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The Role of Technology in Anxiety and Depression during the COVID Pandemic

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Abstract. The purposes of this study were to examine the use of technology tools during COVID-19, determine perceived mental health issues such as anxiety and depression, and identify the relationship between mental health issues and technology use. Secondary data from the Wave 64 survey of the Pew Research Center were used. This study used information from 10,310 participants after excluding those missing data on demographic information. Frequencies and percentages were calculated for categorical variables of age group, gender, race, education, income, marital status, mental health issues, and technology use. Binominal logistic regression was used to test the relationship between perceived mental health status and technology use. Most participants felt nervous, anxious, and depressed and had trouble sleeping a moderate amount of time or all the time. Many respondents (80%) reported using email or messaging services to communicate with others, followed by searching online for information about the coronavirus and using social media to share or post information about coronavirus. Associations between mental health status and use of technologies were mostly statistically significant. The finding shows that people who have used technological tools had fewer mental health issues than who did not use technological tools. It is important to set up the technology infrastructure for present and future crises to address mental health problems.

Keywords. Mental health Issues, Anxiety, Depression, Coping, COVID-19, Technology tools, Social Media, Mobile applications.

A. Introduction

like previous health crisis, the need for social distance during the COVID -19 pandemic has exacerbated the social isolation [1]. The increased social isolation is associated with psychological distress and incidence of long-term psychiatric disorders [2-4]. The specific negative impact on their mental health involves anxiety or depressive disorder, symptoms of a trauma- or stressor-related disorder, difficulty sleeping or eating, and increased alcohol consumption [5].

Many studies have assessed the risk factors of mental health being affected by COVID-19 [6-11] . For example, being female or younger [6,12,13,] or having a lower education level [7,11,13] were associated with a greater likelihood of developing depression symptoms. Some studies identified the impact of COVID-19 on mental health in vulnerable

populations such as older adults [14] , immigrant people [15], and pregnant women [16].

Amid this stress, anxiety, nervousness, and depression associated with COVID-19, the use of technology has increased significantly [3]. People now spend more time using technology—consuming news, using media, watching TV, checking social media, and using lifestyle apps for grocery and other shopping for consumer goods [17,18]. Technology may be considered a tool to decrease the mental health burden during the COVID-19 pandemic. Technology tools may include email, texting applications, telehealth (teleconferencing, videoconferencing), smartphone applications, and social media. Social media is one of the methods to provide positive and supportive connections and share or seek information during social isolation. Beyond social media, many modern-day interactions are conducted via phones and computers, such as video chats, phone calls, and text messages during crises [19]. Texting applications can easily provide messages to many people at once and are also appropriate tools for people with lower digital literacy and underserved populations [20, 21]. Telehealth platforms such as teleconferencing or videoconferencing are also an effective way to access health care [22]. In addition to telehealth, smartphone applications (mobile applications) are a tool for monitoring and improving health. Use of technology generally surges during times of crisis, but the role of technology in anxiety and depression during the pandemic is not uncovered.

It is timely and necessary to see if technology can ease or worsen anxiety and depression. The purposes of this study were to: (a) examine the use of technology tools during COVID-19, (b) determine perceived anxiety and depression, and (c) identify the relationship between mental health issues (anxiety and depression) and technology use.

B. Methods

1. Data Source

Secondary data from the Wave 64 survey of the Pew Research Center, conducted between March 19, 2020, and March 24, 2020, were used. A sample of 11,537 participants completed the survey, and survey weights were provided for the total responding sample. The overall target population was aged 18 or older, living in the United States including Alaska and Hawaii, and spoke either English or Spanish. This study used information from 10,310 participants after excluding those missing data on demographic information. A mixed-mode design was used. Adults who used the internet and provided an email address participated via a self-administered web survey, and adults who did not use the internet (or did not provide an email address) participated via a mail survey or computer-assisted telephone interview. Pew Research Center provided the weighting benchmarks. Weights were trimmed and scaled to sum to the unweighted sample of all respondents. The sample was weighted to match national parameters for the adult general population. The Pew Research Center in consultation with Ipsos developed the questionnaire in English and Spanish. The web program was rigorously tested on both computers and mobile devices by the Ipsos project management team and Pew Research Center researchers. In this more detailed secondary analysis, we explored mental health during COVID-19 and technology use.

