

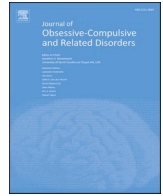


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The impact of the coronavirus pandemic on specific symptom dimensions and severity in OCD: A comparison before and during COVID-19 in the context of stress responses

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ABSTRACT

The present study aimed to compare a group of patients with obsessive-compulsive disorder (OCD; N = 270) before and during COVID-19 on specific obsessive-compulsive (OC) symptom dimensions and symptom severity. In addition, the study aimed to evaluate the associations of COVID-19-related stress responses with change in OC symptom dimensions and severity of symptoms as the result of the pandemic. Results showed that patients with OCD had higher scores on all OC symptom dimensions and symptom severity during the pandemic as compared to their scores from before the pandemic. Thus, the effect of COVID-19 is not limited to an increase in fears of contamination alone, but occurs across other symptom dimensions, including responsibility for harm, unacceptable thoughts, and symmetry. In addition, regression analyses indicated that COVID-19-related stress responses significantly predicted the observed increase in specific OC symptom dimensions and general severity, after controlling for pre-COVID-19 scores of symptoms and severity. The increase of symptoms as the result of COVID-19 might be best understood in the context of a non-specific stress-related response similar to the effects observed in non-clinical and other clinical populations.

1. Introduction

The coronavirus disease-2019 (COVID-19) pandemic has affected mental health in patients with obsessive-compulsive disorder (OCD) (Pan et al., 2021) and has raised specific concerns for those with OCD due to their tendency to respond to danger and uncertainty (Khosravani, Asmundson, Taylor, Bastan, & Ardestani, 2021; Wheaton, Messner, & Marks, 2021). In particular, it has been suggested that hygienic recommendations in the context of the pandemic may intensify illness severity, especially for those with obsessional fears of contamination (Fineberg et al., 2020; Fontenelle & Miguel, 2020; Lee, 2020). Indeed, most authors anticipating the negative effects of the pandemic on symptoms have focused on patients whose obsessional concerns revolve around contamination (Chatterjee, Malathesh Barikar, & Mukherjee, 2020; Fontenelle & Miguel, 2020; Kumar & Somani, 2020; Rajkumar,

2020).

A relatively large number of studies have reported that COVID-19 has increased general symptom severity, as well as contamination-related obsessions and compulsions (Abba-Aji et al., 2020; Davide et al., 2020; Knowles & Olatunji, 2021), but no other obsessive-compulsive (OC) symptoms (Matsunaga, Mukai, & Yamanishi, 2020; Tanir et al., 2020). One recent study reported no general increase in symptom severity among children and adolescents with a significant portion of the sample in treatment (Schwartz-Lifshitz et al., 2021). Jelinek, Moritz, Miegel, and Voderholzer (2021) found that 72% of OCD patients, especially those with washing symptoms experienced an exacerbation of OC symptoms as the result of the pandemic. Also, Benatti et al. (2020) reported that COVID-19 is associated with the clinical worsening of OCD severity, as well as the emergence of new obsessions and compulsions.

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Despite the surge in research on the effect of COVID-19 on those with OCD, there are limitations to studies carried out so far, and significant gaps in knowledge remain. Some studies have primarily focused on treated or young patients with OCD (e.g., Davide et al., 2020; Matsunaga et al., 2020; Schwartz-Lifshitz et al., 2021; Tanir et al., 2020), while there is evidence that the effects of COVID-19 may be stronger in adults with pre-existing or untreated mental illnesses (Ahmed et al., 2020; Asmundson et al., 2020; Pieh, Budimir, & Probst, 2020; Sher, 2020). Similarly, those with an untreated and/or current diagnosis of OCD may be especially likely to experience adverse effects (Nissen, Højgaard, & Thomsen, 2020). Another important limitation is that a significant number of studies did not directly compare OC symptoms during the pandemic with scores from before the pandemic (e.g., Abba-Aji et al., 2020; Benatti et al., 2020; Davide et al., 2020; Jelinek et al., 2021). In addition, most studies have only focused on contamination-related fears, while ignoring other important symptom dimensions of OCD (e.g., Abba-Aji et al., 2020; Benatti et al., 2020; Davide et al., 2020; Knowles & Olatunji, 2021; Matsunaga et al., 2020; Tanir et al., 2020). Hence, a comprehensive examination of the effects of COVID-19 across multiple symptom domains as well as the potential role of COVID-related stress in the exacerbation of symptoms of OCD is needed.

Stress responses and anxiety induced by the current pandemic may be an important underlying mechanism accounting for an exacerbation of symptoms among those with OCD during the current pandemic. Stressful life events, as well as distress in general, have previously been shown to be associated with the exacerbation of OC symptoms (Adams et al., 2018; Imthon et al., 2020; Khosravani, Bastan, Ardestani, & Amirinezhad, 2020; Khosravani, Ardestani, Mohammadpanah, & Amirinezhad, 2020; Rosso, Albert, Asinari, Bogetto, & Maina, 2012). COVID-19-related stress is significantly associated with OCD-like stress symptoms (Taylor et al., 2020a), intrusive thoughts (Lee, 2020; Marroquín, Vine, & Morgan, 2020), reassurance-seeking (Shafraan, Coughtry, & Whittal, 2020), intolerance of uncertainty, OCD symptoms, health anxiety (Wheaton et al., 2021), anxiety symptoms, and avoidance behaviors (McKay, Yang, Elhai, & Asmundson, 2020; Nissen et al., 2020; Seçer & Ulaş, 2020), especially in individuals with anxiety-related disorders (Asmundson et al., 2020) and those with OCD (Khosravani et al., 2021). Consequently, an increase in symptoms of OCD as the result of the current pandemic would be expected to be significantly predicted by what has recently been labeled as “COVID Stress Syndrome” (Khosravani et al., 2021; Taylor et al., 2020c).

