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The association between fear of Covid-19 and smartphone addiction among individuals: the mediating and moderating role of cyberchondria severity

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Abstract

The coronavirus disease-2019 (COVID-19) has quickly spread all over the world and has contributed to psychological consequences including fear of the virus. Depending upon the severity of their problems, individuals often search the internet via their mobile devices to understand whether the symptoms they perceive are symptoms of the disease. This condition has been termed 'cyberchondria'. In this context, the aim of this study is examine the mediating and moderating role of cyberchondria severity in the association between smartphone addiction and the fear of COVID-19. The sample comprised 520 participants (335 females [64.4%], 185 males [35.6%] aged 17 to 65 years [Mean = 28.61 years, SD = 10.60]). A survey included the Cyberchondria Severity Scale Short-Form, The Smartphone Addiction Scale-Short Version, and The Fear of COVID-19 Scale. Structural equation modeling and SPSS Process Macro moderator variable analysis were used to test the research model. The study found a positive association between smartphone addiction, fear of COVID-19, and cyberchondria severity. Cyberchondria severity had both moderating and mediating role in the association between smartphone addiction and the fear of COVID-19. In conclusion, it has been determined that during the COVID-19 pandemic, cyberchondria severity has negative effects on individuals' fear of COVID-19.

Keywords Cyberchondria severity · Fear of COVID-19 · Health concern · Pandemic · Smartphone addiction

Introduction

The coronavirus disease-2019 (Covid-19) which first appeared in China in December 2019, quickly spread all over the world. The World Health Organization declared the disease as a pandemic in March 2020 (WHO, 2020a). Due to the high transmission rate of the Covid-19 virus, the number of cases and deaths seen around the world has increased rapidly. At the time of writing, the number of Covid-19 cases was over 44 million and over 1.7 million deaths (WHO, 2020b). It is accepted that the rapidly spreading negative effects of the Covid-19 virus is a potential death threat among individuals and societies (Pakpour & Griffiths, 2020). Therefore, countries have implemented various measures including national lockdowns, curfews, wearing masks in public places, spatial distance practices, and travel restrictions since the very beginning of the pandemic process to reduce the negative effects of the virus (Liu et al., 2020; Xiang et al., 2020). As the destructive impact of the pandemic on the world has increased, so too has the number and frequency of these measures increased (Cao et al., 2020; Zhang & Ma, 2020). However, these increased measures have caused individuals to radically change their daily routines and has resulted in increased fear and panic among many individuals

(Haung & Zhao, 2020; Rajkumar, 2020; Qui et al., 2020). Consequently, individuals have started to feel fear and anxiety about the possibility of Covid-19 infecting them and/or their families (Admunson & Taylor, 2020; Pakpour & Griffiths, 2020).

Increasing social isolation during the pandemic and governmental agencies telling individuals what they should do to protect themselves from the virus on an ongoing basis has contributed to individuals' fear of Covid-19 (Lau et al., 2020). Because the measures that are repeated and excessively emphasized during pandemic periods have a positive function such as raising awareness of the dangers of Covid-19 among individuals, it can also contribute to individuals worrying more about their health (Stacevic & Berle, 2013). For this reason, individuals who have been exposed to intense warnings about the virus during the Covid-19 pandemic experience health concerns, constantly check for symptoms of the virus, and start doing their own online research to assure themselves (Cao et al., 2020; Gao et al., 2020).

Most individuals who stayed and/or worked from home during the pandemic period have accessed developments related to Covid-19 via the internet (e.g., news on social media) (Jungmann & Witthöft, 2020). However, this situation has led to the production and rapid spread of much misinformation concerning Covid-19 in online environments during the pandemic period (Brown, Skelly and Chew-Graham, 2019; Garfin, Silver and Holman, 2020; Laato, Islam, Islam & Whelan, 2020). This sharing of misinformation in online environments can also cause an increase in individuals' fear of Covid-19 (Jugman, Brand, Kolb, & Witthöft, 2020). This situation has led to the formation of a new problem area related to the Covid-19 pandemic, and has shown the risk of emotional transmission due to sharing in online environments beyond the risk of physical transmission of the virus (Gao et al., 2020; Roy et al., 2020). The World Health Organization stated that the misinformation that individuals access online concerning Covid-19 can cause psychological and physical pathological consequences (WHO, 2020). In various parts of the world, deaths have been reported of individuals who have followed the online advice and misinformation about Covid-19 treatment (Milliyet Newspaper, 2020; Sabah Newspaper, 2020; Euronews-Internet News, 2020). Such stories demonstrate how serious the situation can be for some individuals. Consequently, the World Health Organization has recommended that countries address the information needs of all individuals concerning Covid-19 and that accurate and reliable information is provided in all media channels in order to prevent other problems (WHO, 2020b). In fact, there have been attempts to open a special area on the WHO website to refute false information concerning Covid-19 (WHO, 2020c).

