mhc
MENTAL HEALTH CLINICIAN

ORIGINAL RESEARCH Open Access

Evaluation of obsessive-compulsive symptoms in relation to smartphone use

Carly A. Kempf, PharmD Candidate[1]
Kimberly A. Ehrhard, PharmD[2]
Steven C. Stoner, PharmD, BCPP[3]

How to cite: Kempf CA, Ehrhard KA, Stoner SC. Evaluation of obsessive-compulsive symptoms in relation to smartphone use. Ment Health Clin [Internet]. 2020;10(2):44-8. DOI: 10.9740/mhc.2020.03.044.

Abstract

Introduction: The use of smartphones throughout the United States continues to rise. Although smartphones have increased our capacity to access information, there is concern if excessive use may impact mental health. The purpose of this study was to examine whether a relationship exists between smartphone use and the presence of obsessive-compulsive symptoms (OCS) or behaviors.

Methods: A 33-item online survey was developed with 19 items relating to *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5) criteria for obsessive-compulsive disorder (OCD). A survey response was considered *positive* for possible OCS if participants answered at least 3 questions as *Most of the time* or *All of the time* for the OCD-related questions structured around the DSM-5 criteria for OCD while also using their smartphone for greater than 2 or more hours per day.

Results: A total of 308 of 550 subjects identified spending 2 or more hours on their smartphone per day and also answered positively on 3 or more questions designed to identify OCS. A statistically significant difference was discovered between those who used their smartphone for 2 or more hours per day and those who met 3 or more positive criteria for OCS compared to those who used their smartphone less than 2 hours per day ($P < .00001$).

Discussion: The results of this study demonstrate a possible relationship between smartphone use and OCS. Additional research needs to be conducted to further investigate these results to determine their significance in clinical practice.

Keywords: smartphone use, OCD, obsessive-compulsive disorder, DSM-5, obsessive-compulsive symptoms, OCS, cell phone, mental health, anxiety, hours

[1] Student, University of Missouri–Kansas City School of Pharmacy, Kansas City, Missouri, ORCID: https://orcid.org/0000-0002-5418-3258; [2] (Corresponding author) Postgraduate Year One Resident, Veterans Affairs Tennessee Valley Healthcare System, Nashville, Tennessee, kimberly.ehrhard@va.gov, ORCID: https://orcid.org/0000-0002-7499-9692; [3] Chair of Division of Pharmacy Practice and Administration, Clinical Professor, University of Missouri–Kansas City School of Pharmacy, Kansas City, Missouri, ORCID: https://orcid.org/0000-0001-9168-8792

Disclosures: S.C.S. serves on speakers bureaus for Jansssen Pharmaceuticals and Neurocrine Pharmaceuticals and has served on the advisory board for Alkermes Pharmaceuticals. Otherwise there are no other disclosures to note.

Introduction

Smartphone use has dramatically increased over the past decade. In 2011, it was estimated that 35% of the US population owned a smartphone; in 2018, this has increased to 81% of individuals owning a smartphone.[1] As the number of individuals who own smartphones increases, growing concern has prompted research into how smartphones may affect mental health, both positively and negatively. Research on smartphone use in relation to mental health conditions has examined the impact smartphone use may have on depression, anxiety,

addiction, and cognitive dysfunction.[2-4] Neuroimaging studies have shown that Internet addiction (of which smartphone and social media addictions are a subset) demonstrates similar increases in brain activity, specifically in the nucleus accumbens of the ventral tegmental region, to substance-related addictions.[5] However, whether an association may exist between smartphone use and inherent obsessive-compulsive symptoms (OCS) is unknown.

The prevalence of those diagnosed with obsessive-compulsive disorder (OCD) in the United States is an estimated 1.2% of the general population.[6] According to the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5), OCD can be defined as the presence of either obsessions or compulsions or both.[6] Obsessions are recurrent and persistent thoughts, urges, or images that are experienced and, at some time during the disturbance, are intrusive and unwanted, resulting in anxiety or distress in most that are impacted.[6] Individuals often attempt to ignore or suppress such thoughts, urges, or images or to neutralize them with some other thought or action (eg, by performing a compulsive act).[6] Compulsions are repetitive behaviors that a person feels driven to perform in response to an obsession or according to perceived rules that must be applied rigidly and are often time-consuming.[6] The behaviors or mental acts are aimed at preventing or reducing anxiety or distress or preventing some dreaded event or situation; however, these behaviors or mental acts are not connected in a realistic way with what they are designed to neutralize or prevent and are often excessive.[6] Those with OCD may know that their thoughts and actions are not rational but still possess a need or strong desire to perform those behaviors or have those compulsive thoughts.[6]

The purpose of this study was to examine whether a relationship exists between smartphone use and the presence of OCS or behaviors. A degree of uncertainty exists as to whether an individual's need or desire to frequently check their smartphone may be attributable to an obsessive-compulsive type behavior. A survey was developed utilizing aspects of the DSM-5 diagnostic criteria for OCD to analyze whether a relationship exists.