1.1. Aims and hypotheses of the present study

The aims of the present study were twofold. First, given the limitations of previous studies, which have mainly focused on obsessional fears of contamination in smaller sample sizes, younger patients, and without direct comparison between symptoms before and during the pandemic, we aimed to determine the effect of the current pandemic across symptom dimensions of OCD as well as general symptom severity in a large adult sample of OCD patients. Second, the current study aimed to clarify the effects of COVID-related stress responses on OCD symptoms. It was hypothesized that: 1) OCD patients experience an increase in symptoms across multiple symptom dimensions, not limited to fears of contamination alone; 2) those with OCD experience a general increase in their severity of symptoms during the pandemic compared with their symptom severity before the pandemic, and; 3) the increase in symptoms and their general severity during the pandemic is significantly predicted by COVID-related stress.

2. Method

2.1. Participants

A group of treatment-seeking patients with a principal diagnosis of OCD participated in the current study. The current study consisted of

270 patients with OCD with the following exclusion criteria: 1) substance abuse, 2) mental disabilities, 3) psychotic disorders, 4) physical (other than COVID-19) or neurological diseases, and 5) the presence of personality disorders. All diagnoses were performed by a clinical psychologist according to the DSM-5 (American Psychiatric Association, 2013) on the Structured Clinical Interview for DSM-5 Disorders, Research Version (SCID-5-RV; First, Williams, Karg, & Spitzer, 2014). In the pre-COVID-19 study, all participants previously met the diagnostic criteria of OCD according to the DSM-5. The Medical Ethics Committee of Shahid Beheshti University of Medical Sciences approved the current study (IR.SBMU.RETECH.REC.1399.901) and all participants provided informed consent.

2.2. Procedure

We had previously studied a group of patients with OCD ($N = 764$) examining the psychometric properties of several OCD questionnaires before the outbreak of COVID-19. During the pandemic, we decided to recall the same OCD group and re-examine them. The re-evaluation occurred between May and July 2020 during the first wave of COVID-19 in Iran. The overall response rate was 35.3% ($N = 270$). Common reasons for non-participation included a fear of being infected with COVID-19 during face-to-face visits or not having the necessary technology or skills to participate online or by phone. Clinical variables that had been examined in the pre-COVID-19 study were re-evaluated during the pandemic, including measures of OC symptom dimensions and OCD severity that were previously administered. In addition, we evaluated stress reactions resulting from COVID-19 on the COVID-19 Stress Scale (Taylor et al., 2020a) during the pandemic. Among patients with OCD recalled to participate, two-hundred seventy patients participated in the study. Participants took part in the study online and by phone or in-person and completed the questionnaires.

2.3. Self-report measures

2.3.1. The dimensional obsessive-compulsive scale (DOCS; Abramowitz et al., 2020)

The DOCS is a scale to assess OC symptom dimensions including 1) contamination (5 items), 2) responsibility for harm (5 items), 3) unacceptable obsessional thoughts (5 items), 4) and symmetry (5 items). The DOCS has been validated in Iranian patients with OCD (Khosravani, Abramowitz, Ardestani, Bastan, & Kamali, 2020). In the current study, Cronbach's alphas for the total DOCS and its dimensions of contamination, responsibility for harm, unacceptable obsessional thoughts, and symmetry were 0.97, 0.93, 0.94, 0.94, and 0.97, respectively.

2.3.2. The Yale-Brown obsessive-compulsive scale (Y-BOCS; Goodman et al., 1989)

The Y-BOCS is a self-report scale to assess the two subscales of obsessions (5 items) and compulsions (5 items) to determine OCD severity. The scale has been validated in an Iranian sample (Esfahani, Motaghipour, Kamkari, Zahiridin, & Janbozorgi, 2012). In the current study, Cronbach's alphas of the total Y-BOCS, and the subscales of obsessions and compulsions were equal to 0.97, 0.94, and 0.95, respectively.

2.3.3. The COVID-19 Stress Scale (CSS; Taylor et al., 2020a)

The CSS has 36 items to assess stress reactions stemming from COVID-19 across sub-dimensions, including 1) danger and contamination; 2) socio-economic consequences; 3) xenophobia; 4) traumatic stress, and; 5) compulsive checking. Items are rated on a 5-point Likert scale scoring from 0 (never) to 4 (always/extremely). The scale has been validated in an Iranian sample of patients with OCD (Khosravani et al., 2021). In the present study, Cronbach's alpha of the CSS was 0.95.

2.4. Statistical analysis

Paired t-tests were performed to investigate differences between the scores before and during COVID-19 on OC symptom dimensions (DOCS) and OCD severity (YBOCS). Hierarchical regression analyses were performed to determine the role of COVID-19-related stress responses in change in specific OCD symptom dimensions and general severity during COVID-19, by controlling for pre-COVID-19 scores of these symptoms and general severity. In each regression model, the pre-COVID-19 score of each clinical symptom measure was entered in step 1. At step 2, the COVID-19 stress response as measured by the CSS total score was entered as an independent variable. The dependent variable in each regression analysis consisted of the score of the relevant clinical symptom measure during the pandemic (DOCS subscales and YBOCS). In addition, to further disentangle the role of COVID-stress responses, hierarchical regression analyses were performed using the individual subscales of the CSS in the prediction of change in symptoms due to COVID-19. Kolmogorov-Smirnov test showed that the data were normally distributed. Data analysis was performed using SPSS-22 software (IBM Corporation, Armonk, NY, USA).

