopmental disorder additional to schizophrenia and schizoaffective disorder (n=13), inability to be oriented to evaluations (n=9), being 65 years or older (n=16), inability to read and write in Turkish (n=3), having received electroconvulsive therapy (ECT) within the last 6 months (n=2), not being able to reach to inform about the study (n=48), and refusing to participate in the study (n=52). Finally, 100 patients diagnosed with either schizophrenia (n=87) or schizoaffective disorder (n=13) according to the DSM-V criteria (American Psychiatric Association, 2013), participated in the study.

### Ethical Approval

The study was approved by the Dokuz Eylül University School of Medicine Non-Interventional Ethics Committee with protocol number 3570-GOA and approval number 2016/06-05. This study was conducted in accordance with the principles stated in the Declaration of Helsinki.

## Study Materials and Data Collection

Following regular psychiatric examinations at the psychosis outpatient unit, patients were verbally asked for their consent to participate in the study. Patients who agreed to participate in the study were informed about the details and duration of the evaluations through written informed consent. First, sociodemographic data were obtained.

**Sociodemographic data form:** This form was used to collect data such as age, educational status, marital status, employment status, residence information, psychiatric history, duration of illness, and medical and pharmacotherapy history.

**Short questionnaire for digital technology use:** For this research, a short survey was developed to evaluate the technology use. The survey included 13 questions: 4 multiple-choice questions (e.g., which of the following applications do you use?), 2 open-ended questions (e.g., how many hours do you spend on the internet in a day? and how long have you been using the internet?), and 7 yes/no questions. (e.g., Do you have a computer at home? Do you use internet connection on your mobile phone? etc.). The survey obtained the following data: 1. Access and use of mobile phones, computers, the internet, and mobile applications, 2. Use of mobile applications, social media, and messaging applications, 3. How many hours of daily internet use and how many years the internet has been used were asked. Through this survey, the type (e.g. messaging, social media, game, bank) and name (e.g. Facebook, WhatsApp) of mobile applications used by the patients and social media applications, messaging applications, mobile phone ownership, internet access, and computer usage were evaluated. WhatsApp and Messenger are included in the category of messaging applications, and WhatsApp is also included in the category of social media applications.

**Psychosocial functioning:** The level of psychosocial functionality was assessed using the Turkish version of the Personal and Social Performance Scale (PSP) (Aydemir et al. 2009, Morosini et al. 2000). Four domains of functioning, including socially useful activities, personal and social relationships, self-care, and disturbing and aggressive behaviors, were measured on an interview basis. These four psychosocial functioning domains were evaluated on a six-point scale (none, mild, moderate, moderate-severe, severe, extremely severe) out of 100 points. A higher score indicates better psychosocial functioning.

**Clinical symptom severity:** Positive and negative symptom severity was evaluated using the Turkish version of the Positive and Negative Syndrome Scale (PANSS) (Kay et al. 1987, Kostakoğlu et al. 1999). The PANSS has three subscales: positive symptoms, negative symptoms, and general psychopathology. The positive and negative symptom subscales each has seven items, whereas the general psychopathology subscale consists of 16 items. Each item is

given a score between 1 and 7 (1= none, 2= minimal, 3= mild, 4= moderate, 5= moderate-severe, 6= severe, 7= extreme). A higher score indicates worse symptom severity. In this study, cognitive symptoms were evaluated using the PANSS cognitive factor (P2, N5, G5, G10, G11) (Lindenmayer et al. 1994).

A trained psychologist (EIH) assessed psychosocial functioning and clinical symptom severity. The duration of the interviews varied between 80 and 110 minutes, depending on the clinical condition of the patients. Within this timeframe, approximately 20-30 minutes were devoted to completing the sociodemographic data form and the technology use survey, 40-50 minutes were allocated to PANSS, and 20-30 minutes were dedicated to PSP evaluations.

### Statistical Analysis

Statistical Package for the Social Sciences (SPSS) version 24.0 software for Windows was used for statistical analysis. The data demonstrated a normal distribution, as indicated by the normality test. Descriptive statistical analysis was used to analyze the sociodemographic data. The relationship among gender, marital status, monthly household income, and digital technology use was examined using the chi-square test. Independent samples t-test was used to compare the differences in PSP, PANSS total, PANSS subscales, and age between patients who used digital technology tools and those who did not.

The correlation between age and PSP was assessed using Pearson correlation because the data showed a normal distribution. The relationship between the two was examined to control the age factor in case further analysis was needed.

For all analyses, the significance value was accepted as  $p < 0.05$ .

### Description of the Subgroups

In this study, data were collected based on the self-reports of study participants regarding the use of digital technology tools. Patients' use and non-use of tools for each technological tool, mobile application and social media platform was recorded. Because of the diverse usage behaviors and preferences of each patient, there were varying numbers of users in each category. For instance, if a patient uses Facebook but not Messenger, he/she was recorded as a user of Facebook but not Messenger in the study. Consequently, the number of users for Facebook and Messenger varied.

## RESULTS

### Sample Characteristics

The study was conducted with 100 participants diagnosed with schizophrenia ( $n=87$ ) and schizoaffective disorder

( $n=13$ ). The sample consisted of 32 females and 68 males. The mean age of the sample was  $42.5 \pm 10.2$  years (range: 21-64), and the mean duration of education was  $11.5 \pm 4.7$  years (range: 3-28). The sociodemographic characteristics of the participants are presented in Table 1.

At the time of the evaluation, 15% of the patients were receiving monotherapy, while 85% were on multidrug therapy. In addition, 14% of the patients were using first-generation antipsychotics, 97% were using second- or third-generation antipsychotics, and 30% were receiving long-acting injectable antipsychotics.

### Clinical Characteristics of the Samples

According to clinical characteristics, the mean duration of the illness was  $15.4 \pm 10.1$  years. The mean score of the PANSS total was  $63.1 \pm 16.7$ , the mean score of the positive symptom subscale was  $15.0 \pm 4.7$ , the mean score of the negative symptom subscale was  $16.6 \pm 5.4$ , the mean score of the general psychopathology subscale was  $31.3 \pm 9.1$ , the mean score for the PANSS cognitive factor was  $12.8 \pm 4.3$ , and the mean score for PSP was  $49.1 \pm 16.4$  (Table 2).