2. Variables

A covariance measure related to mental health issues consisted of perceived anxiety, nervousness, depression, loneliness, and trouble sleeping in the past 7 days, with a rating scale from 1 (*rarely or never*) to 4 (*most or all of the time*). Higher scores indicate more perceived mental health issues in the past 7 days. The dependent measure was experiences of technology use during the COVID; specifically, whether participants had: (a) searched online for information about the coronavirus, (b) used social media to share or post information about

the coronavirus, (c) used the internet or email to connect with doctors or other medical professionals, (d) used email or messaging services to communicate with others, and (e) used video calling or online conferencing services like Zoom or Webex to attend a work meeting. The response options were 0 (*yes*) or 1 (*no*).

3. Data Analysis

Analyses focused on 10,310 participants with complete demographic information. Data analysis included demographic variables (age, gender, race/ethnic, education, income, marital status), mental health issues, and technology use. Frequencies and percentages were calculated for categorical variables of age group, gender, race, education, income, marital status, mental health issues, and technology use.

Binominal logistic regression was used to test the relationship between perceived mental health status and technology use. SPSS software version 26 was used for all statistical analyses. A p-value < .05 was considered to indicate statistical significance.

C. Results

The most prevalent age groups were 30–49 (n = 3,661, 35.5%) and 50–65 (n = 2,560, 24.8%), followed by 18–29 (n = 2,128, 20.6%) and older than 65 (n = 1,960, 24.8%). Female (n = 5,306, 51.5%) and male (n = 5,004, 48.5%) gender were almost evenly split. Regarding education level, 34% (n = 3,589) of participants had completed high school or less, whereas 65.2% (n = 6,721) had completed college or beyond. The participants were predominately White non-Hispanic (n = 6,695, 64.9%), followed by Black non-Hispanic (n = 1,060, 10.3%), Hispanic (n = 1,647, 16.0%), or other (n = 907, 8.8%). Most were currently married (n = 4,913, 47.7%) or had never been married (n = 2,516, 24.4%), with very few reporting their marital status as separated, widowed, or divorced. Many respondents earned between $30,000 and $75,000 a year ($n$ = 3,778, 36.7%), followed by less than $30,000 ($n$ = 2,916, 28.3%). The mean sum score of mental health issues was 7.92 (SD = 3.16), with a range of 4 to 16.

Table 1 presents how often participants felt nervous, anxious, depressed, lonely, or hopeful about the future or had trouble sleeping in the past 7 days. Almost 30% (n = 3,093) indicated that they felt nervous or anxious some or a little of the time (1–2 days), whereas 18% (n = 1,858) felt nervous or anxious most or all the time (5–7 days) and only 26.4% didn't feel anxious or nervous. Almost half of respondents indicated that they felt depressed rarely or none of the time (less than 1 day), and only 9% of respondents felt depressed most or all of the time (5–7 days). Most participants (n = 8,244, 80%) responded that they felt lonely rarely or some of the time (less than 2 days). Almost 40% (n = 4,123) indicated that they had trouble sleeping rarely or none of the time, whereas 14% (n = 1,443) had sleep issues most or all of the time (5–7 days). Regarding hope for the future, half of respondents indicated that they felt hopeful occasionally or all the time.

Table 1. Mental Health Status (n=10310)

	Nervous, Anxious	Felt Depressed	Felt Lonely	Trouble Sleeping	Felt hopeful about the future
	n(%)	n(%)	n(%)	n(%)	n(%)
Rarely or none of the time (less than 1 day)	2726(26.4)	5337(51.8)	5907(57.3)	4123(40)	1611(15.6)
Some or a little of the time (1-2 days)	3093(30)	2531(24.6)	2337(22.7)	2874(27.9)	3454(33.5)

Occasionally or a moderate amount of time (3-4 days)	2632(25.5)	1537(14.5)	1215(11.8)	1869(18.2)	2970(28.8)
Most or all of the time (5-7 days)	1858(18)	904(8.8)	850(8.2)	1443(14)	2275(22.1)

The rating scale is from 1=rarely or none of the time to 4=most or all of the time. The highest value indicates poor mental health status

Figure 1 shows the use of technological tools during the COVID-19. Many respondents (80%) reported using email or messaging services to communicate with others, followed by searching online for information about the coronavirus and using social media to share or post information about coronavirus. Respondents had fewer experiences using the internet or email to connect with doctors or using video calling or online conferencing services such as Zoom.