3. Results

3.1. Demographic and clinical characteristic of participants

The sample consisted of 155 (57.4%) females and 115 (42.6%) males with an average age of 36 (SD = 12.1; range = 17–67 years). The mean education of the participants was 13.62 years (SD = 3.1). Among participants, 41.5%, 51.8%, and 6.7% were single, married, and divorced, respectively. The age of OCD onset and illness duration were 26.6 (SD = 8.55) and 9.6 (SD = 7.0) years, respectively. A substantial number of patients had a comorbid disorder (N = 120; 44.4%), primarily consisting of depressive and anxiety disorders. All participants were taking medication, and 30% of the total sample had previously received psychological treatment for their symptoms or received treatment during the study, including cognitive-behavioral therapy (CBT). The mean score of patients on COVID-19-related stress symptoms was 102.6 (SD = 23.1).

3.2. Differences between the scores of patients with OCD before and during COVID-19

Table 1 shows the results of paired-tests comparing scores during the COVID-19 pandemic with scores from before the pandemic. Results showed that there were significant differences between the scores of patients with OCD on symptoms and general severity before and during COVID-19. The scores of patients with OCD on all OC symptom dimensions as measured by the DOCS (i.e., contamination, responsibility

Table 1
Comparison of symptoms and severity before and during COVID-19 in a group of patients with OCD (N = 270).

	Pre-COVID-19, Mean ± S.D	During COVID-19, Mean ± S.D	t
Total DOCS	38.4 ± 14.1	55.2 ± 14.2	13.5
DOCS contamination	9.5 ± 4.0	14.4 ± 3.5	15.2
DOCS responsibility for harm	9.9 ± 4.4	14.0 ± 3.7	11.4
DOCS unacceptable thoughts	11.2 ± 3.9	14.3 ± 3.8	9.5
DOCS symmetry	7.8 ± 4.5	12.4 ± 4.8	11.7
Total Y-BOCS	19.6 ± 9.1	28.7 ± 8.2	12.7
Y-BOCS obsessions	10.5 ± 4.9	14.6 ± 4.1	10.6
Y-BOCS compulsions	9.1 ± 4.8	14.1 ± 4.2	13.6

Note.
OCD = obsessive-compulsive disorder; COVID-19 = coronavirus disease 2019; DOCS = dimensional obsessive-compulsive scale; Y-BOCS=Yale Brown obsessive-compulsive scale.
All t values were significant (p < 0.001).

for harm, unacceptable thoughts, and symmetry) and also general OCD severity as measured by the YBOCS were significantly higher during COVID-19 as compared to their scores from before the pandemic (all ps < 0.001) (Table 1).

3.3. Predicting change in OC symptom dimensions and general severity based on COVID-19 stress responses during the pandemic

The results of hierarchical regression analyses predicting symptom levels during the COVID-19 pandemic controlled for scores before the pandemic are represented in Table 2. Results showed that COVID-19 stress responses as measured by the total score of the CSS was significantly associated with the increase of all OC dimensions, including the DOCS subscales contamination (Adj R² = 0.50), responsibility for harm (Adj R² = 0.56), unacceptable thoughts (Adj R² = 0.50), and symmetry (Adj R² = 0.26), as well as OCD severity (Adj R² = 0.46) (all ps < 0.001).

Table 3 shows the results of hierarchical regression analyses predicting symptom dimensions and general severity during COVID-19 based on the individual subscales of the CSS (i.e., danger and contamination, socio-economic consequences, xenophobia, traumatic stress, and compulsive checking) entered as independent variables. After controlling for pre-COVID-19 scores of symptoms and general severity, all specific stress reactions as measured by the subscales of CSS offered unique and contributed to the prediction of specific symptoms and general OCD severity (p < 0.001), with the exception of xenophobic stress reactions (p > 0.05). Danger and contamination-related stress reactions significantly predicted all specific OC symptom dimensions, as well as the general severity of symptoms. Except for symmetry,

Table 2
Predicting change in obsessive-compulsive symptom dimensions and OCD severity based on general COVID-19-related stress responses (CSS total score)^a.

Outcome variables (during COVID-19)	Independent variables	Adj R ²	R ² change	β	t
Contamination	Pre-COVID-19 contamination	0.51	0.01	0.02	0.50
	COVID-19 stress responses				
Responsibility for harm	Pre-COVID-19 responsibility for harm	0.57	0.01	0.01	0.33
	COVID-19 stress responses				
Unacceptable thoughts	Pre-COVID-19 unacceptable thoughts	0.51	0.01	0.01	0.25
	COVID-19 stress responses				
Symmetry	Pre-COVID-19 symmetry	0.27	0.01	0.06	1.10
	COVID-19 stress responses				
OCD severity	Pre-COVID-19 OCD severity	0.48	0.02	0.06	1.42
	COVID-19 stress responses				

Note.
^a There were two steps in each regression model: Step 1: The pre-COVID-19 score of the outcome variable; Step 2: The total score of the CSS. Also, in these models, we represented the final step (step 2) for readability in the table. β = standardized coefficient; OCD = obsessive-compulsive disorder; COVID-19 = coronavirus disease 2019; CSS=COVID Stress Scales.
^b p < 0.001.

Table 3
Predicting change in obsessive-compulsive symptom dimensions and OCD severity based on specific COVID-19 stress responses (CSS subscales) ^a.