When research concerning the Covid-19 pandemic and the statements made by WHO are evaluated together, it demonstrates that it is important to not only protect individuals from the risk of physical transmission of the disease, but also to support their mental health (Bakioğlu, Korkmaz, & Ercan, 2020; Wang et al., 2020). Previous studies have also shown that individuals can experience intense negative emotions such as stress, fear, and anxiety during pandemic periods (e.g., H1N1-2010, SARS-2009) (Lau; Griffiths; Choi & Tsui, 2010; Peng et al., 2010; Saadatian et al., 2010). Consequently, considering the transmission rate of the Covid-19 virus, the potential risk of death, and the rate of spread throughout the world, it is inevitable that some individuals will experience fear and anxiety about this issue (Pakpour & Griffiths 2020). In an environment that rapidly affects the whole world and thousands of new cases and deaths every day, the mental health concerns of individuals continue to increase gradually (Ahorsu et al., 2020; Fitzpatrick, Harris, & Drawve, 2020).

Many studies have reported that anxiety and stress caused by the fear of Covid-19 negatively affects the mental health of individuals (e.g., Ahorsu, et al., 2020; Bakioğlu et al., 2020; Lia et al., 2020; Wang et al., 2020; Xiao, Zhang, Kong, Li, & Yang, 2020). It has also been reported that the use of internet and information technologies, which increases with social isolation, may also have an impact on individuals' fear of Covid-19 (Elhai, Yang, McKay, & Asmundson, 2020; Hashemi et al., 2020). Prior to the pandemic, studies reported that excessive use of smartphones, internet and social media were associated with anxiety, stress, and depression among a minority of individuals (Bragazzi & Puente, 2014; Çakır & Oğuz, 2017; Franchina et al., 2018; Soni et al., 2017). Given the apparent increase in technology use of individuals during the Covid-19 pandemic, this may also have a negative effect on some individuals' fear of Covid-19 (Gao et al., 2020; Krilay et al., 2020).

Due to the excessive use of smartphones by some individuals, research into smartphone addiction has emerged (Griffiths & Szabo, 2014; Kwon, Kim, Cho, & Yang, 2013). With smartphones, individuals can engage in many activities such as accessing the internet, playing games, and accessing social media on a single device, wherever and whenever they want (Geser, 2006; Griffiths, 2013). The fact that individuals can engage in many different activities on a single device has led to a large increase in smartphone use (King et al., 2013; Yılmaz, Şar, & Civan, 2015). During the Covid-19 pandemic, the main source of information for individuals at home has been online websites (Garcia-Priego dv., 2020). During this period, individuals have relied on their technological devices to access news concerning Covid-19 at any given time (Gao et al., 2020; Krilay et al., 2020).

Smartphone addiction, which was a growing research interest prior to the Covid-19 pandemic, has gradually increased during the pandemic (Elhai et al., 2020; Duran, 2020; Gür, 2020). In addition to accessing information about Covid-19, the use of smartphones can also be a means of getting emotional support and coping during social isolation periods. The pandemic is also thought to be a contributing factor to individuals spending more time on their smartphones (Sha et al., 2020). Studies during the pandemic have also shown that individuals are not selective about the accuracy of sharing and information about the disease and that they constantly share information concerning Covid-19 (Bao et al., 2020; Garfin et al., 2020). As the time spent on smartphones increases, individuals are more likely to encounter false information about the pandemic and fears may rise (Lei et al., 2020; Li et al., 2020). Furthermore, intensive use of smartphones by individuals causes the rapid spread of misinformation about Covid-19 in the society and this situation causes serious increases in individuals' health concerns (Mattiuzzi & Lippi, 2020; WHO, 2019; Wang et al., 2020). Covid-19 fears are likely to rise due to a vicious circle in which individuals turn to their smartphones, internet, and social media in order to relieve their concerns and reduce the stress they experience, but can become a negative coping method because the information they find increases their stress, anxiety and/or fear (Qui et al., 2020; Xiao et al., 2020).