Figure 1. Use of technological tools during the COVID-19

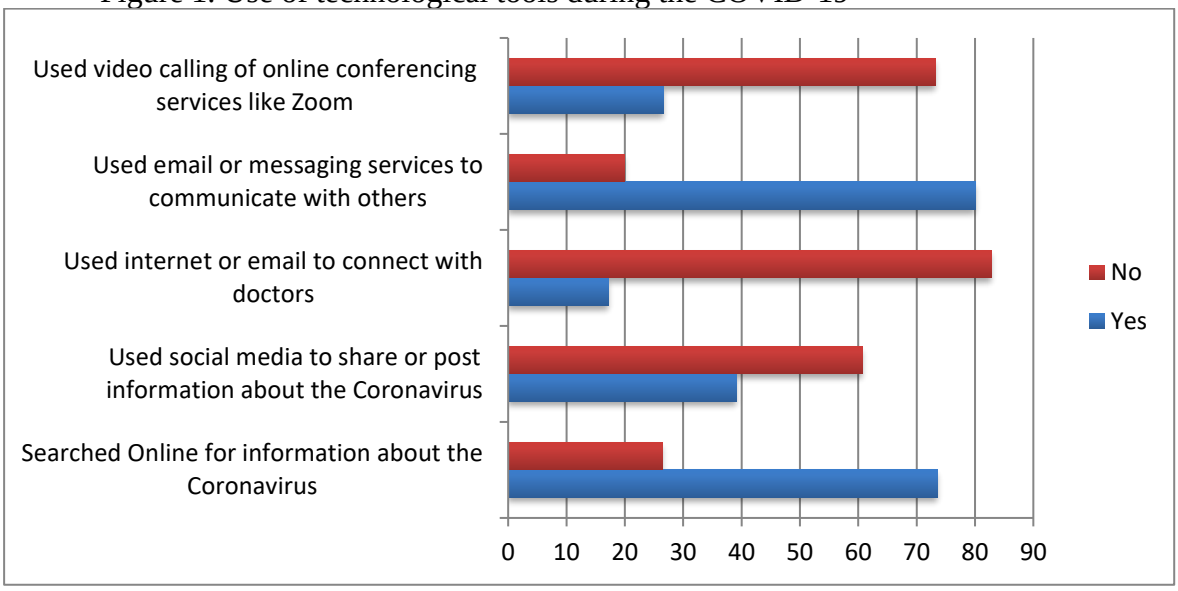

Table 2 summarizes the relationship between mental health status and technology use during COVID-19. Mental health issues reflect levels of anxiety, nervousness, depressive feelings, loneliness, and trouble sleeping. Mental health status and use of technology were mostly statistically significantly associated at $p < .05$. Only one item, "Using video calling or online conferencing services like Zoom or Webex to attend a work meeting," was not statistically significantly associated with mental health status ($p = .07$).

Table 2. The relationship between mental health status and experiences of technological use during the COVID-19.

	B	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Searched online for information about the coronavirus	-0.096	1	.000**	0.908	0.895	0.922

Used social media to share or post information about the coronavirus	-0.085	1	.000**	0.919	0.907	0.930
Used the internet or email to connect with doctors or other medical	-0.092	1	.000**	0.913	0.898	0.927
Used email or messaging services to communicate with others	-.055	1	.000**	0.947	.0932	0.962
Used video calling or online conferencing services like, Zoom or Webex to attend a work meeting	-0.013	1	.070	0.987	.974	1.001

* P<.05 , **p<.001

Participants who indicated more anxiety, nervousness, depressive symptoms, loneliness, and trouble sleeping had less experience using technological tools such as searching online for information about the coronavirus ($p < .001$), using social media to share or post information about the coronavirus ($p < .001$), using the internet or email to connect with doctors or other medical professionals ($p < .001$), and using email or messaging services to communicate with others ($p < .001$). This indicates that people who have used technological tools had fewer mental health issues than who did not use technological tools.

D. Discussion

The current COVID-19 pandemic has the potential to increase loneliness and social isolation due to mobility restrictions enforced in many countries. Loneliness and social isolation are consistently identified as risk factors for poor mental and physical health. Technology tools can help people stay connected during the current crisis by broadening their social reach or increasing the frequency of contact with acquaintances.

The purpose of this study was to identify relationships between mental health status and experience with technological tools. In this study, participants were asked how often they felt nervous, anxious, depressed, lonely, or hopeful about the future or had trouble sleeping in the past 7 days as a measure of mental health status. They generally felt nervous or anxious (73.3%), had trouble sleeping (60%), felt depressed (48.2%), and felt lonely (32.7%) a moderate amount of time or all the time. Similar to our findings, other studies found that overall, almost half of respondents reported at least one adverse mental or behavioral health condition, including symptoms of anxiety disorder, depressive disorder, or a trauma- and stressor-related disorder related to the pandemic [5]. Vulnerable people experience more psychosocial effects of pandemics. In particular, people who contract the disease, those at heightened risk (including older adults, people with compromised immune function, and those living or receiving care in congregate settings), and people with preexisting medical, psychiatric, or substance use problems are at increased risk of adverse psychosocial outcomes [23].