### Prevalence of Digital Technology Use

More than half of the participants had a mobile phone (86%), a computer at home (67%), internet connection at home (67%), internet access on a mobile phone (57%), at least one mobile application (61%), video chat (55%) and messaging application (53%) (Figure 1). 47% of the patients were using social media applications. In descending order, the most common social media networks preferred by participants were WhatsApp (48%), Facebook (48%), Messenger (36%), and others (Twitter, Instagram, Snapchat, Swarm). According to the results of the study, 33 patients did not spend time on the Internet, whereas 67 patients did. The mean duration of daily internet use was found to be 99.3 minutes, and the mean duration of patients' internet use was 47.34 months (Figure 1). The responses to the open-ended question "How many hours a day do you spend on the internet?" were categorized during the analysis and presented in their categorized form in Figure 1. Five participants reported avoiding the use of these digital technology tools because of delusions, but at the same time, they also avoided using mass communication tools such as television, newspapers, and radio. Additionally, 8% mentioned that they did not need a mobile phone and instead used a landline.

Of the patients using mobile applications, 16.40% ( $n=10$ ) reported that they did not have internet access on their mobile phone, 22.95% ( $n=14$ ) did not have an internet connection at home, and 5% ( $n=3$ ) did not have a mobile phone. Of the patients using social media applications, 19.15% ( $n=9$ ) reported that they did not have internet

**Table 1.** Sociodemographic Characteristics of the Participants

		n=100 (%)		n	%	Mean ± S.D.
<b>Gender (n %)</b>		<b>Female</b>	<b>Male</b>			
Age (Mean ± S.D.)		32 (32.0)	68 (68.0)			42.5 ± 10.2
		43.8 ± 9.6	41.9 ± 10.6			
Marital Status	Married	10	15	25	25.0	
	Single	16	44	60	60.0	
	Divorced	6	9	15	15.0	
Diagnosis	Schizophrenia	25	58	83	83.0	
	Schizoaffective disorder	7	10	17	17.0	
Educational status						11.5±4.7
Living with/	Alone	2	7	9	9.0	
	Spouse (/children)	11	15	26	26.0	
	Parents	18	43	61	61.0	
	Other	1	3	4	4.0	
Residency	Urban	31	67	98	98.0	
	Rural	1	1	2	20.0	
Employment Status*						9.94±9.9
				20	20.0	
				38	38.0	
				42	42.0	

S.D. standard deviation

\* Employment status was analysed in three categories: currently employed, formerly employed but not currently employed (not working), and no work experience (never worked). Mean and standard deviation were calculated according to the data of patients who were working (n=20) and not working (had work experience but not currently working) (n=38).

**Table 2.** Clinical Characteristics of the Participants

	Mean ± S.D.	Min-Max
Duration of Illness (years)	15.4±10.1	1–42
DUP (years)	1.4±2.8	0–15
Age of Onset (years)	21.0±9.0	12–57
PSP score	49.1±16.4	14–85
PSS score	15.0±4.7	7–28
NSS score	16.6±5.4	7–31
GP score	31.3±9.1	16–60
Cog score	12.8±4.3	6–25
PANSS Tot. score	63.1±16.7	32–116

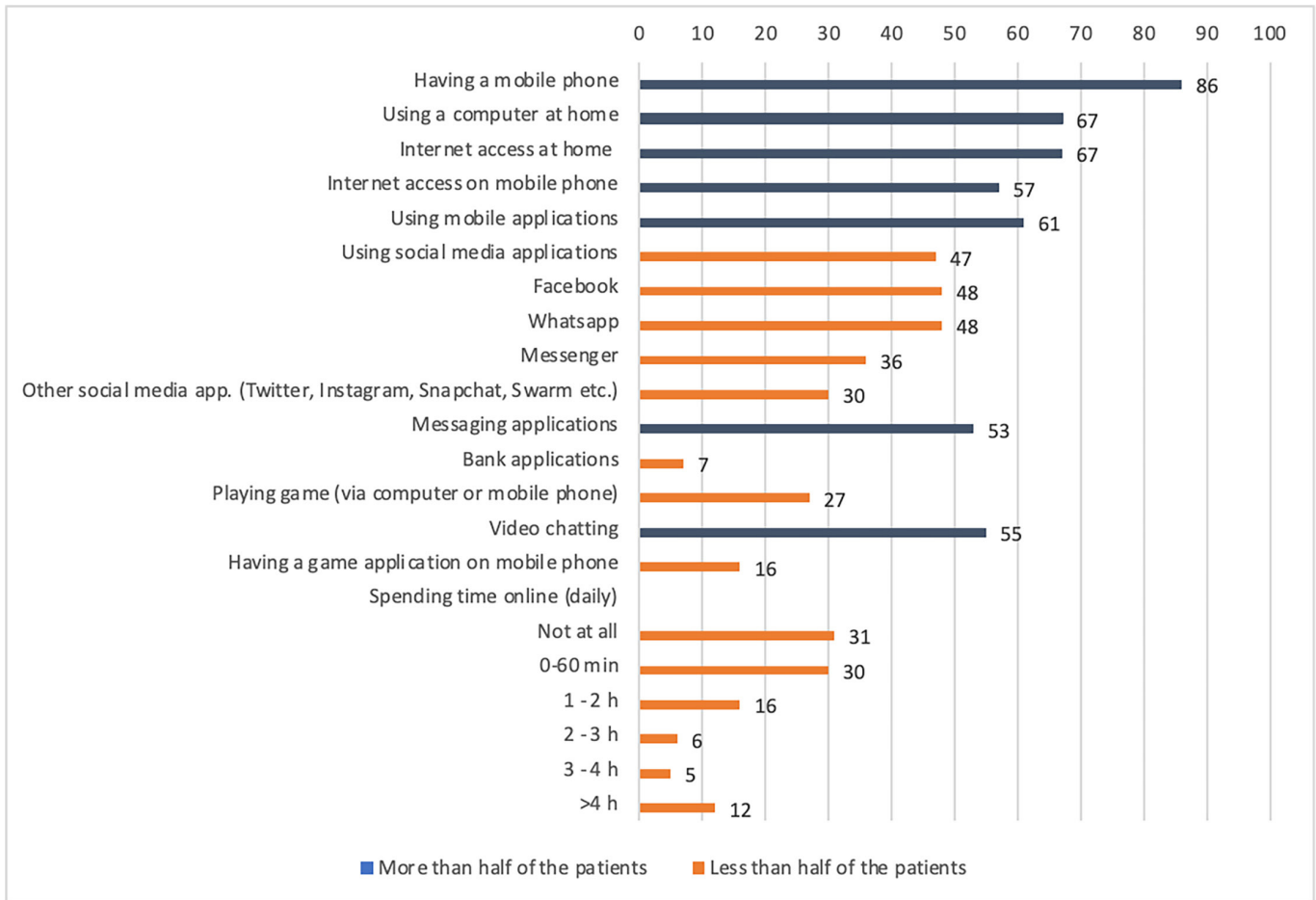
DUP: duration of untreated psychosis; PSP: Personal and Social Performance Scale; PANSS: Positive and negative Symptom Scale; PSS: Positive Symptom Scale of PANSS; NSS: Negative Symptom Scale of PANSS; GP: general psychopathology of PANSS; Cog: Cognitive score of PANSS.