Individuals' reactions to pandemics are known to vary (White & Horvitz, 2009). However, studies have reported that individuals experience more anxiety and fear during pandemic periods and therefore develop behaviors that will make them feel safe (Gaygisiz, Gaygisiz, Ozkan & Lajunen, 2012; Main et al., 2011). Depending upon the severity of the anxiety, individuals often search the internet to understand whether the symptoms they perceive are symptoms of the disease (Norr et al., 2015; White & Horvitz, 2009). This condition, which has been termed 'cyberchondria', is defined as the behavior of individuals who experience excessive fear of being sick to search for the symptoms they perceive online (Starcevic & Barle, 2013). In studies on cyberchondria, the main reason for this behavior is health anxiety (Nor et al., 2015; Starcevic & Barle, 2013).

It has been found that social isolation during the Covid-19 period, the increasing use of the internet and technological devices, and the easy access to all kinds of information about the virus online may cause the increase of cyberchondria behavior during the pandemic period (Rovetta & Bhagavathula, 2020). In addition, as the effect of the pandemic expands, it is possible that cyberchondria behaviors increase (Husnayain et al., 2020). In some studies, it has been stated that the fear of Covid-19 has triggered cyberchondria behaviors (Hashemi et al.,

2020; Jungmann & Witthöft, 2020; Laato et al., 2020). Individuals' increasing smartphone and internet usage can also contribute cyberchondria (Fergus & Spada, 2017).

The present study

In a report published by We Are Social (2020a), it was claimed that among the world's 7.5 billion individuals, 60% are internet users, 67% use smartphones, and 49% are active social media users. In the same report, it was reported that the means used by individuals for internet access was smartphones with a rate of 92%. This means that approximately 4.5 billion of the world population is internet users and approximately 3.8 billion are social media users. In another report, We Are Social (2020b) claimed that in Turkey which has a population of 83.88 million (where the present study was carried out), 92% use smartphones, 64% use social media and 74% are internet users. These results suggest Turkey's internet and technology utilization rate is well above the world average. It is thought that this increase in the use of technology during the pandemic period may increase the likelihood of individuals encountering misinformation concerning Covid-19, and that this will be associated with increased levels of fear and anxiety. For all these reasons, the present study examined the mediating and moderating role of cyberchondria severity in the relationship between smartphone addiction and the fear of Covid-19. In the present study, the following hypotheses (H_s) were examined:

H_1: Smartphone addiction will positively predict the fear of Covid-19.

H_2: Smartphone addiction will positively predict the severity of cyberchondria.

H_3: Cyberchondira severity will positively predict the fear of Covid -19.

H_4: Cyberchondria severity will have a mediating role in the relationship between smartphone addiction and the fear of Covid-19.

Method

Participants and procedure

The participants comprised 520 individuals [335 females (64.4%), 185 males (35.6%)]. Participants' ages ranged from 17 to 65 years (mean = 28.61; SD = 10.60). A total of 520 of the participants stated that they had low socioeconomic level (10%), 421 medium socioeconomic level (81%), and 47 high socioeconomic level (9%). Participants were recruited through public

social media groups. The data were collected online from volunteer participants (via *Google Forms* in October and November 2020). The scales took approximately 10 minutes to respond. No personal information was requested from the participants.

Measures

The Cyberchondria Severity Scale Short-Form (CSS-12): McElroy and Shevlin (2014) originally developed the 33-item Cyberchondria Severity Scale. A shorter 12-item version (CSS-12) was then developed by McElroy et al. (2019). The CSS-12 assesses the severity of individuals searching for disease symptoms online and comprises four sub-dimensions (i.e., Excessiveness, Distress, Reassurance, Compulsion). Items are scored using five-point scale ranging from 1 (*Never*) to 5 (*Always*) with total scores ranging from 0 to 60. Example items include: *"If I notice an unexplained bodily sensation I will search for it on the internet"* (Excessiveness), *"I start to panic when I read online that a symptom I have is found in a rare/serious condition"* (Distress), *"Researching symptoms or perceived medical conditions online leads me to consult with my GP"* (Reassurance), and *"Researching symptoms or perceived medical conditions online distracts me from reading news/sports/entertainment articles online"* (Compulsion). The higher the score the higher the level of cyberchondria severity.