Outcome variables (during COVID-19)	Independent variables	Adj R ²	R ² change	β	t
Contamination	Pre-COVID-19 contamination	0.54	0.01	0.03	0.72
	CSS danger and contamination			0.56	5.71 ^b
	CSS socio-economic consequences			0.04	0.71
	CSS xenophobia			0.08	0.92
	CSS traumatic stress			0.17	2.52 ^b
	CSS compulsive checking			0.53	0.08
Responsibility for harm	Pre-COVID-19 responsibility for harm	0.59	0.01	0.01	0.28
	CSS danger and contamination			0.39	4.16 ^b
	CSS socio-economic consequences			0.03	0.44
	CSS xenophobia			0.01	0.17
	CSS traumatic stress			0.16	2.86 ^b
	CSS compulsive checking			0.58	0.33
Unacceptable thoughts	Pre-COVID-19 unacceptable thoughts	0.52	0.01	0.01	0.21
	CSS danger and contamination			0.37	3.62 ^b
	CSS socio-economic consequences			0.14	2.42 ^b
	CSS xenophobia			0.08	0.88
	CSS traumatic stress			0.33	3.67 ^b
	CSS compulsive checking			0.51	0.03
Symmetry	Pre-COVID-19 symmetry	0.30	0.01	0.05	1.02
	CSS danger and contamination			0.40	3.29 ^b
	CSS socio-economic consequences			0.24	3.32 ^b
	CSS xenophobia			0.13	1.19
	CSS traumatic stress			0.06	0.52
	CSS compulsive checking			0.29	0.03
OCD severity	Pre-COVID-19 OCD severity	0.49	0.02	0.06	1.41
	CSS danger and contamination			0.36	3.48 ^b
	CSS socio-economic consequences			0.15	2.48 ^b
	CSS xenophobia			0.08	0.84
	CSS traumatic stress			0.29	3.12 ^b
	CSS compulsive checking			0.47	0.04

Note.

^a There were two steps in each regression model: Step 1: The pre-COVID-19 score of the outcome variable; Step 2: The subscales of the CSS. Also, in these models, we represented the final step (step 2) for readability in the table. β = standardized coefficient; CSS=COVID Stress Scales; COVID-19 = coronavirus disease 2019; OCD = obsessive-compulsive disorder.

^b $p < 0.001$.

traumatic stress-related reactions predicted most specific OC symptoms and general severity. Socio-economic stress reactions significantly predicted unacceptable thoughts, symmetry, and general OCD severity. Finally, compulsive checking-related stress reactions significantly and

uniquely predicted responsibility for harm.

4. Discussion

The current study aimed to compare the scores of a group of patients with OCD on OC symptom dimensions and OCD severity before and during COVID-19. In addition, it aimed to evaluate changes in OC symptom dimensions and general severity based on COVID-19-related stress reactions. It was hypothesized that COVID-19 is associated with an increase across all OC symptom dimensions and general severity. In addition, we expected COVID-19-related stress to significantly account for the change in these symptoms as the result of the pandemic. Results confirmed these hypotheses.

Previous theoretical reports (e.g., Chatterjee et al., 2020; Fontenelle & Miguel, 2020; Kumar et al., 2020) and empirical studies (e.g., Abba-Aji et al., 2020; Benatti et al., 2020; Davide et al., 2020; Jelinek et al., 2021; Knowles & Olatunji, 2021; Matsunaga et al., 2020; Tanir et al., 2020) have highlighted a specific link between COVID-19 and contamination symptoms. The present empirical study showed that COVID-19 is also linked to an increase in all OC symptom dimensions, including contamination, responsibility for harm, unacceptable thoughts, and symmetry. In addition, as reported in previous studies (Benatti et al., 2020; Tanir et al., 2020), the results of the present study showed that the COVID-19 pandemic increased general OCD severity.

COVID-19 poses significant challenges for many that would be expected to result in an increase in OC symptoms across different dimensions. COVID-19 has been previously noted to have negative effects on mental health due to increased levels of uncertainty and unpredictability (Tull et al., 2020; Wheaton et al., 2021; Zandifar & Badrfam, 2020), distress, fear, anxiety (Elhai, Yang, McKay, & Asmundson, 2020; Mertens, Gerritsen, Duijndam, Saleminck, & Engelhard, 2020), and health-related worries and concerns (Jungmann & Witthöft, 2020; Taylor, Landry, Paluszek, Rachor, & Asmundson, 2020b). Indeed, when OC symptoms emerge in community individuals due to the COVID-19 (Zheng, Xiao, Xie, Wang, & Wang, 2020), it is not surprising to find an increase in symptoms across multiple dimensions in patients with OCD. In particular, as outlined earlier, COVID-related stress and anxiety induced by the current pandemic may be an important underlying mechanism accounting for an exacerbation of symptoms, including those with OCD.

The results of the present study supported the notion that the increase in symptoms and general severity observed among those with OCD might primarily be due to stress induced by the current pandemic. COVID-related stress responses explained a substantial amount of the variance of change in symptoms across all OC dimensions and general OCD severity. In particular, stress reactions that revolved around danger and contamination, traumatic stress, compulsive checking, and socio-economic concerns predicted a worsening of symptoms across multiple symptom dimensions and general OCD severity. While the present study does not directly comment on whether those with OCD are more vulnerable to the negative effects of COVID-19 than other populations, it highlights some of the potential mechanisms by which specific symptoms of OCD might be exacerbated as the result of the current pandemic. For example, excessive checking of news and events related to COVID-19 might result in increased concerns about responsibility for harm and checking behaviors (Shafraan et al., 2020). Similarly, anger and pessimistic attitudes towards the future and aggressive symptoms might result in an increase of symptoms revolving around immoral, sexual, suspicious, and violent themes or other OC symptoms during the COVID-19 pandemic in patients with OCD (Nissen et al., 2020).