access on their mobile phone or internet connection at home, and 4.25% (n=2) reported that they did not have a mobile phone.

### Sociodemographic Characteristics Between Groups That Use and Do Not Use Digital Technology Tools

Patients who had a computer at home (p=0.008), internet access at home (p=0.002), internet access on their mobile phones (p<0.001), used mobile applications (p<0.001), social media applications (p<0.001), messaging applications (p<0.001), Facebook (p<0.001), WhatsApp (p=0.003), Messenger (p<0.001), and played games on a computer or mobile phone (p<0.001) were found to be younger than those who did not use these tools. This difference was statistically significant (Table 3).

No statistically significant differences were found between the user and non-user groups in terms of gender, education level, and employment status (p>0.05). However, a



**Figure 1.** Prevalence of using technological tools, mobile applications, and social communication tools

Abbreviations: h, hour; min, minute

Note: Use rates are shown in the Figure.

significant relationship was observed between monthly household income and having a computer at home [ $\chi^2$  (2, N=100)=10.85,  $p=0.004$ ], as well as having internet access at home [ $\chi^2$  (2, N=100)=12.86,  $p=0.002$ ].

### Relationship Between the Use of Digital Technology Tools and Psychosocial Functioning

Patients using the internet on their mobile phones ( $p=0.003$ ), mobile applications ( $p=0.033$ ), social media applications ( $p=0.003$ ), messaging applications ( $p<0.001$ ), Facebook ( $p=0.010$ ), WhatsApp ( $p<0.001$ ), Messenger ( $p=0.010$ ), and video calling ( $p=0.007$ ) were found to have statistically higher PSP scores compared with patients who did not use these tools (Table 4). According to the correlation analysis conducted between the Personal and Social Performance Scale and age, no significant relationship was found between the two variables ( $r=-0.080$ ,  $p=0.430$ ). Therefore, further analyses were not conducted to examine the relationship between digital technology tools and PSP after adjusting for age.

### Relationship Between Digital Technology Use and Symptom Severity

Patients using social media applications ( $p=0.028$ ), messaging applications ( $p=0.014$ ), and WhatsApp ( $p=0.006$ ) were observed to have significantly lower PANSS total scores than patients who did not use these tools. Patients using the internet on their mobile phones ( $p=0.004$ ), mobile applications ( $p=0.009$ ), social media applications ( $p=0.006$ ), messaging applications ( $p<0.001$ ), Facebook ( $p=0.022$ ), WhatsApp ( $p<0.001$ ), Messenger ( $p=0.022$ ), other social media applications ( $p<0.001$ ), and video calling ( $p=0.029$ ) were found to have significantly lower negative symptom severity compared with patients who did not use these applications. Patients using WhatsApp ( $p=0.025$ ) and messaging applications ( $p=0.046$ ) were observed to have significantly lower PANSS General Psychopathology subscale scores than patients who did not use these tools. Patients who had a shared computer at home, internet access on the mobile phone, and used messaging applications, social media applications, Facebook, WhatsApp, and Messenger were found to have significantly lower PANSS

**Table 3.** The Comparison of Age Between Patients Using and Not Using Digital Technology Tools

	n=100 User/Non-user	User		Non-user		t	p
		Mean	S.D.	Mean	S.D.		
<b>Age</b>							
Computer access at home	67/33	40.82	9.92	46.63	9.89	2.76	.008
Internet access at home	67/33	40.50	9.65	47.27	10.02	3.21	.002
Internet access on mobile phone	57/43	38.73	8.53	48.04	9.98	4.91	<.001
Mobile applications	61/39	38.90	8.90	48.74	9.35	5.23	<.001
Social media applications	47/53	38.27	8.56	46.30	10.21	4.22	<.001
Messaging applications	53/47	39.22	8.94	46.70	10.25	3.86	<.001
Facebook	48/52	38.58	8.47	46.57	10.30	4.25	<.001
WhatsApp	48/52	39.66	8.99	45.57	10.58	3.01	.003
Messenger	36/64	38.11	8.48	45.34	10.27	3.78	<.001
Playing game (via computer or mobile phone)	27/73	34.62	7.74	45.73	9.42	5.99	<.001