The original CSS was adapted into Turkish by Selvi et al. (2018). However, the Turkish validity and reliability study of the CSS-12 has not been conducted. Therefore, the present study tested the validity (using confirmatory factor analysis [CFA]) and reliability [Cronbach Alpha internal consistency coefficients of the CSS-12. CFA examining the four-factor construct validity of the scale was carried out. The goodness of fit values were: χ^2 = 219.01, p<.001, df = 48; CFI = .943; TLI = .922; RMSEA = .08 (90% CI = .07-.09). Item-factor loads for the four-factor structure varied between .48 and .90. Calculated corrected item-total correlations for the scale vary between .58 and .85. The Cronbach Alpha internal consistency coefficient for the total score in the present study was very good (.89) and good to very good for the sub-dimensions: Excessiveness (.83), Distress (.79), Reassurance (.70), and Compulsion (.80).

Data analysis

Before the analysis, the distribution of the data was examined. When the kurtosis and skewness values were examined, the data showed a normal distribution. The independent samples t-test, one-way ANOVA and Pearson correlation analyses were performed. Structural equation

modeling and SPSS Process Macro moderator variable analysis were used to test the research model (Figure 1).

Figure 1. Research Model

In the examination of the goodness of fit values of the structural equation model, $\chi^2/df <5$; GFI, CFI, TLI >.90; RMSEA<.10 values were taken as basis for good fits (Hu & Bentler, 1999; Tabachnick & Fidell, 2007). Bootstrapping tests were used to examine whether cyberchondria severity mediated the relationship between the smartphone addiction and the fear of COVID-19 (Preacher & Hayes, 2008). To test the indirect effect of smartphone addiction on fear of COVID-19, bootstrapping confidence interval was calculated (10.000 resamples). IBM SPSS Statistics 26 and AMOS Graphics 24 were used for the analyses

Ethics

All data in the study were collected voluntarily. The participants all provided informed consent. All procedures in this study involving human participants were conducted in accordance with the ethical standards of the 1975 Helsinki Declaration and the study was approved by the research team's university ethics committee.

Results

Descriptive statistics

Information on the descriptive statistics of the participants is shown in Table 1.

Table 1 Descriptive statistics

Variables	f	%	M_1	SD_1	M_2	SD_2	M_3	SD_3
Gender								

	N	%	M1	SD1	M2	SD2	M3	SD3
Male	335	64.4	15.92	5.95	31.49	9.70	28.44	12.36
Female	185	35.6	13.99	5.59	31.41	9.73	26.38	11.63
Socioeconomic status								
Low	52	10	16.77	5.53	33.94	9.67	28.79	13.22
Middle	421	81	15.07	5.69	31.33	9.62	27.45	11.90
High	47	9	15.26	7.70	29.87	10.10	28.83	13.08
Daily smartphone use								
0-1 hour	44	8.25	14.57	6.37	30.16	10.08	17.25	9.37
1-3 hours	196	37.7	14.89	5.43	30.83	9.15	23.24	9.31
Above 3 hours	280	53.8	15.62	6.12	32.11	9.99	32.48	12.07
Daily social media use								
0-1 hour	141	27.1	14.65	5.53	29.75	10.11	20.10	9.56
1-3 hours	220	42.3	15.51	5.78	31.10	9.50	26.78	10.59
Above 3 hours	159	30.6	15.44	6.35	33.48	9.29	35.74	11.38

Note1. $M_{1,2,3}$: Mean, $SD_{1,2,3}$: Standard Deviation

Note2. M_1 and SD_1: Fear of COVID-19, M_2 and SD_2: Cyberchondria Severity, M_3 and SD_3: Smartphone Addiction.

According to the results of the independent samples t-test, females had a higher fear of COVID-19 than males ($t_{(518)} = 3.67$, $p<.001$). However, there were no gender differences for smartphone addiction and cyberchondria severity. According to a one-way ANOVA, fear of COVID-19, smartphone addiction and cyberchondria severity did not differ according to the socioeconomic levels of the participants. As expected, in relation to the duration of daily smartphone use, the smartphone addiction levels of the participants differed significantly in all groups ($F_{(517,2)} = 63.69$, $p<.001$). However, fear of COVID-19 and cyberchondria severity did not differ according to duration of daily smartphone use. In relation to duration of daily social media use time, levels of smartphone addiction ($F_{(517,2)} = 1.04$, $p<.001$) and cyberchondria severity ($F_{(517,2)} = 5.91$, $p<.001$) significantly differed. There was a significant difference in all three groups in relation to duration of daily social media use time (0-1 hours daily use, 1-3 hours daily use, above 3 hours daily use) in smartphone addiction. However, it was found that individuals who spent more than three hours daily on social media had higher levels of cyberchondria than those who spent less daily time on social media. Finally, it was found that fear of COVID-19 did not differ according to daily time spent on social media use.

