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Citation

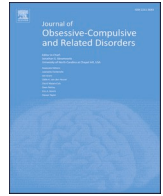
Mortier, J. A. M. du, Giltay, E. J., Kok, A. A. L., Oppen, P. van, Eikelenboom, M., Rhebergen, D., ... Visser, H. A. D. (2024). Contamination fear during the COVID-19 pandemic in patients with lifetime obsessive compulsive disorder and healthy controls: a longitudinal cohort study. *Journal Of Obsessive-Compulsive And Related Disorders*, 42.
doi:10.1016/j.jocrd.2024.100889

Version: Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).



Contamination fear during the COVID-19 pandemic in patients with lifetime obsessive compulsive disorder and healthy controls: A longitudinal cohort study

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ARTICLE INFO

Keywords:

Obsessive-compulsive disorder
OCD
Symptom dimensions
COVID-19
Pandemic

ABSTRACT

Background: The COVID-19 pandemic could be considered a 'symptom provocation test,' which may trigger specific OCD and other psychiatric symptoms. Therefore, we aimed to compare the long-term impact of the pandemic on fear of COVID-19, and contamination, depressive and anxiety symptoms in three groups: individuals with OCD with and without pre-pandemic contamination symptoms and healthy controls.

Methods: From April 2020 to February 2022, we administered 16 online questionnaires on 138 persons with a lifetime diagnosis of OCD and 373 healthy controls. We evaluated outcomes related to fear of COVID-19, cleaning obsessions and compulsions, anxiety, and depressive symptoms. Using mixed models, we compared the trajectories among persons with OCD who had pre-pandemic contamination symptoms, those without such symptoms, and healthy controls.

Results: Pre-pandemic contamination symptoms were significantly associated with higher fear of COVID-19, contamination symptoms, anxiety, and depressive symptoms. Persons with OCD without pre-pandemic contamination symptoms scored, on average, quite similarly to healthy controls.

Conclusions: Only in persons with pre-pandemic contamination symptoms did the pandemic provoke more fear of COVID-19 and contamination symptoms than in controls. It seems that stress caused by external factors, does not tri trigger OCD symptoms unless there is a connection to the subtype of OCD.

1. Introduction

There are several reasons to believe that the COVID-19 pandemic and associated measures to prevent contamination could have had a negative influence on persons with obsessive-compulsive disorder (OCD). First, during the pandemic, there were preventive measures like hand-washing with a minimum duration in a specific way, which could contribute to a ritualistic pattern and could normalise repeated behavior, such as compulsions associated with OCD (Banerjee, 2020). Second, the pandemic caused stress. The behavioral theory considers

compulsions as actions to neutralise anxiety and stress (Gillan & Sahakian, 2015; Mowrer, 1939; Stein et al., 2019) and studies about stress in OCD found that stress predicted more severe OCD symptoms (Coles et al., 2008). Third, for persons with OCD, a key element of their psychological treatment is exposure with response prevention (ERP). In ERP, patients are exposed to fear-provoking stimuli while they abstain from compulsive behavior (Stein et al., 2019). The measures related to social distancing, hand hygiene, and cleaning reduced exposure to anxiety-provoking situations. This could lead to more avoidance and worsening of existing OCD, especially in patients with symptoms

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<https://doi.org/10.1016/j.jocrd.2024.100889>

Received 28 February 2024; Received in revised form 30 May 2024; Accepted 5 June 2024

Available online 8 June 2024

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belonging to the contamination-cleaning subtype of OCD (hereafter referred to as 'contamination symptoms').

Several types of studies have examined the influence of the COVID-19 pandemic on OCD and OCD-like symptoms in the general population and in patients with OCD. At first, general population studies focused on the prevalence of OCD-like symptoms in the population. Typically, the annual prevalence ranges between 0.69% and 0.79% across different countries (Fontenelle et al., 2006). In a relatively large population study of 1190 individuals, 82% scored positive on one of the Y-BOCS symptom scale items related to contamination and cleaning, indicating that these symptoms were highly frequent in that population during the pandemic. When these compulsions and obsessions were rated with the Y-BOCS severity scale 19% of the persons without a previous psychiatric disorder ($n = 958$) exhibited compulsions and obsessions that could be classified as at least mild OCD (Y-BOCS score >7) (Alhujaili et al., 2021). This means that 19% of the persons without a previous psychiatric disorder not only worried about contamination with COVID-19 or engaged in excessive handwashing but also exhibited additional symptoms, leading to a score of 7 or higher on the Y-BOCS. Examples of these additional symptoms include spending a significant amount of time on these obsessions or compulsions, being excessively hindered or distressed by them, or experiencing a lack of control over them. Other studies using the Obsessive-Compulsive Inventory-Revised (Foa et al., 2002) to assess obsessions and compulsions, also found high rates (21.4–62.4%) of persons scoring higher than 21, which is the typical cutoff for OCD (AlHusseini et al., 2021; Munk et al., 2020).