Independent Samples t-Test. p&lt;0.05. p&lt;0.001

**Table 4.** The Comparison of PSP Scores Between Patients Using and Not Using Digital Technology Tools

	n=100 User/Non-user	User		Non-user		t	p
		Mean	S.D.	Mean	S.D.		
Internet access on mobile phone	57/43	53.31	15.9	43.53	15.05	3.00	.003
Mobile applications	61/39	51.9	16.91	44.74	14.8	2.16	.033
Social media applications	47/53	54.29	18.02	44.50	13.43	3.10	.003
Messaging applications	53/47	54.24	16.97	43.31	13.78	3.50	<.001
Facebook	48/52	53.47	17.77	45.07	14.07	2.63	.010
WhatsApp	48/52	54.68	17.24	43.96	13.09	3.40	<.001
Messenger	36/64	54.69	17.15	45.96	15.24	2.62	.010
Video chatting	55/45	53.05	16.48	44.28	15.17	2.74	.007

Independent samples t-Test, p&lt;0.001, p&lt;0.05 PSP: Personal and Social Performance Scale.

cognitive factor scores than patients who did not use these tools. This difference was statistically significant for having a shared computer at home (p=0.029), internet access on the mobile phone (p=0.013), social media applications (p=0.020), messaging applications (p=0.014), Facebook (p=0.024), WhatsApp (p=0.003), and Messenger application (p=0.039).

The comparison of symptom severity between patients using and not using digital technology is shown in Table 5. However, no significant difference was observed in PANSS-positive symptom subscale scores between patients using and not using digital technology (p>0.05).

## DISCUSSION

### Key Findings

In this study, the prevalence of digital technology tool use among patients with schizophrenia was examined, and the sociodemographic, clinical, and psychosocial characteristics of patients using and not using these tools were investigated. The study has three main findings. First, the study indicates that more than half of the participants use digital technology tools such as the Internet, mobile phones, mobile applications, messaging applications, and video calls. However, when compared with the general population in Türkiye (Kemp 2019), the rate of schizophrenia patients

**Table 5.** The Comparison of PANSS and PANSS Subscale Scores Between Patients Using and Not Using Digital Technology Tools

	N=100 User/Non-user	User		Non-user		t	p
		Mean	SD	Mean	SD		
<b>PANSS</b>							
<b>PANSS NS</b>							
Internet access on mobile phone	57/43	15.26	5.37	18.34	4.98	-2.93	0.004
Mobile applications	61/39	15.47	5.6	18.33	4.89	-2.65	0.009
Social Media applications	47/53	15.04	5.89	17.96	4.56	-2.78	0.006
Messaging applications	53/47	14.96	5.47	18.42	4.74	-3.36	<.001
Facebook	48/52	15.31	5.84	17.76	4.72	-2.32	0.022
WhatsApp	48/52	14.77	5.66	18.26	4.59	-3.4	<.001
Messenger	36/64	14.94	5.86	17.51	4.94	-2.33	0.022
Other applications	30/70	13.83	4.06	17.77	5.49	-3.52	<.001
Video Chatting	55/45	15.52	5.73	17.88	4.72	-2.21	0.029
<b>PANSS GP</b>							
Messaging applications	53/47	29.64	9.28	33.25	8.59	-2.02	0.046
WhatsApp	48/52	29.22	8.9	33.28	8.92	-2.27	0.025
<b>PANSS Cog</b>							
Computer access at home	67/33	12.16	3.9	14.15	4.8	-2.21	0.029
Internet access on mobile phone	57/43	11.89	4.38	14.04	3.9	-2.54	0.013
Messaging applications	53/47	11.83	4.34	13.93	4.03	-2.52	0.014
Social Media applications	47/53	11.76	4.38	13.75	4.03	-2.36	0.020
Facebook	48/52	11.81	4.35	13.75	4.07	-2.29	0.024
WhatsApp	48/52	11.5	4.33	14.03	3.93	-3.07	0.003
Messenger	36/64	11.63	4.45	13.48	4.1	-2.09	0.039
<b>PANSS Tot.</b>							
Social Media applications	47/53	59.25	17.67	66.56	15.17	-2.22	0.028
Messaging applications	53/47	59.28	17.08	67.46	15.34	-2.5	0.014
WhatsApp	48/52	58.37	17.02	67.51	15.31	-2.81	0.006

Independent Samples t-Test.  $p < 0.05$ .  $p < 0.001$

PANSS: Positive and Negative Symptom Scale; PANSS Tot: PANSS total; PANSS NS: PANSS negative symptoms subscale; PANSS GP: PANSS general psychopathology; PANSS Cog: PANSS cognitive.

using digital technology tools was lower than that in the general population. While it was assumed that half of the participants used social media, it was found that only 48% of those actually were using social media applications. One possible reason for this could be the impairment of neurocognitive skills required for using social media (Bernard et al. 2016, Hoşgelen et al. 2022). Among the participants, the most commonly used social networking site was found to be Facebook (48%), which aligns with previous studies (Miller et al. 2015, Rekhi et al. 2019). The most frequently used messaging and social media application was WhatsApp (48%), and only 30% used Instagram, Twitter, or any other type of social media applications. The second key finding of the study is that patients who use digital technology tools

demonstrate better psychosocial functioning, lower negative symptoms, and lower cognitive symptom severity. Despite some patients experiencing severe positive symptoms, it has been observed that they do not refrain from using the internet, mobile applications, social media applications, and video calls. Positive symptoms may not be significantly associated with social media use (Degnan et al. 2018), indicating that the positive symptoms do not limit patients' use of these tools. Patients with schizophrenia can use the internet, social media, and messaging applications without experiencing new positive symptoms or an increase in the severity of existing symptoms. Recent findings indicate that smartphones do not induce paranoia or worsen positive symptoms in patients with schizophrenia (Ainsworth et al. 2013, Firth and Torous



2015, Miller et al. 2015, Torous et al. 2021). On the other hand, patients who used the internet less frequently have been observed to exhibit higher severity of positive symptoms compared with frequent users (Villagonzalo et al. 2019).