Correlation analysis

Correlations between variables are shown in Table 2.

Table 2. *Inter-correlations of the variables and descriptive statistics*

Variables	1.	2.	3.	Mean	SD	Skewness	Kurtosis
1. Fear of COVID-19	1.00			15.26	5.90	.70	-.02
2. Cyberchondria severity	.31***	1.00		31.46	9.70	.04	-.45
3. Smartphone addiction	.28***	.37***	1.00	27.71	5.90	.46	-.58

***$p<.001$

As shown in Table 2, the variables examined in the study had significant positive relationships. Fear of COVID-19 had a significant relationship with cyberchondria and smartphone addiction. In addition, there was a positive significant relationship between cyberchondria and smartphone addiction.

Mediating role of cyberchondria in the relationship between smartphone addiction and fear of COVID-19

The mediating role of cyberchondria severity in the relationship between smartphone addiction and fear of COVID-19 was tested. The figure containing the findings of the research model is shown in Figure 2.
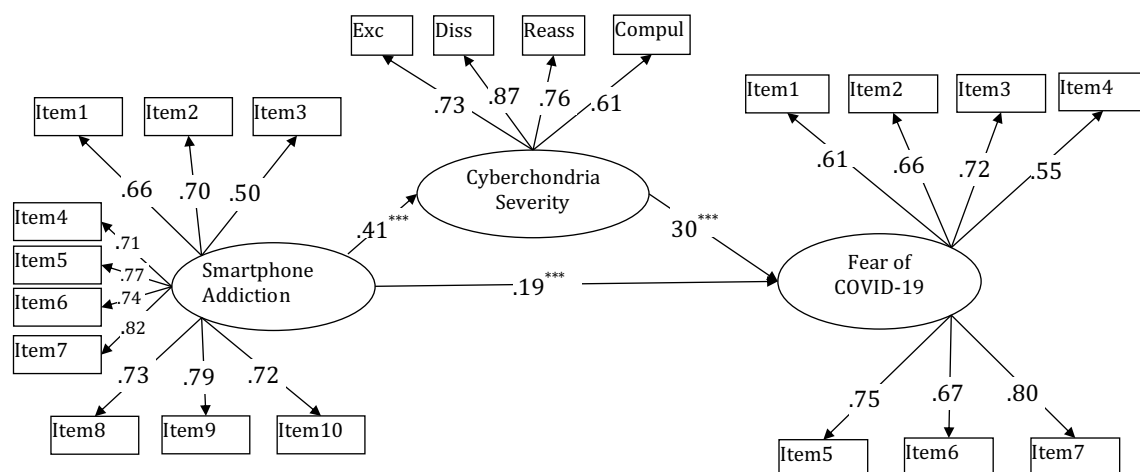
Figure 2. Mediation model of the relationships between the research variables

Analysis demonstrated that the goodness of fit values of the model were within acceptable limits [χ^2 = 580.534, df = 181, $p<.001$, χ^2/df = 3.207; GFI = .90; CFI = .94; TLI = .92; RMSEA = .07 (90% CI = .06 - .07)]. When the direct effects in the model were examined, it was found that smartphone addiction predicted fear of COVID-19 (β = .19, $p<.001$) and cyberchondria severity

(β = .41, p<.001). Similarly, cyberchondria severity predicted fear of COVID-19 positively (β = .30, p<.001). When the findings regarding the indirect effects in the model were examined, it was found that smartphone addiction predicted fear of COVID-19 via cyberchondria severity (β = .12, p<.001). Path coefficients for indirect and direct effects are shown in Table 3.

Table 3. Bootstrapping analysis results of the model

Pathway	Coefficient	Lower-bound	Upper-bound
Direct effect			
SA → FCV19	.19	.077	.308
SA → CS	.41	.311	.498
CS → FCV19	.30	.186	.425
Indirect effect			
SA → CS → FCV19	.12	.074	.185

Note$_1$. R = .42, R^2 = .18, N = 520.
Note$_2$. CS: Cyberchondria severity; FCV19: Fear of COVID-19; SA: Smartphone addiction.

As can be seen in Table 3, the path coefficient of all direct and indirect effects in the model were significant.

Moderating role of cyberchondria severity in the relationship between smartphone addiction and fear of COVID-19

Regression analysis was performed using Process Macro developed by Hayes (2018) in order to test the moderating role of cyberchondria severity in the effect of individuals' smartphone addiction on their fear of COVID-19. The findings of the analysis are shown in Table 4.