Methods

The investigators established a survey that was 33 questions in length. The first 2 questions were certifying the subject was 18 years old and consented to complete the survey. The next 12 questions addressed information related to subject demographics including age, sex, and ethnicity and prior mental health diagnosis as well as daily smartphone use (eg, hours of use, time of use). The remaining 19 items were modeled around the DSM-5 criteria for OCD. Each criteria bullet was broken down to ensure there would be a question to assess the entirety of the criteria for OCD. For example, 1 question asked, *Do you find yourself trying to ignore or suppress the urge to look at your smartphone?* and survey respondents were given the option to select *None of the time*, *Some of the time*, *Most of the time*, or *All of the time*. This question specifically models 1 of the definitions of *obsessions* as described by DSM-5, which states, "The individual attempts to ignore or suppress such thoughts, urges, or images or to neutralize them with some other thought or action (ie, by performing a compulsion)."[6(p237-8)] A survey was considered positive for possible OCS if the participant answered at least 3 questions as *Most of the time* or *All of the time* for the questions surrounding the DSM-5 OCD criteria. The questions that were framed around DSM-5 criteria can be seen in Table 1. It should be noted that not all the 19 questions were framed in the same format of the *None of the time* to *All of the time* range, and those that were not were either excluded from inclusion for positive criteria and were rather informative in nature or were adapted to fit inclusion into positive criteria. No methods were used to assess the survey's validity and reliability as no previous survey or study has been conducted to compare DSM-5 diagnostic criteria and smartphone use. *Most of the time* and *All of the time* were used as the threshold and determined to be significant as this indicated subjects spent a majority of their time on a certain behavior. This threshold and number of questions needed to be considered positive for possible OCS was determined prior to survey distribution.

Data was further analyzed to include self-reported daily smartphone use that was less than 2 hours per day or greater than or equal to 2 hours per day. This information was collected to address the diagnostic criteria, which state the requirement that "the obsessions or compulsions are time-consuming (eg, take more than 1 hour per day) or cause clinically significant distress or impairment in social, occupational, or other important areas of functioning."[6(p237-8)] The time was extended to 2 hours instead of 1 hour per day in an attempt to account for the multitude of uses of smartphones. The results were examined using χ^2 analyses in an attempt to identify correlations and significance within this project. Specifically, the aim was to determine if increased use per day of a smartphone is related to OCS. Power was not set during this study.

Approval of the survey was received through the University of Missouri–Kansas City Institutional Review Board process, and investigators distributed a research electronic data capture survey link through different social media and electronic outlets. Survey links were distributed

TABLE 1: Questions modeled around DSM-5 criteria[6] and positive criteria response percentage

Survey Question	Positive Responses, %[a]
Do you find the urge to check your smartphone as intrusive and unwanted?	10.7
Do you find yourself trying to ignore or suppress the urge to look at your smartphone?	10.9
Do you feel that checking your smartphone relieves a sense of anxiousness/nervousness/feeling on edge?	12.8
Do you believe frequently checking your smartphone prevents or reduces anxiety or distress that would come if you did not check your smartphone?	9.6
Do you feel the need to check your smartphone is overall rooted by the fear of outcomes/consequences if you were to not check it?	9.6
Do you feel that checking your smartphone is more of a routine or rather to fulfill a feeling of satisfaction by checking?[b]	44.4
Do you feel that the need to check your smartphone is driven by an over-concern to know what's going on in the world around you?	24.6
Have you been bothered by an over-concern with keeping your social media platform in perfect order and having a uniform image?	7.4
How well do you feel that you would be able to function on a daily basis if you did not have your smartphone as a part of your routine?	13.9
Do you worry about negative things happening, such as missing out on events, if you do not check your smartphone or social media?	13.3
To what extent do you feel that the need to check your smartphone is similar to the effects of being addicted to a substance (eg, coffee, alcohol, tobacco, drugs)?[c]	7.9
Do you feel that the habit of checking your smartphone is repetitive/ritualistic in nature?	43.4
To what extent do you feel that checking your smartphone takes up your time?	41.9
To what extent do you feel that checking your smartphone interferes with your normal routine?	59.9
To what extent do you feel like checking your smartphone interferes with your social activities or relationships?	7.3
To what extent do you feel that checking your smartphone is under your control?[d]	20.7
To what extent do you feel that your smartphone habits are dangerous to yourself or others (eg, checking your phone while driving)?	9.3
Does the extent of times you check your smartphone on a daily basis bother you?	17.5
Has the use of your smartphone in a public or social setting ever had a negative impact on your relationship with others around you?	3.9

DSM-5 = *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition.