Using the internet for various purposes can assist patients to ignore their positive symptoms; however, there are studies indicating that patients may have delusions related to the internet. Case studies suggest that some patients believe their thoughts are spreading through the internet, that they are being watched by someone online, or that radiation spreading through the internet causes discomfort or shortness of breath (Lerner et al. 2006, Margolese et al. 2002, Schmid-Siegel et al., 2004). Recent research, however, has proposed that the use of digital technology in patients with schizophrenia does not lead to the development of delusional content or an increase in psychotic symptoms (Bonet et al. 2017, Torous et al. 2021). The exacerbation of psychotic symptoms does not prevent patients from using social media; however, as symptoms worsen, a significant difference is observed in the content shared, which could predict relapse (Birnbaum et al. 2019). Therefore, these case studies do not represent the overall situation regarding the exacerbation of positive symptoms due to the patients using digital technology tools.

Third, it has been observed that patients who use social media applications, the internet, and mobile applications are younger. This finding is consistent with previous research findings indicating that social media and internet use in patients with schizophrenia is more strongly associated with younger age (Gay et al. 2016, Miller et al. 2015, Naslund et al. 2019, Rekhi et al. 2019). Younger patients may be more familiar with digital technology than older patients. Adapting to the use of digital technology tools becomes more challenging, especially for individuals aged 65 years and older (Niehaves and Plattfaut 2014), a situation that may be associated with a younger age in schizophrenia patients. Determining the age limit associated with the ability of patients with schizophrenia to adapt to technology use is challenging due to the heterogeneous nature of the illness and the characteristics of delusional contents. However, the higher level of psychosocial functioning in patients who use these tools at any age may be associated with better adaptation skills. Providing necessary resources and training to young patients who face challenges in using digital technology tools can empower them to use these tools, potentially resulting in noticeable enhancements in psychosocial functioning. On the other hand, lower psychosocial functioning, lack of social skills, and severe negative symptoms may limit the need for using these tools.

The increasing prominence of using digital technology tools to interact with others and develop new social relationships has supported their use in the fields of health and telemedicine. Although it has been suggested that patients may have difficulty adapting to the evaluation, intervention,

and treatment programs conducted using video calls in the fields of telemedicine and telepsychiatry due to positive symptoms (Kopelovich et al. 2021), our study, observing that patients who did not engage in video calls had more severe negative symptoms and no significant difference in positive symptoms, indicates that individuals with predominant negative symptoms in the sample may find it more difficult to adapt to these programs compared to those with predominant positive symptoms.

Similar to those of previous studies, our findings indicate that the severity of negative symptoms and the level of psychosocial functioning are determinant factors in the use of digital technology tools for individuals with schizophrenia (Miller et al. 2015, Rekhi et al. 2019). Individuals with schizophrenia have lower motivation to engage with the social environment because of impairments in social skills, such as self- and interpersonal conflict, which are associated with psychosocial functioning (Weittenhiller et al. 2021). The reason for lower psychosocial functioning, especially among patients who do not use social media and messaging applications, may be an ongoing lack of motivation and social skills to interact with others and establish new social relationships. Nowadays, social media and social networking sites are a new option for creating and maintaining social networks and preserving existing social relationships and may be one of the areas that represent social functionality. However, social isolation, a prominent aspect of negative symptoms, is a key risk factor for the decline in social networks even before the onset of psychosis (Gayer-Anderson and Morgan 2013, Jorm 2005, Pantell et al. 2013).

Avoiding the use of social media and messaging applications may be a sign of social isolation. In individuals with schizophrenia, a decrease in the quality of life, reduced motivation, and frequent relapses are observed because of social isolation and severe illness symptoms (Correll and Schooler 2020). The use of social media can reduce social isolation and improve social functioning in patients with schizophrenia (Gay et al. 2016). Additionally, it is possible to predict and prevent relapses through applications specifically developed for predicting relapses in schizophrenia (Španiel et al. 2008). According to a meta-analysis, social media usage is strongly associated with social behaviors such as building social capital, maintaining social ties, creating social networks, providing social support, and searching for information (Liu et al. 2016).

Establishing social relationships plays a crucial role in patients taking action, generating information, and managing their illnesses (Pinto 2006). Patients with better cognitive functions may find it easier to use social media and messaging applications, leading to a reduction in negative symptoms and an improvement in social functioning. Consequently, these patients can establish meaningful social networks. On the other hand, it could be argued that patients with better

social functioning and lower severity of negative symptoms may tend to use these tools more. However, the direction of causality is unclear. The severity of symptoms and the level of social functioning vary significantly depending on whether patients use these tools or not and determine whether patients go online or not.

The ability to use digital technology tools such as the internet, computer, mobile phone, and mobile applications has been associated with well-organized neurocognitive skills (Rotondi et al. 2007). Using technology tools and social media requires well-preserved executive function skills and subsequent conscious learning (Littlefield and Gjertsen 2018, p.26). Consistent with previous findings, our study indicates that social media and messaging applications are used by patients with lower scores on the cognitive factor of PANSS. For instance, schizophrenia patients without smartphones exhibit poorer processing speed performance (Young et al. 2020). Additionally, patients who use the internet and social media demonstrate better cognitive performance compared with those who do not use these tools (Hoşgelen et al. 2022, Villagonzalo et al. 2019). Impairments in neurocognitive functions may lead patients with schizophrenia to use digital technology tools less frequently than the general population. The use of social networking sites and applications by patients with schizophrenia may play an instrumental role in improving or preserving neurocognitive functions. Encouraging patients with schizophrenia to use digital technology tools through online social and health service-related platforms, with the condition that it improves their symptoms and daily life challenges, may motivate them to use these tools. When patients use these platforms, they may feel more socially engaged, contributing to the improvement of their recovery processes.