Danger and contamination-related stress, which forms the core of COVID-Stress Syndrome (Taylor et al., 2020c), predicted change in all symptom dimensions of OCD as well as change in general severity, as would be expected given that danger and contamination-related concerns are highly prevalent in disorders with high levels of anxiety (Asmundson et al., 2020), including those with OCD (Khosravani et al.,

2021). It is worth noting, however, that perceptions of threat and danger, including exaggerated danger-related stress responses to COVID-19, do not necessarily indicate a specific obsessional response, which has been suggested to depend on more specific perceived self-related vulnerabilities (Aardema, 2020; Aardema & Wong, 2020). Nonetheless, results support that these danger-related stress reactions are associated with an increase in symptoms among those with OCD (Ji et al., 2020; Nissen et al., 2020; Yassa et al., 2020), likely through similar mechanisms by which symptoms may be exacerbated in non-clinical and other clinical populations (Montano & Acebes, 2020; Song, 2020; Taylor et al., 2020a, 2020c).

4.1. Implications

The present study has several important clinical implications. First, the present study indicated that stress responses to the pandemic are associated with an increase in all OC symptom dimensions and their severity. Consequently, therapists should consider the effects of the pandemic on all OC symptom dimensions and adjust their treatment plans accordingly (McKay, Minaya, & Storch, 2020; Sheu, McKay, & Storch, 2020; Storch, Schneider, Guzik, McKay, & Goodman, 2020). In particular, results suggest that reducing COVID-related stress may be particularly beneficial to reduce the negative impact of COVID-19 on symptoms (Babore et al., 2020; Fullana, Hidalgo-Mazzei, Vieta, & Radua, 2020; Ye et al., 2020). In addition, therapists can provide online psychological therapy programs through CBT that are tailored to the current pandemic, including relaxation, distress tolerance, acceptance, and engagement in positive activities (Benhamou & Piedra, 2020).

4.2. Limitations

This study has some limitations. First, results are limited by the use of self-report scales in the assessment of specific symptom dimensions, which might be subject to response bias. The distress induced by COVID-19 may cause patients to exaggerate their symptoms. Alternatively, patients may experience difficulty distinguishing between stress-related reactions in response to COVID-19 and symptoms of OCD. Therefore, the use of clinical interviews may help further clarify the results of this study, including the exact mechanisms by which symptoms of OCD worsen through stress responses to the pandemic. Second, an important point to consider is that the circumstances surrounding current pandemic, including orders to stay at home, may cause patients with OCD not to seek treatment or follow-up meetings, which may play a role in the exacerbation of symptoms. There is evidence that patients who are in-treatment do not fare worse during COVID-19 than the general public (Kuckertz et al., 2020). Results of the study may therefore not be generalizable to patients that are currently in treatment or those who have previously been treated. Third, the effects of COVID-19 may be temporary and should be re-examined after the pandemic has run its course to determine if it has any lasting effect on symptoms of OCD.

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Contributors

The first author (methodology, data curation, formal analysis, writing - original draft, review, and editing). The second author (supervision, methodology, writing - review and editing). The third author (supervision, clinical diagnosis, review and editing). The fourth author (clinical diagnosis, data curation, formal analysis).

Declaration of competing interest

None declared.