[a]Positive criteria response was if the participant answered at least 3 questions as *Most of the time* or *All of the time* for the questions surrounding the DSM-5 obsessive-compulsive disorder criteria.

[b]Positive criteria response was indicated by answering *Level of satisfaction* or *Both*.

[c]Positive criteria response was indicated by answering *Mostly similar to the addiction of a substance* and *Basically equivalent to one another.*

[d]Positive criteria response was indicated by answering *None of the time* and *Some of the time*.

to students and faculty at the surveyor's school through e-mail. The link was also shared with the presidents of every College of Psychiatric and Neurologic Pharmacists collegiate chapter (Lincoln, NE) to share with their members as well. Researchers also shared the survey link on Facebook (Menlo Park, CA), Instagram (Menlo Park, CA), and Twitter (San Francisco, CA). Researchers encouraged subjects who took this survey to further distribute the link on social media and through e-mail. The survey could be completed by anyone over the age of 18 who currently owned a smartphone within the United States. The survey was completed voluntarily and was estimated to take the subject about 15 minutes to complete. Participants could stop the survey at any given point while taking it. The target population this analysis attempted to reach was anyone over the age of 18 who used a smartphone.

Results

After 60 days of survey distribution, 654 participants started the survey, and 633 completed it. Reasons for incomplete surveys included that the participant was less than 18 years old (0.3%), the participant did not own a smartphone (0.8%), and other factors that the investigators were unable to determine. The majority (57.6%) of participants were between the ages of 18 and 24, 79.6% of those who participated identified as female, and 86.9% of participants identified as white. It was also noted that 26.6% of participants self-reported a previous or current

TABLE 2: Demographics of the current study (n = 633)

Demographics	No. (%)
Age, y	
18-24	370 (58.5)
25-34	119 (18.8)
35-44	30 (4.7)
45-54	64 (10.1)
55 and older	48 (7.6)
Prefer not to say	2 (0.3)
Sex	
Male	128 (20.2)
Female	504 (79.6)
Nonbinary	1 (0.2)
Past/Current diagnosis with mental health condition	
Yes	172 (27.2)
No	454 (71.7)
Prefer not to say	7 (1.1)
Hours of daily smartphone use, h	
<1	18 (2.8)
1	65 (10.3)
2	191 (30.2)
3	161 (25.5)
4	93 (14.7)
5	57 (9)
6	18 (2.8)
>6	30 (4.7)

mental health diagnosis with the most common being depression and generalized anxiety disorder. For a complete overview of the demographic information, view Table 2. Daily smartphone use was also analyzed, and 550 participants estimated their daily smartphone use was 2 or more hours per day. Results were then examined to observe the number of individuals who met positive criteria based on answering 3 or more survey questions as *Most of the time* or *All of the time* in relation to the 19 questions surrounding DSM-5 criteria as well as those who self-reported spending 2 or more hours a day on their smartphone. The determination of what constitutes positive criteria for possible OCS was established prior to survey distribution. The Figure shows the number of participants who spent 2 or more hours a day on their phone and answered DSM-5 criteria questions as *Most of the time* or *All of the time*. Additionally, Table 1 shows the percentage of positive criteria responses for each of the 19 questions asked. Four questions showed a percentage of positive criteria responses as >40%, and themes regarding those questions were satisfaction, ritualistic nature, time-consuming, and interfering in normal routine when checking smartphone. The positive criteria represent the questions that were modeled around the DSM-5 criteria.

A χ^2 analysis was performed to identify if a possible relationship between smartphone use greater than or equal to 2 hours a day and those who met positive criteria for possible OCS exists. A total of 308 of the 550 subjects who identified spending 2 or more hours on their smartphone per day also answered positively on 3 or more questions designed to identify OCS. Only 12 of the 83 subjects who identified spending less than 2 hours on their smartphone per day answered positively on 3 or greater questions designed to identify OCS. A statistically significant difference was discovered between those who use their smartphone for 2 or more hours per day and those who met 3 or more positive criteria for possible OCS ($P < .00001$).