According to previous research, social exclusion affecting the cognitive skills of patients with schizophrenia (Reddy et al. 2019) disrupts the recall and use of complex information, leading to delays in processing new information or retrieving previously stored information (Baumeister et al. 2002). Patients who do not use social media and messaging applications may be exposed to social exclusion compared with those who use these tools (Robotham et al. 2016). This exclusion may explain why patients avoid connecting with others online. However, the internet and social media usage enable patients who are hesitant about face-to-face communication to interact with others and acquire information without feeling unsafe (Schrank et al. 2010). Identifying the neurocognitive characteristics of patients with schizophrenia who use and do not use digital technology tools is a crucial factor that will guide the development of digital technology tools for schizophrenia. Addressing this gap can help meet the technology-based

needs of patients with schizophrenia on online platforms, mobile applications, and social media platforms. When digital technology components such as the Internet, mobile applications, and social media platforms are designed as tools tailored to the needs of patients with schizophrenia, they can be used to enhance patients' neurocognitive performance.

The significant difference observed in household income between those with and without internet connection and a computer at home suggests that lower socioeconomic status may hinder access to technology. In contrast, no differences were observed in the use of mobile applications, social media, messaging apps, and video calls based on income level. Some patients without personal mobile phones or internet access reported using these tools through devices owned by people close to them. This situation may indicate that patients who are socially and cognitively inclined to use these tools actively strive to interact with others using social media platforms. In addition, not having a smartphone does not necessarily imply that a patient does not use social media or mobile applications. In summary, digital technology tools can be a low-cost platform that can be beneficial for low-income households, rural areas, and other disadvantaged groups (Welch et al. 2016).

### Limitations of the Study

The study findings have limited generalizability due to factors such as the number of samples and the possibility that the cultural and socioeconomic characteristics of the samples may not represent the general population. Although 52 eligible patients met the inclusion criteria, they refused to participate in the study. The reason for this could be severe positive symptoms or predominant negative symptoms. However, the sociodemographic and clinical characteristics of the patients who refused to participate were not recorded for ethical reasons. Previous research has shown that factors such as age, education level, and the duration of the relationship with psychiatrists, regardless of the severity of psychopathology, can determine the willingness of volunteers to participate in the research, citing reasons such as refusal (Kim et al. 2009).

The samples included in the study may not provide a complete representation of individuals living in rural areas because it is primarily composed of patients residing in urban areas. To address this limitation, conducting a descriptive cross-sectional study with more extensive and diverse samples from various regions would offer a more comprehensive understanding of the technology usage among individuals with schizophrenia. Moreover, the absence of objective metrics to measure the technology usage is a notable limitation. Unfortunately, no reliable and valid assessment tool is currently available to objectively evaluate the technology usage of individuals with schizophrenia.

## Suggestions for Future Studies

There is an increasing interest and need for the use of technology-based interventions in mental health services (Li et al. 2020). Particularly during the COVID-19 pandemic, a global need for remote intervention services for schizophrenia patients has come to the fore (Torous and Keshavan 2020). This study provides foundational data for further research aimed at developing technology-based applications to enhance socialization and provide mental health services for individuals with schizophrenia. Future research should longitudinally examine the causal relationship between the use of digital technology and clinical characteristics of individuals with schizophrenia and design follow-up studies to develop appropriate intervention programs. Additionally, determining the purposes, frequency, and beneficial aspects of the technology usage among patients using these tools is crucial. Future studies should focus on developing objective assessment tools to evaluate the use of technology in individuals with schizophrenia. There is a need for further research to examine the long-term effects of digital technology use on patients with schizophrenia. Understanding the potential benefits and limitations of digital technology for individuals with schizophrenia can contribute to the development of future interventions and improve the overall care of these individuals.

## CONCLUSION

Individuals with schizophrenia use the internet, mobile applications, and social media applications at a lower rate than the general population. This research has demonstrated a significant difference in social functioning, cognitive functions, and negative symptoms between patients with schizophrenia who use digital technology tools such as the internet, mobile applications, and social media and those who do not. However, it is unclear whether having better social functionality is the cause or the result of better technology use skills. Future research will require longitudinal studies to determine the cause-and-effect relationship.

According to the results of this study, individuals with schizophrenia may be willing to use and adapt mobile applications that could be developed focusing on their needs, such as telemedicine and telehealth services in Turkey. Applications integrated with the healthcare system that can be developed to meet the needs of patients and the disease can be used for purposes such as disease monitoring, medication management, daily activity planning, and predicting relapses. It is essential to make these technologies more accessible and beneficial to the individuals with schizophrenia.