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References

- Aardema, F. (2020). COVID-19, obsessive-compulsive disorder and invisible life forms that threaten the self. *Journal of Obsessive-Compulsive and Related Disorders*, 26, Article 100558. <https://doi.org/10.1016/j.jocrd.2020.100558>
- Aardema, F., & Wong, S. F. (2020). Feared possible selves in cognitive-behavioral theory: An analysis of its historical and empirical context, and introduction of a working model. *Journal of Obsessive-Compulsive and Related Disorders*, 24, Article 100479. <https://doi.org/10.1016/j.jocrd.2019.100479>
- Abba-Aji, A., Li, D., Hrabok, M., Shalaby, R., Gusnowski, A., Vuong, W., et al. (2020). COVID-19 pandemic and mental health: Prevalence and correlates of new-onset obsessive-compulsive symptoms in a Canadian province. *JMIR Public Health and Surveillance*, 17(19), 6986. <https://doi.org/10.2196/preprints.19648>
- Abramowitz, J. S., Deacon, B. J., Olatunji, B. O., Wheaton, M. G., Berman, N. C., Losardo, D., et al. (2010). Assessment of obsessive-compulsive symptom dimensions: Development and evaluation of the dimensional obsessive-compulsive scale. *Psychological Assessment*, 22, 180–198. <https://doi.org/10.1037/a0018260>
- Adams, T. G., Kelmendi, B., Brake, C. A., Gruner, P., Badour, C. L., & Pittenger, C. (2018). The role of stress in the pathogenesis and maintenance of obsessive-compulsive disorder. *Chronic Stress*, 2, Article 2470547018758043. <https://doi.org/10.1177/2470547018758043>
- Ahmed, M. Z., Ahmed, O., Aibao, Z., Hanbin, S., Siyu, L., & Ahmad, A. (2020). Epidemic of COVID-19 in China and associated psychological problems. *Asian Journal of Psychiatry*, 51, Article 102092. <https://doi.org/10.1016/j.ajp.2020.102092>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*. Washington, DC: DSM-5 American Psychiatric Publishing.
- Asmundson, G. J., Paluszek, M. M., Landry, C. A., Rachor, G. S., McKay, D., & Taylor, S. (2020). Do pre-existing anxiety-related and mood disorders differentially impact COVID-19 stress responses and coping? *Journal of Anxiety Disorders*, 74, Article 102271. <https://doi.org/10.1016/j.janxdis.2020.102271>
- Babore, A., Lombardi, L., Viceconti, M. L., Pignataro, S., Marino, V., Crudele, M., et al. (2020). Psychological effects of the COVID-2019 pandemic: Perceived stress and coping strategies among healthcare professionals. *Psychiatry Research*, 293, Article 113366. <https://doi.org/10.1016/j.psychres.2020.113366>
- Benatti, B., Albert, U., Maina, G., Fiorillo, A., Celebre, L., Gironi, N., et al. (2020). What happened to patients with obsessive compulsive disorder during the COVID-19 pandemic? A multicentre report from tertiary clinics in northern Italy. *Frontiers in Psychiatry*, 11, 720. <https://doi.org/10.3389/fpsy.2020.00720>
- Benhamou, K., & Piedra, A. (2020). CBT-informed interventions for essential workers during the COVID-19 pandemic. *Journal of Contemporary Psychotherapy*, 50(4), 275–283. <https://doi.org/10.1007/s10879-020-09467-3>
- Chatterjee, S. S., Malathesh Barikar, C., & Mukherjee, A. (2020). Impact of COVID-19 pandemic on pre-existing mental health problems. *Asian Journal of Psychiatry*, 51, Article 102071. <https://doi.org/10.1016/j.ajp.2020.102071>
- Davide, P., Andrea, P., Martina, O., Andrea, E., Davide, D., & Mario, A. (2020). The impact of the COVID-19 pandemic on patients with OCD: Effects of contamination symptoms and remission state before the quarantine in a preliminary naturalistic study. *Psychiatry Research*, 291, Article 113213. <https://doi.org/10.1016/j.psychres.2020.113213>
- Elhai, J. D., Yang, H., McKay, D., & Asmundson, G. J. (2020). COVID-19 anxiety symptoms associated with problematic smartphone use severity in Chinese adults. *Journal of Affective Disorders*, 274, 576–582. <https://doi.org/10.1016/j.jad.2020.05.080>
- Esfahani, S. R., Motaghipour, Y., Kamkari, K., Zahireadin, A., & Janbozorgi, M. (2012). Reliability and validity of the Persian version of the Yale-Brown obsessive-compulsive scale (Y-BOCS). *Iranian Journal of Psychiatry and Clinical Psychology*, 17, 297–303.
- Fineberg, N. A., Van Ameringen, M., Drummond, L., Hollander, E., Stein, D. J., Geller, D., et al. (2020). How to manage obsessive-compulsive disorder (OCD) under COVID-19: A clinician's guide from the international college of obsessive compulsive spectrum disorders (ICOCs) and the obsessive-compulsive research network (ocrn) of the European college of neuropsychopharmacology. *Comprehensive Psychiatry*, 100, Article 152174. <https://doi.org/10.1016/j.comppsy.2020.152174>
- First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2014). *Structured clinical interview for DSM-5 disorders (SCID-5-RV), research version*. Arlington, VA: American Psychiatric Publishing.
- Fontenelle, L. F., & Miguel, E. C. (2020). The impact of COVID-19 in the diagnosis and treatment of obsessive-compulsive disorder. *Depression and Anxiety*, 37, 510–511. <https://doi.org/10.1002/da.23037>
- Fullana, M. A., Hidalgo-Mazzei, D., Vieta, E., & Radua, J. (2020). Coping behaviors associated with decreased anxiety and depressive symptoms during the COVID-19