Table 4. Analysis findings regarding moderating impact

Variables	Coefficient	SE	t	LLCI	ULCI
Constant	15.26	.27	56.08	14.726	15.795
SA	.11***	.02	4.73	.0628	.1521
CS	.16***	.03	5.83	.1091	.2202
SA x CS	.01**	.002	2.59	.0012	.0090

Note$_1$. **p<.01, ***p<.001, R = .42, R^2 = .18, N = 520.
Note$_2$. CS: Cyberchondria severity, SA: Smartphone addiction.

As shown in Table 4, all variables included in the analysis explained approximately 18% of fear of COVID-19 (F = 32.32, R^2 = .18, p<.001). Smartphone addiction (β = .11, p<.001) and

cyberchondria severity (β = .16, p<.001) had positive and significant effects on fear of COVID-19. The moderating role of cyberchondria severity was significant in the relationship between smartphone addiction and fear of COVID-19 (β = .01, p<.01). It was also found that the increase in R^2 was significant by adding the interaction between smartphone addiction and cyberchondria severity (SA x CS) to the model (F = 6.72, R^2 change = .012, p<.01). The effects of smartphone addiction on fear of COVID-19 for different levels of cyberchondria severity are given in Table 5

Table 5. The effects of smartphone addiction on fear of COVID-19 for different levels of cyberchondria severity

Levels	Coefficient	SE	*T*	LLCI	ULCI
Low	.06	.03	1.85	-.0035	.1178
Middle	.11***	.02	4.73	.0628	.1521
High	.16***	.03	5.46	.1009	.2145

Note₁. ***p<.001

The analysis indicated that the effect of smartphone addiction on fear of COVID-19 for middle and high levels of cyberchondria severity was significant. However, it appears that this effect was not significant for low levels of cyberchondria severity. The slope graphs regarding the effects of the moderator variable are presented in Figure 3.
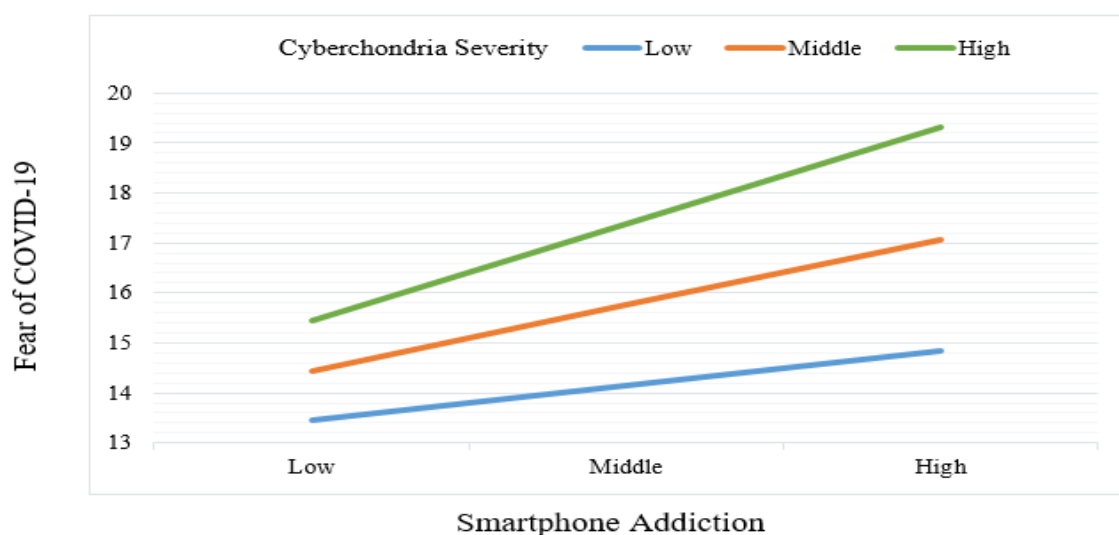
Figure 3. The effects of smartphone addiction on fear of COVID-19 for different levels of cyberchondria severity

Figure 3 shows that the effect of smartphone addiction on fear of COVID-19 increases in the middle and high levels of cyberchondria severity. In the case of high cyberchondria severity, this relationship is even stronger. Therefore, if cyberchondria severity is high, the effect of smartphone addiction on fear of COVID-19 is greater. This finding indicates that cyberchondria severity is a moderator in the relationship between smartphone addiction and fear of COVID-19.