## REFERENCES

- Abdel-Baki A, Lal S, D-Charron O et al. (2017) Understanding access and use of technology among youth with first-episode psychosis to inform the development of technology-enabled therapeutic interventions. *Early Interv Psychiatry* 11: 72–6.
- Ainsworth J, Palmier-Claus JE, Machin M et al. (2013) A comparison of two delivery modalities of a mobile phone-based assessment for serious mental illness: Native smartphone application vs text-messaging only implementations. *J Med Internet Res* 15.
- Amerikan Psikiyatri Birliği. Ruhsal Bozuklukların Tanısal ve Sayımsal Elkitabı, Beşinci Baskı (DSM-5), Tanı ölçütleri başvuru Elkitabı'ndan, Köroğlu E (Çev. ed.). Ankara; Hekimler Yayın Birliği 2013.
- Athanasopoulou C, Vălimăki M, Koutra K et al. (2017) Internet use, eHealth literacy and attitudes toward computer/internet among people with schizophrenia spectrum disorders: A cross-sectional study in two distant European regions. *BMC Med Inform Decis Mak* 17: 1–14.
- Aydemir Ö, Üçok A, Esen-Danaci A, et al. (2009) Bireysel ve sosyal performans ölçęğinin Türkçe sürümünün geçerlilik ve güvenilirlik çalıřması. *Klinik Psikofarmakoloji Bulteni*, 19: 93–100.
- Baumeister RF, Twenge JM, Nuss CK (2002) Effects of social exclusion on cognitive processes: Anticipated aloneness reduces intelligent thought. *J Pers Soc Psychol* 83.
- Ben-Zeev (2012) Mobile technologies in the study, assessment, and treatment of schizophrenia. *Schizophr Bull* 38: 384–5.
- Ben-Zeev D, Brenner CJ, Begale M et al. (2014) Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. *Schizophr Bull* 40: 1244–53.
- Bernard R, Sabariego C, Cieza A (2016) Barriers and Facilitation Measures Related to People With Mental Disorders When Using the Web: A Systematic Review. *J Med Internet Res* 18: e157.
- Birnbaum ML, Ernala SK, Rizvi AF et al. (2019) Detecting relapse in youth with psychotic disorders utilizing patient-generated and patient-contributed digital data from Facebook. *Npj Schizophrenia*.
- Bonet L, Izquierdo C, Escarti MJ et al. (2017) Use of mobile technologies in patients with psychosis: a systematic review. *Rev Psiquiatr Salud Ment* 10: 168–78.
- Bonet L, Llăcer B, Hernandez-Viadel M et al. (2018) Differences in the Use and Opinions About New eHealth Technologies Among Patients With Psychosis: Structured Questionnaire. *JMIR Ment Health* 5: e51.
- Brusilovskiy E, Townley G, Snethen G et al. (2016) Social media use, community participation and psychological well-being among individuals with serious mental illnesses. *Comput Hum Behav* 65: 232–40.
- Correll CU, Schooler NR (2020) Negative symptoms in schizophrenia: A review and clinical guide for recognition, assessment, and treatment. *Neuropsychiatr Dis Treat* 16: 519–34.
- Degnan A, Berry K, Sweet D et al. (2018) Social networks and symptomatic and functional outcomes in schizophrenia: a systematic review and meta-analysis. *Soc Psychiatry Psychiatr Epidemiol* 53: 873–88.
- Depp CA, Harmell AL, Vahia IV et al. (2016) Neurocognitive and functional correlates of mobile phone use in middle-aged and older patients with schizophrenia. *Aging Ment Health* 20: 29–35.
- Firth J, Torous J (2015) Smartphone Apps for Schizophrenia: A Systematic Review. *JMIR Mhealth Uhealth* 3: e102.
- Gay K, Torous J, Joseph A et al. (2016) Digital Technology Use Among Individuals with Schizophrenia: Results of an Online Survey. *JMIR Ment Health* 3: e15.
- Gayer-Anderson C, Morgan C (2013) Social networks, support and early psychosis: A systematic review. *Epidemiol Psychiatr Sci* 22: 131–46.
- Granhölm E, Holden J, Dwyer K et al. (2020) Mobile-assisted cognitive behavioral therapy for negative symptoms: Open single-arm trial with schizophrenia patients. *JMIR Ment. Health* 7.
- Hecht M, Kloß A, Bartsch A (2022) Stopping the Stigma. How Empathy and Reflectiveness Can Help Reduce Mental Health Stigma. *Media Psychol* 25: 367–86.