Regarding technology use during COVID-19, many respondents (80%) in this study reported that they used email or messaging service to communicate with others, followed by searching online for information about the coronavirus and using social media to share or post information about the coronavirus. This finding is consistent with previous literature. More than 90% of Americans have some type of mobile phone and more than 80% have smartphones [24]. In this study, some respondents were less experienced using the Internet or email to connect with doctors or using video calling of online conferencing services such as Zoom. This finding is not surprised because some participants may have had limited access to the nternet, technology, or equipment such as smartphones or computers. Anderson et al [24]

recognized that a lack of internet availability, due to limited data plans and lack of Wi-Fi, and inability to use smartphone features such as downloading apps can be barriers to using the internet or email to connect with doctors or making video calls. This leads to disparities in technology access and digital literacy. Before the pandemic, only 1 in 10 patients in the United States used telehealth and 75% said that they were unaware of telehealth options or how to access them [21]. Recent data from primary care clinics showed that although video care consults went up by 80% during the pandemic, minority groups represented a smaller portion of these new visits [26].

Finally, in this study, the relationship between mental health status and technology use during COVID-19 was identified. Associations between mental health status and use of technology were mostly statistically significant. Only using video calling or online conferencing services like Zoom or Webex to attend a work meeting was not significantly associated with mental health status. In this study, participants who had less experience searching online for information about the coronavirus, using social media to share or post information about the coronavirus, using the internet or email to connect with doctors or other medical personnel, and using email or messaging services to communicate with others were more likely to report feeling anxious or nervous, depressed, and lonely and having trouble sleeping. A prior study [19] also revealed that people who wanted to ease their anxiety were more likely to have increased their technology use to connect and used social media actively and checked for messages or news, but did not connect with others via video or take time for self-care. Mental health apps also have shown effectiveness in decreasing symptoms of depression [27] and anxiety [28]. In addition to apps, Berrouiguet et al [20] found that use of text-messaging platforms could be leveraged to help people cope with mental health challenges evoked by COVID-19, because texts are delivered via individuals' devices and are easy to provide to many people at once using automated text-messaging platforms. Particularly, text messaging is an appropriate tool for populations with low digital literacy and underserved groups [21]. In this study, there was a positive relationship between using social media to share or post information about the coronavirus and mental health issues. If participants used social media more, they had fewer mental health issues. However, the impact of social media has been reported as positive or negative in the literature. A prior study [29] showed that many people with mental illness are increasingly turning to social media to share their experiences and seek mental health information and advice, yet others found social media also increased depression or anxiety due to negative social comparisons or the spread of distressing information [30].

Limitations

The limitations of this study include the lack of some relevant variables due to using secondary data. For example, the racial and ethnic demographic data reflect a potential limitation because they only included categories of White non-Hispanic, Black non-Hispanic, Hispanic, and other. Further distinctions among other groups, including Asian Americans or Pacific Islanders, could provide more detailed information about how certain groups are affected by technology use during the pandemic. Another potential limitation is that the measures were self-reported. Participants reported their perceived mental health issues and experiences with technology based on their perceptions and memory. Collecting data through self-report questionnaires has limitations. Participants are often biased when they report on their own experiences [31]. For example, many people are consciously or unconsciously influenced by "social needs." In other words, they are more likely to report experiences that are considered socially acceptable or preferred [32].

E. Conclusion

Currently, there is in a serious health crisis that necessitates a massive expansion of mental health resources. Technology provides a medium for remote and widespread delivery of mental health services, which is particularly important during social distancing. Even if the COVID-19 pandemic subsides, significant need for mental health supports and services provided through technology will remain. This study identified levels of perceived mental health issues, technology use, and the relationship between technology use and perceived mental health issues. Most participants felt nervous, anxious, and depressed and had trouble sleeping a moderate amount of time or all the time. Regarding use of technological tools during COVID-19, many respondents used email or messaging services to communicate with others, searched online for information about the coronavirus, and used social media to share or post information about the coronavirus. Associations between mental health status and use of technologies were mostly statistically significant, except using video calling or online conferencing services like Zoom or Webex to attend a work meeting. Technology can be a tool for easing mental health problems. It is important to set up the technology infrastructure for present and future crises to address mental health problems

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