Discussion

According to the first finding of the study, there is a positive association between smartphone addiction and the fear of Covid-19. In other words, it can be said that there is a linear relationship between smartphone addiction and the fear of Covid-19. These results show that the H_1 was supported. There are studies in the literature that support this research finding (Elhai et al., 2020a; Hashemi et al., 2020; Krilay et al., 2020; Yang et al., 2020). In addition, it is stated that many false information about the Covid-19 pandemic is shared in the cyber environment and the fear of Covid-19 of individuals who are exposed to them increases (Brown, Skelly, & Chew-Graham, 2019; Garfin, Silver, & Holman, 2020). It has even been claimed that during the pandemic period, sharing misinformation concerning Covid-19 increases the risk of emotional transmission among individuals and therefore individuals start to feel anxiety and fear about the Covid-19 (Gao et al.2020; Roy et al., 2020; WHO, 2020c).

However, with social isolation, many individuals follow all developments related to the Covid-19 pandemic via their smartphones, and it has been claimed that Covid-19 fears may rise because this causes individuals to view many inaccurate shares and news stories (Hashemi et al., 2020). In addition, it has been claimed that during the Covid-19 pandemic, there has been a large increase in internet and social media use rates among individuals (Gao et al.2020; Jungmann & Witthöft, 2020). In some studies, it has been reported that individuals with internet and social media addiction have higher fear of Covid-19 (Ahmad & Murad, 2020; Islam et al., 2020; Garcia-Priego et al., 2020; Yu et al., 2020). These studies findings concur with the present study's findings. However, the present findings are similar to the results of the studies conducted before the pandemic on smartphone addiction. Such studies have shown that smartphone addiction is associated with stress, anxiety, fear, and depression in individuals (Bragazzi & Puente, 2014; Elhai et al., 2017; Elhai et al., 2020b; Çakır & Oğuz, 2017; Franchina et al., 2018; Soni et al., 2017). Taken together, the findings suggest that technological addictions have had negative effects on individuals' fear of Covid-19 during the pandemic period. In

addition, since the intensive use of smartphones increases the possibility of encountering misinformation about the Covid-19 virus, this provides a possible reason for why individuals have increased fear of Covid-19.

The second finding of the study showed that there was a significant positive relationship between smartphone addiction and cyberchondria severity. This suggests that individuals with smartphone addiction during the pandemic period exhibited higher cyberchondria behaviors. This finding supported H_2. There are previous studies that have reported similar results to this finding. In some studies, it has been concluded that addictions to smartphones, the internet and/or social media is associated with cyberchondria severity (Fergus & Spada, 2017; Ivanova, 2013; Ivanova & Karabeova, 2014; Khazaal et al. 2019). Other studies have reported that individuals who experience intense anxiety and fear during pandemics engage in behaviors that make them safe (Gaygisiz, Gaygisiz, Ozkan & Lajunen, 2012; Main et al., 2011). Due to the measures implemented in the Covid-19 pandemic which can result in social isolation, individuals have come to follow the developments related to Covid-19 mostly on the internet via their smartphones in order to cope with their anxiety and fear and to feel safe (Elhai et al., 2020a; Duran, 2020; Gür, 2020). This may lead to an increase in technological addiction rates among individuals during the pandemic period (Elhai et al., 2020a; Gao et al.2020). Cyberchondria severity may increase among individuals who seek out all kinds of information concerning Covid-19 during the pandemic period (Rovetta & Bhagavathula, 2020; Sha et al., 2020). However, with the increase of the threatening effect of the pandemic, the fact that individuals seek out more information concerning Covid-19 on the internet is a factor that may cause an increase in cyberchondria severity (Husnayain et al., 2020). In addition, in some studies have reported that the Covid-19 pandemic has contributed to an increase in the health concerns among individuals, and as a result of this, individuals tend to seek out more information about the virus on the internet which triggers cyberchondria severity (Hashemi et al., 2020; Jungmann & Witthöft, 2020; Laato et al., 2020). The finding concerning the relationship between smartphone and cyberchondria severity is also consistent with the I-PACE (Interaction of Person-Affect-Cognition-Execution Model) model proposed (Brand et al., 2019). In this model, it states that individuals tend to use the internet and smartphones excessively to manage mood states such as anxiety and fears. Similarly, another study found that cyberchondria severity was associated with technological addictions (Vismara et al., 2020).