- pandemic and lockdown. *Journal of Affective Disorders*, 275, 80–81. <https://doi.org/10.1016/j.jad.2020.06.027>
- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., et al. (1989). The Yale-Brown obsessive compulsive scale: I. Development, use, and reliability. *Archives of General Psychiatry*, 46, 1006–1011. <https://doi.org/10.1001/archpsyc.1989.01810110048007>
- IBM Corp. (2013). *IBM statistics for windows*. Armonk, NY: IBM Corp.
- Imthou, A. K., Caldart, C. A., do Rosário, M. C., Fontenelle, I. F., Miguel, E. C., & Ferrão, Y. A. (2020). Stressful life events and the clinical expression of obsessive-compulsive disorder (OCD): An exploratory study. *Journal of Clinical Medicine*, 9, 3371. <https://doi.org/10.3390/jcm9103371>
- Jelinek, L., Moritz, S., Miegel, F., & Voderholzer, U. (2021). Obsessive-compulsive disorder during COVID-19: Turning a problem into an opportunity? *Journal of Anxiety Disorders*, 77, Article 102329. <https://doi.org/10.1016/j.janxdis.2020.102329>
- Ji, G., Wei, W., Yue, K. C., Li, H., Shi, L. J., Ma, J. D., et al. (2020). Effects of the COVID-19 pandemic on obsessive-compulsive symptoms among university students: Prospective cohort survey study. *Journal of Medical Internet Research*, 22, Article e21915. <https://doi.org/10.2196/21915>
- Jungmann, S. M., & Witthöft, M. (2020). Health anxiety, cyberchondria, and coping in the current COVID-19 pandemic: Which factors are related to coronavirus anxiety? *Journal of Anxiety Disorders*, 73, Article 102239. <https://doi.org/10.1016/j.janxdis.2020.102239>
- Khosravani, V., Abramowitz, J. S., Ardestani, S. M. S., Bastan, F. S., & Kamali, Z. (2020). The Persian version of the dimensional obsessive-compulsive scale (P-DOCS): A psychometric evaluation. *Journal of Obsessive-Compulsive and Related Disorders*, 25, Article 100522. <https://doi.org/10.1016/j.jocrd.2020.100522>
- Khosravani, V., Ardestani, S. M. S., Mohammadpanah, A., & Amirinezhad, A. (2020). The Obsessive-Compulsive Inventory-Revised (OCI-R): Further psychometric examination and its adaptation to the DSM-5 in Iranian patients with obsessive-compulsive disorder. *Journal of Obsessive-Compulsive and Related Disorders*, 26, Article 100547. <https://doi.org/10.1016/j.jocrd.2020.100547>
- Khosravani, V., Asmundson, G. J. G., Taylor, S., Bastan, F. S., & Ardestani, S. M. S. (2021). The Persian COVID Stress Scales (Persian-CSS) and COVID 19-related stress reactions among patients with obsessive-compulsive and anxiety disorders. *Journal of Obsessive-Compulsive and Related Disorders*, 28, Article 100615. <https://doi.org/10.1016/j.jocrd.2020.100615>
- Khosravani, V., Bastan, F. S., Ardestani, S. M. S., & Amirinezhad, A. (2020). Psychometric evaluation of the Vancouver Obsessional-Compulsive Inventory (VOCI) and its adaptation based on the DSM-5 in Iranian patients with obsessive-compulsive disorder. *Journal of Obsessive-Compulsive and Related Disorders*, 25, Article 100536. <https://doi.org/10.1016/j.jocrd.2020.100536>
- Knowles, K. A., & Olatunji, B. O. (2021). Anxiety and safety behavior usage during the COVID-19 pandemic: The prospective role of contamination fear. *Journal of Anxiety Disorders*, 77, Article 102323. <https://doi.org/10.1016/j.janxdis.2020.102323>
- Kuckertz, J. M., Van Kirk, N., Alperovitz, D., Nota, J. A., Falkenstein, M. J., Schreck, M., et al. (2020). Ahead of the curve: Responses from patients in treatment for obsessive-compulsive disorder to coronavirus disease 2019. *Frontiers in Psychology*, 11, Article 572153. <https://doi.org/10.3389/fpsyg.2020.572153>
- Kumar, A., & Somani, A. (2020). Dealing with Corona virus anxiety and OCD. *Asian Journal of Psychiatry*, 51, Article 102053. <https://doi.org/10.1016/j.ajp.2020.102053>
- Lee, S. A. (2020). How much "Thinking" about COVID-19 is clinically dysfunctional? *Brain, Behavior, and Immunity*, 87, 97–98. <https://doi.org/10.1016/j.bbi.2020.04.067>
- Marroquín, B., Vine, F., & Morgan, R. (2020). Mental health during the COVID-19 pandemic: Effects of stay-at-home policies, social distancing behavior, and social resources. *Psychiatry Research*, 293, Article 113419. <https://doi.org/10.1016/j.psychres.2020.113419>
- Matsunaga, H., Mukai, K., & Yamanishi, K. (2020). The acute impact of the pandemic of COVID-19 on the phenomenological features in the full or partial remitted patients with obsessive-compulsive disorder (OCD). *Psychiatry and Clinical Neurosciences*, 1–4. <https://doi.org/10.1111/pcn.13119>
- McKay, D., Minaya, C., & Storch, E. A. (2020). Conducting exposure and response prevention treatment for contamination fears during COVID-19: The behavioral immune system impact on clinician approaches to treatment. *Journal of Anxiety Disorders*, 74, Article 102270. <https://doi.org/10.1016/j.janxdis.2020.102270>
- McKay, D., Yang, H., Elhai, J., & Asmundson, G. (2020). Anxiety regarding contracting COVID-19 related to interoceptive anxiety sensations: The moderating role of disgust propensity and sensitivity. *Journal of Anxiety Disorders*, 73, Article 102233. <https://doi.org/10.1016/j.janxdis.2020.102233>
- Mertens, G., Gerritsen, L., Duijndam, S., Salemkink, E., & Engelhard, I. M. (2020). Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *Journal of Anxiety Disorders*, 74, Article 102258. <https://doi.org/10.1016/j.janxdis.2020.102258>
- Montano, R. L. T., & Acebes, K. M. L. (2020). Covid stress predicts depression, anxiety and stress symptoms of Filipino respondents. *International Journal of Research in Business and Social Science*, 9, 78–103. <https://doi.org/10.20525/ijrbs.v9i4.773>
- Nissen, J. B., Højgaard, D., & Thomsen, P. H. (2020). The immediate effect of COVID-19 pandemic on children and adolescents with obsessive compulsive disorder. *BMC Psychiatry*, 20, 511. <https://doi.org/10.1007/s00004-020-0003-4063-6866>