Discussion

The possibility of a relationship between smartphone use and OCS may exist. A statistically significant difference

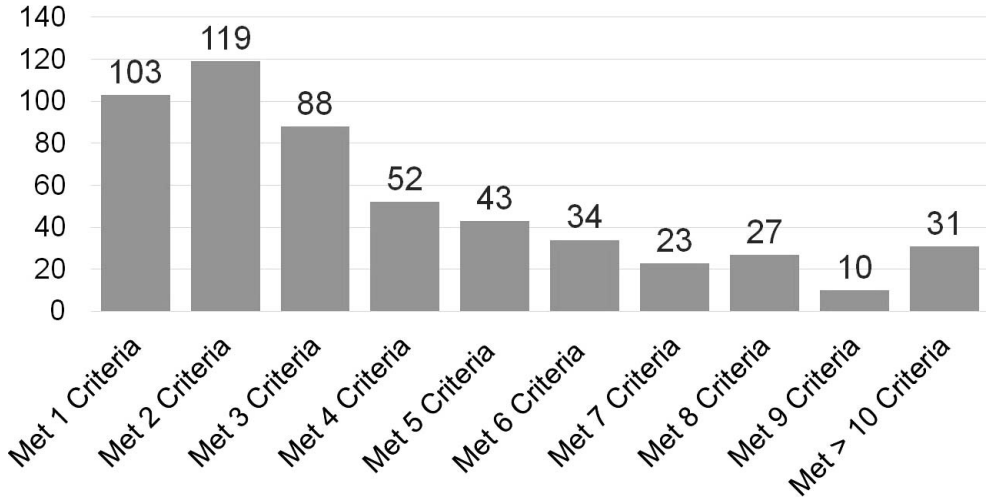

FIGURE: Number of participants who met survey-designated criteria

($P < .00001$) was discovered between those who used their smartphone for 2 or more hours per day and those who met 3 or more positive criteria for possible OCS compared to those who used their smartphone less than 2 hours per day. Despite the possibility of OCS, there were various limitations that existed within the study that limit the ability to assess this relationship. First, the study population prevents this information from being generalizable to the entire population as 58.5% of the participants were between the ages of 18 and 24 and 79.6% of the participants were female. This survey also only accounted for the absolute time used on a smartphone, not the specific activities that the smartphone was being used for, such as work, school, games, etc. The breakdown of activities a smartphone is used for would be an additional area of research to assess whether this confounded the results. Another limitation is the lack of established validity and reliability regarding the survey questions themselves. Survey questions were formed around the DSM-5 criteria for OCD and transformed to be applicable to smartphone use. These survey questions have not been vetted by prior studies, nor does it directly reflect criteria needed to be met for OCD in the DSM-5, which limits the interpretation. This survey additionally did not analyze if certain behaviors surrounding smartphone use could be attributable to other psychiatric causes, such as generalized anxiety disorder or addiction or for other reasons than a mental health condition. Additional questions beyond the ones presented in this survey surrounding DSM-5 criteria for OCD would need to be used to identify if there is a different cause of these behaviors. Further research should utilize the ability to differentiate the sole cause of these types of behaviors and the reasons for positive answers to the survey for reasons other than a mental health diagnosis, such as perceived social or work pressures.

Additional steps would need to be taken to determine what the approach to treatment would be for a patient who has a formal diagnosis of OCD secondary to smartphone use if further research supports the data found in this study. Based on research done by others concerning depression and anxiety, it has been recommended to decrease smartphone use as a way to manage the mental illness; however, a specific course of treatment would need to be identified to determine the best approach for those demonstrating OCS due to their smartphone use.[4] At a minimum, this research could lead to a better understanding of just 1 of the many ways that smartphones can impact an individual's mental health.

References

1. Pew Research Center [Internet]. Mobile fact sheet; 2019 [cited 2019 Jun]. Available from: https://www.pewresearch.org/internet/fact-sheet/mobile/.
2. Demirci K, Akgönül M, Akpinar A. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. J Behav Addict. 2015;4(2):85-92. DOI: 10.1556/2006.4.2015.010. PubMed PMID: 26132913.
3. Elhai JD, Dvorak RD, Levine JC, Hall BJ. Problematic smartphone use: a conceptual overview and systematic review of relations with anxiety and depression psychopathology. J Affect Disord. 2017;207:251-9. DOI: 10.1016/j.jad.2016.08.030. PubMed PMID: 27736736.
4. Alhassan AA, Alqadhib EM, Taha NW, Alahmari RA, Salam M, Almutairi AF. The relationship between addiction to smartphone usage and depression among adults: a cross sectional study. BMC Psychiatry. 2018;18(1):148. DOI: 10.1186/s12888-018-1745-4. PubMed PMID: 29801442; PubMed Central PMCID: PMC5970452.
5. Kuss DJ, Griffiths MD. Internet and gaming addiction: a systematic literature review of neuroimaging studies. Brain Sci. 2012;2(3):347-74. DOI: 10.3390/brainsci2030347. PubMed PMID: 24961198.
6. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington (VA): American Psychiatric Publishing; 2013.