The third main finding of the study found a positive relationship between cyberchondria severity and the fear of Covid 19. This result indicates that individuals with high levels of

cyberchondira behavior during the pandemic period also have higher fear of Covid-19. H_3 was therefore supported. This has been found in previous studies. Farooq et al. (2020) concluded that individuals who conducted a lot of research concerning Covid-19 online had high concerns about the virus. Similarly, another study concluded that individuals' cyberchondria behaviors during the pandemic period increased their fear of Covid-19 (Jungman & Witth, 2020). However, when the literature is examined, it is found that the most important determinant of cyberchondria severity is health anxiety (Nor et al.2015; Starcevic & Barle, 2013). Individuals with health concerns concerning the Covid-19 pandemic tend to intensively seek out information on the virus online in order to feel more secure (Cao et al., 2020; Gao et al., 2020). Consequently, individuals have been found to increase their fear and anxiety levels regarding the disease because they view a lot of unconfirmed information about the virus (Xie et al., 2020; Laato et al., 2020). It has been found that individuals with high cyberchondria severity seek out more information about diseases on the internet. These individuals are more likely to encounter false information about the virus because they make more internet searches concerning Covid-19.

The fourth finding of the study showed that cyberchondria severity had a partial mediating role in the relationship between smartphone addiction and the fear of Covid-19. This suggests that the fear of Covid-19 among individuals with smartphone addiction increases, but with high cyberchondria severity, the fear of Covid-19 among individuals increases even more. This finding supports H_4. The fifth finding of the study showed that cyberchondria severity played a moderating role in the relationship between smartphone addiction and the fear of Covid-19. According to this result, it appears that the relationship between smartphone addiction and the fear of Covid-19 in cases with moderate and high levels of cyberchondria severity is stronger than in cases with low cyberchondria severity. In other words, cyberchondria severity has a significant role in the relationship between smartphone addiction and the fear of Covid-19. This result supports H_5. In the literature, there are studies that have reached similar results regarding the relationship between smartphone addiction, cyberchondria severity and fear of Covid-19 (Ahmad &Murad, 2020; Brown, et al., 2019; Elhai et al., 2020a; Farog et al., 2020 Garfin, Silver & Holman, 2020; Husnayain et al., 2020; Jungmann & Witthöft, 2020). On the other hand, the literature shows that fear anxiety increases during pandemic periods, and that individuals' information needs about many areas, especially health, increase and therefore tend to seek out more information online (Lau et al., 2010; Saadatian et al., 2010). In addition, it is stated that individuals exhibit more cyberchondriac behaviors during epidemic periods that

affect the whole world such as a pandemic (Zeng et al., 2020). Because, with measures resulting in social isolation to prevent the spread of the virus, the time individuals spend on the internet and technological devices have increased. It can be stated that all these explanations support the present research findings.

Limitations and future research

The present study has some limitations. The study sample comprised individuals living in Turkey. Therefore, caution should be exercised when generalizing the present research results to individuals outside of the Turkish society. In future research, the present study could be repeated with groups of individuals from different countries and cultures to confirm the explanatory power of the model in other contexts. In addition, the present study was cross-sectional study and therefore is unable to provide unequivocal evidence for causality among the variables studied. Furthermore, all the data were self-report and are therefore subject to well-known methods biases. Therefore, longitudinal research utilizing other methodologies is needed to overcome these shortcomings. Finally, in the research model, only the relationship between smartphone addiction, cyberchondria severity and fear of Covid-19 was examined. In order to ensure the validity of the research results after the pandemic, the model can be examined with different types of fear that may affect variables such as cyberchondria and smartphone addiction.

Conclusion

The present study found that smartphone addiction was associated with an increase in Covid-19 fear among individuals during the pandemic. Similarly, during the pandemic period, it was found that individuals with higher smartphone addiction scores presumably access their smartphones to seek out health information. In addition, the study found that cyberchondria severity was associated with individuals' fear of Covid-19. In other words, during the Covid-19 pandemic, it appears that individuals who searched online for health information and were exposed to a lot of inaccurate information increased their fear of Covid-19. However, it has been observed that cyberchondria severity has both a mediating and a regulatory role in the relationship between smartphone addiction and the fear of Covid-19. Consequently, it has been determined that during the Covid-19 pandemic, where social isolation has resulted and individuals most basic communication tool is accessing the internet via smartphones, has negative effects on individuals' fear of Covid-19. These results also indicate that it is very important to raise the awareness to individuals concerning the negative effects of internet and

information technologies during pandemic periods. For this reason, it is important for governments to utilize their relevant departments (e.g., Ministries of Health) effectively in order to provide reliable information for individuals regarding Covid-19 during the pandemic period. Consequently, individuals' anxieties and fears regarding Covid-19 would be supported in becoming more manageable.

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