- Pan, K. Y., Kok, A. A., Eikelenboom, M., Horsfall, M., Jörg, F., Luteijn, R. A., et al. (2021). The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: A longitudinal study of three Dutch case-control cohorts. *The Lancet Psychiatry*, 8(2), 121–129. [https://doi.org/10.1016/S2215-0366\(20\)30491-0](https://doi.org/10.1016/S2215-0366(20)30491-0)
- Pieh, C., Budimir, S., & Probst, T. (2020). The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *Journal of Psychosomatic Research*, 136, Article 110186. <https://doi.org/10.1016/j.jpsychores.2020.110186>
- Rajkumar, R. P. (2020). Contamination and infection: What the coronavirus pandemic could reveal about the evolutionary origins of obsessive-compulsive disorder. *Psychiatry Research*, 289, Article 113062. <https://doi.org/10.1016/j.psychres.2020.113062>
- Rosso, G., Albert, U., Asinari, G. F., Bogetto, F., & Maina, G. (2012). Stressful life events and obsessive-compulsive disorder: Clinical features and symptom dimensions. *Psychiatry Research*, 197, 259–264. <https://doi.org/10.1016/j.psychres.2011.10.005>
- Schwartz-Lifshitz, M., Basel, D., Lang, C., Hertz, N., Dekel, I., Zohar, J., et al. (2021). Obsessive compulsive symptoms severity among children and adolescents during COVID-19 first wave in Israel. *Journal of Obsessive-Compulsive and Related Disorder*, 28, Article 100610. <https://doi.org/10.1016/j.jocrd.2020.100610>
- Seçer, İ., & Ulaş, S. (2020). An investigation of the effect of COVID-19 on OCD in youth in the context of emotional reactivity, experiential avoidance, depression and anxiety. *International Journal of Mental Health and Addiction*, 1–14. <https://doi.org/10.1007/s11469-020-00322-z>
- Shafraan, R., Coughtrey, A., & Whittal, M. (2020). Recognising and addressing the impact of COVID-19 on obsessive-compulsive disorder. *The Lancet Psychiatry*, 7, 570–572. [https://doi.org/10.1016/S2215-0366\(20\)30222-4](https://doi.org/10.1016/S2215-0366(20)30222-4)
- Sher, L. (2020). Individuals with untreated psychiatric disorders and suicide in the COVID-19 era. *Brazilian Journal of Psychiatry*, 1–2. <http://orcid.org/0000-0002-7729-3222>
- Sheu, J. C., McKay, D., & Storch, E. A. (2020). COVID-19 and OCD: Potential impact of exposure and response prevention therapy. *Journal of Anxiety Disorders*, 76, Article 102314. <https://doi.org/10.1016/j.janxdis.2020.102314>
- Song, M. (2020). Psychological stress responses to COVID-19 and adaptive strategies in China. *World Development*, 136, Article 105107. <https://doi.org/10.1016/j.worlddev.2020.105107>
- Storch, E. A., Schneider, S. C., Guzick, A., McKay, D., & Goodman, W. K. (2020). Impact of COVID-19 on exposure and response prevention for obsessive-compulsive disorder: Present and post-pandemic considerations. *Psychiatry Research*, 292, Article 113310. <https://doi.org/10.1016/j.psychres.2020.113310>
- Tanir, Y., Karayagmurlu, A., İlyas, K. A. Y. A., Kaynar, T. B., Turkmen, G., Dambasan, B. N., et al. (2020). Exacerbation of obsessive compulsive disorder symptoms in children and adolescents during COVID-19 pandemic: COVID-19 OCD children. *Psychiatry Research*, 293, Article 113363. <https://doi.org/10.1016/j.psychres.2020.113363>
- Taylor, S., Landry, C., Paluszczek, M., Fergus, T. A., McKay, D., & Asmundson, G. J. (2020). Development and initial validation of the COVID stress scales. *Journal of Anxiety Disorders*, 72, Article 102232. <https://doi.org/10.1016/j.janxdis.2020.102232>
- Taylor, S., Landry, C. A., Paluszczek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. (2020). COVID stress syndrome: Concept, structure, and correlates. *Depression and Anxiety*, 37, 706–714. <https://doi.org/10.1002/da.23071>
- Taylor, S., Landry, C. A., Paluszczek, M. M., Rachor, G. S., & Asmundson, G. J. (2020). Worry, avoidance, and coping during the COVID-19 pandemic: A comprehensive network analysis. *Journal of Anxiety Disorders*, 76, Article 102327. <https://doi.org/10.1016/j.janxdis.2020.102327>
- Tull, M. T., Barbano, A. C., Scamaldo, K. M., Richmond, J. R., Edmonds, K. A., Rose, J. P., et al. (2020). The prospective influence of COVID-19 affective risk assessments and intolerance of uncertainty on later dimensions of health anxiety. *Journal of Anxiety Disorders*, 75, Article 102290. <https://doi.org/10.1016/j.janxdis.2020.102290>
- Wheaton, M. G., Messner, G. R., & Marks, J. B. (2021). Intolerance of uncertainty as a factor linking obsessive-compulsive symptoms, health anxiety and concerns about the spread of the novel coronavirus (COVID-19) in the United States. *Journal of Obsessive-Compulsive and Related Disorders*, 28, Article 100605. <https://doi.org/10.1016/j.jocrd.2020.100605>
- Yassa, M., Yassa, A., Yirmibeş, C., Birol, P., Ünlü, U. G., Tekin, A. B., et al. (2020). Anxiety levels and obsessive compulsive symptoms of pregnant women during the COVID-19 pandemic. *Turkish Journal of Obstetrics and Gynecology*, 17, 155–160. <https://doi.org/10.4274/tjod.galenos.2020.91455>
- Ye, Z., Yang, X., Zeng, C., Wang, Y., Shen, Z., Li, X., et al. (2020). Resilience, social support, and coping as mediators between COVID-19-related stressful experiences and acute stress disorder among college students in China. *Applied Psychology: Health and Well-Being*, 12(4), 1074–1094. <https://doi.org/10.1111/aphw.12211>
- Zandifar, A., & Badrfam, R. (2020). Iranian mental health during the COVID-19 epidemic. *Asian Journal of Psychiatry*, 51, Article 101990. <https://doi.org/10.1016/j.ajp.2020.101990>
- Zheng, Y., Xiao, L., Xie, Y., Wang, H., & Wang, G. (2020). Prevalence and characteristics of obsessive-compulsive disorder among urban residents in wuhan during the stage of regular control of coronavirus disease-19 epidemic. *Frontiers in Psychiatry*, 11, 1435. <https://doi.org/10.3389/fpsyg.2020.594167>