- Highton-Williamson E, Priebe S, Giacco D (2015) Online social networking in people with psychosis: A systematic review. *Int J Soc Psychiatry* 61: 92–101.
- Hosgelen EI, Akgül Ö, Akdede BB et al. (2022) Relation between processing speed and social media use in schizophrenia patients. *Schizophr Res* 248: 290–1
- Jorm AF (2005) Social networks and health: It's time for an intervention trial. *J. Epidemiol. Community Health* 59: 537–8
- Kay SR, Fiszbein A, Opler LA (1987) The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr Bull* 13: 261–76.
- Kemp S (2019) Digital In 2019: Global Internet Use Accelerates. It was downloaded from <https://wearesocial.com/uk/blog/2019/01/digital-in-2019-global-internet-use-accelerates/on> 14 May 2019.
- Khan GF, Swar B, Lee SK (2014) Social Media Risks and Benefits: A Public Sector Perspective. *Soc Sci Comput Rev* 32: 606–27.
- Kim JH, Kim D, Park SH et al. (2009) Accept or refuse? A pilot study of patients' perspective on participating as imaginary research subjects in schizophrenia. *Psychiatry Investigation*.
- Kopelovich SL, Monroe-DeVita M, Buck, BE et al. (2021) Community mental health care delivery during the COVID-19 pandemic: practical strategies for improving care for people with serious mental illness. *Community Ment Health J* 57: 405–15.
- Kostakoğlu E, Batur S, Tiryaki A et al. (1999) Pozitif ve Negatif Sendrom Ölçeğinin (PANSS) Türkçe uyarlamasının geçerlilik ve güvenilirliği. *Türk Psikol Derg* 14: 23–32.
- Lerner V, Libov I, Witztum E (2006) "Internet delusions": The impact of technological developments on the content of psychiatric symptoms. *Isr J Psychiatry Relat Sci* 43: 47–51.
- Li H, Lewis C, Chi H et al. (2020) Mobile health applications for mental illnesses: An Asian context. *Asian J Psychiatr* 54.
- Lindenmayer JP, Bernstein-Hyman R, Grochowski S (1994) A new five factor model of schizophrenia. *Psychiatr Q* 65: 299–322.
- Littlefield LM, Gjertsen AR (2018) the Use of Technology in Teaching and Learning Translation: Teaching 21st Century Brains: Activating Working Memory in the Online World. RJ Harnish, KR Bridges, DN Sattler, ML Signorella, M Munson (Ed), *Sustainable Multilingualism* 7, s. 26–37
- Liu D, Ainsworth SE, Baumeister RF (2016) A meta-analysis of social networking online and social capital. *Rev Gen Psychol* 20: 369–91
- Mahmood T, Rehman U (2023) Digital technology implementation and impact of artificial intelligence based on bipolar complex fuzzy Schweizer–Skalar power aggregation operators. *Appl Soft Comput* 143: 110375.
- Margolese HC, Chouinard G, Beauclair L et al. (2002) Using the rating scale for psychotic symptoms to characterize delusions expressed in a schizophrenia patient with "internet psychosis". *Can J Psychiatry* 47: 485.
- Miller BJ, Stewart A, Schrimsher J et al. (2015) How connected are people with schizophrenia? Cell phone, computer, email, and social media use. *Psychiatry Res* 225: 458–63.
- Morosini PL, Magliano L, Brambilla L et al. (2000) Development, reliability and acceptability of a new version of the DSM-IV Social and Occupational Functioning Assessment Scale (SOFAS) to assess routine social functioning. *Acta Psychiatr Scand* 101: 323–9.
- Naslund JA, Aschbrenner KA, Barre LK et al. (2015) Feasibility of popular m-health technologies for activity tracking among individuals with serious mental illness. *Telemed E-Health* 21: 213–6
- Naslund JA, Aschbrenner KA, McHugo GJ et al. (2019) Exploring opportunities to support mental health care using social media: A survey of social media users with mental illness. *Early Interv Psychiatry* 13: 405–13.
- Niehaves B, Plattfaut R (2014) Internet adoption by the elderly: Employing IS technology acceptance theories for understanding the age-related digital divide. *Eur J Inf Syst* 23: 708–26
- Pantell M, Rehkopf D, Jutte D et al. (2013) Social isolation: A predictor of mortality comparable to traditional clinical risk factors. *Am J Public Health* 103: 2056–62.
- Pew Research Center: Social Media Fact Sheet (2021). It was downloaded from <https://www.pewresearch.org/internet/fact-sheet/social-media/> on 30 April 2021.
- Pinto RM (2006) Using social network interventions to improve mentally ill clients' well-being. *Clin Soc Work J* 34: 83–100
- Reddy LF, Irwin MR, Breen EC et al. (2019) Social exclusion in schizophrenia: Psychological and cognitive consequences. *J Psychiatr Res* 114: 120–5.
- Reid D, Weigle P (2014) Social Media Use among Adolescents: Benefits and Risks. *Adolesc Psychiatry* 4: 73–80.
- Rekhi G, Ang MS, Lee J (2019) Clinical determinants of social media use in individuals with schizophrenia. *PLoS One* 14: 1–11.
- Robinson P, Turk D, Jilka S et al. (2019) Measuring attitudes towards mental health using social media: investigating stigma and trivialisation. *Soc Psychiatry Psychiatr Epidemiol* 54: e151–8.
- Robotham D, Satkunanathan S, Doughty L et al. (2016) Do we still have a digital divide in mental health? A five-year survey follow-up. *J Med Internet Res* 18: e309
- Rotondi AJ, Sinkule J, Haas GL et al. (2007) Designing Websites for Persons With Cognitive Deficits: Design and Usability of a Psychoeducational Intervention for Persons With Severe Mental Illness *Psychol Serv* 4: 202
- Schmid-Siegel B, Stompe T, Ortwein-Swoboda G (2004) Being a webcam. *Psychopathology* 37: 84–5
- Schrank B, Sibitz I, Unger A et al. (2010) How patients with schizophrenia use the internet: Qualitative Study. *J Med Internet Res* 12: e1550
- Simões De Almeida RF, Sousa TJ, Couto AS (2019) Development of weCope, a mobile app for illness self-management in schizophrenia. *Rev Psiquiatri Clin* 46: 1–4.
- Snethen G, Zook P (2016) Utilizing social media to support community integration. *Am J Psychiatr Rehabil* 19: 160–74.
- Španiel F, Vohlídka P, Hrdlička J et al. (2008) ITAREPS: Information Technology Aided Relapse Prevention Programme in Schizophrenia. *Schizophr Res* 98: 312–7.
- Torous J, Bucci S, Bell IH et al. (2021) The growing field of digital psychiatry : current evidence and the future of apps , social media , chatbots , and virtual reality. *World Psychiatry* 20: 318–35.
- Torous J, Keshavan M (2016) The role of social media in schizophrenia: Evaluating risks, benefits, and potential. *Curr Opin Psychiatry* 29: 190–5.
- Torous J, Keshavan M (2020) COVID-19, mobile health and serious mental illness. *Schizophr Res* 218: 36–7.
- Torous J, Wisniewski H, Liu G et al. (2018) Mental Health Mobile Phone App Usage, Concerns, and Benefits Among Psychiatric Outpatients: Comparative Survey Study. *JMIR Ment Health* 5: e11715
- Villagonzalo KA, Arnold C, Farhall et al. (2019) Predictors of overall and mental health-related internet use in adults with psychosis. *Psychiatry Res* 278: 12–8
- Weittenhiller LP, Mikhail ME, Mote J et al. (2021) What gets in the way of social engagement in schizophrenia? *World J Psychiatry* 11: 13–26.
- Welch V, Petkovic J, Pardo Pardo J et al. (2016) Interactive social media interventions to promote health equity: An overview of reviews. *Health promot chronic dis prev* 36: 63–75.
- Wong KTG, Liu D, Balzan R et al. (2020) Smartphone and internet access and utilization by people with Schizophrenia in South Australia: Quantitative survey study. *JMIR Ment Health* 7: 1–10.
- Young AS, Cohen AN, Niv N et al. (2020) Mobile phone and smartphone use by people with serious mental illness. *Psychiatr Serv* 71: 280–3.
- Žaja N, Vukojević J, Žarko T et al. (2022) Internet Use among Patients with Schizophrenia and Depression. *Int J Environ Res Public Health* 19: 5695

---

**Appreciation:** We would like to express our gratitude to all volunteers who contributed by participating in the research. We thank Emre Bora for his support. We also thank Sinem Güneri for the final readings, suggestions, and contributions to the article. Emine İlgin Hoşgelen is a PhD scholarship holder from the Council of Higher Education (YÖK) in the field of Translational Medicine, which is one of the 100 national priority areas determined by YÖK within the scope of the 100/2000 Program. She also holds a TÜBİTAK (The Scientific And Technological Research Council Of Türkiye) BİDEB 2211/A (Science Fellowships and Grant Programs) fellowship.

---

**Acknowledgement:** Prof. Dr. Köksal Alptekin has received honorarium from Abdi İbrahim, Abdi İbrahim Otsuka, Jansen, Ali Raif and Nobel for consultancy work and lecturing and project support from TUBİTAK for research.