A second type of studies focused on OCD severity in individuals with OCD during the COVID-19 pandemic. These studies compared OCD severity during the pandemic with measurements taken before the pandemic and found a significant increase in OCD severity (Alonso et al., 2021; Davide et al., 2020; Khosravani et al., 2021). Studies that compared the impact of pre-pandemic symptom dimensions in adults found that especially in persons pre-pandemic contamination symptoms overall OCD severity increased (Alonso et al., 2021; Davide et al., 2020; Wilkerson et al., 2024).

A third kind of studies focussed on whether persons with OCD began to experience obsessions and compulsions with COVID-19 themes. Studies in samples from specialised clinics found low percentages of new COVID-19 centred obsessions and compulsions, ranging from 4 to 15% of the patients (Carmi et al., 2021; Nissen et al., 2020; Sharma et al., 2021). However, another study ($n = 127$) found a much higher incidence of new COVID-19-related obsessions and compulsions, reaching 45%. Nevertheless, 79% of the patients who developed these new obsessions had pre-pandemic contamination symptoms. Of the ones in whom this type of compulsions and obsessions became their main concern (in 9% of the sample), 83% had pre-pandemic contamination symptoms (Alonso et al., 2021).

While numerous studies have explored the relationship between OCD and COVID-19, those conducting follow-up studies within the same sample for longer than six months during the pandemic in individuals with OCD are scarce. As far as we know only one study followed persons with OCD for one year. This study found that the rate of relapse and illness trajectories in the pandemic did not differ from a non-pandemic historic cohort (Sharma et al., 2024). Most studies have typically not included both persons with OCD and healthy controls and have used only one or two measurements, focused on OCD-symptoms only, during the pandemic, occasionally comparing them with pre-pandemic data (Grant et al., 2022; Linde et al., 2022; Zaccari et al., 2021). To the best of our knowledge, there are no longitudinal studies that repeatedly assess the fear of COVID-19, anxiety, and depression in individuals with OCD and healthy controls over an extended period. It is important to have more information about the evaluation of these complaints over time to understand, for example, whether these complaints are temporary or not.

In the current study we compared the mental health effects of the COVID-19 pandemic in persons with OCD, with and without pre-

pandemic contamination symptoms and healthy persons. During the pandemic, we assessed fear of COVID-19, contamination symptoms, depressive and anxiety symptoms up to 16 times over a period of two years, in a sample of persons with OCD and healthy controls. We aimed to address the following questions: First, did persons with OCD with pre-pandemic contamination symptoms experience higher levels of fear of COVID-19, contamination symptoms, anxiety and depressive symptoms compared to persons with OCD without pre-pandemic contamination symptoms and healthy controls at several moments during the pandemic? Second, do these groups differ in how symptoms fluctuated over time during the pandemic, relative to the first measurement at the baseline of the pandemic? We hypothesised that during the pandemic, persons with OCD with pre-pandemic contamination symptoms would experience an increase of these symptoms compared to persons with OCD without these symptoms and healthy controls, particularly during periods of rising national COVID-19 death rates. Additionally, we expected a lower decrease in these symptoms when the death rates declined.

2. Methods

The reporting of this study adheres to the STROBE statement (www.strobe-statement.org).

2.1. Participants

We recruited participants with OCD from the Netherlands Obsessive Compulsive Disorder Association (NOCDA) study, as documented by Schuurmans et al. (Schuurmans et al., 2012). NOCDA is a longitudinal study on the course of OCD in patients referred for treatment to mental health care centers. After their clinical evaluation at one of the contributing mental health clinics, 687 patients aged 18 years and above with a confirmed lifetime diagnosis of OCD, as established through the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (First et al., 1999), were invited to join the NOCDA study. The sole exclusion criterion was an inadequate understanding of the Dutch language, necessary for participating in interviews and completing self-report questionnaires. Patients' ages ranged from 18 to 65 at baseline, during the period from 2004 to 2009. Follow-up occurred at 2, 4, and 6 years after the initial assessment.

Healthy controls, i.e., persons without a lifetime psychiatric disorder, were recruited from two existing cohort studies: (a) the Netherlands Study of Depression and Anxiety (NESDA) (Penninx et al., 2008), baseline 2004 and (b) the Netherlands Study of Depression in Older Persons (NESDO, baseline 2008 (Comijs et al., 2011)). Both studies recruited healthy controls without psychiatric disorders from general practitioners. Exclusion criteria for NESDO healthy controls were having a lifetime psychiatric disorder and insufficient knowledge of the Dutch language. NESDA did also include persons with lifetime (but no current) disorders at baseline. Diagnoses of psychiatric disorders were based on the Composite Interview Diagnostic Interview (CIDI) (Wittchen, 1994), using DSM-IV criteria. Both questions related to life-time as well as current episodes were asked. In NESDO also persons with dementia were excluded.

Starting from April 1, 2020, participants from these cohorts and the NOCDA cohort who gave permission to be contacted for further research activities ($n = 2748$) were invited via e-mail to participate in a recurring online questionnaire about mental health and the impact of the COVID-19 pandemic. After the baseline measurement, 15 follow-up measurements were conducted until February 2022 at varying time intervals. All participants provided online informed consent. This study received approval from the Institutional Review Board of VU University Medical Center, Amsterdam.

Among the 300 persons with OCD and 562 controls who had participated in pre-COVID waves of NOCDA, NESDA and NESDO and had indicated their willingness to be approached for new data

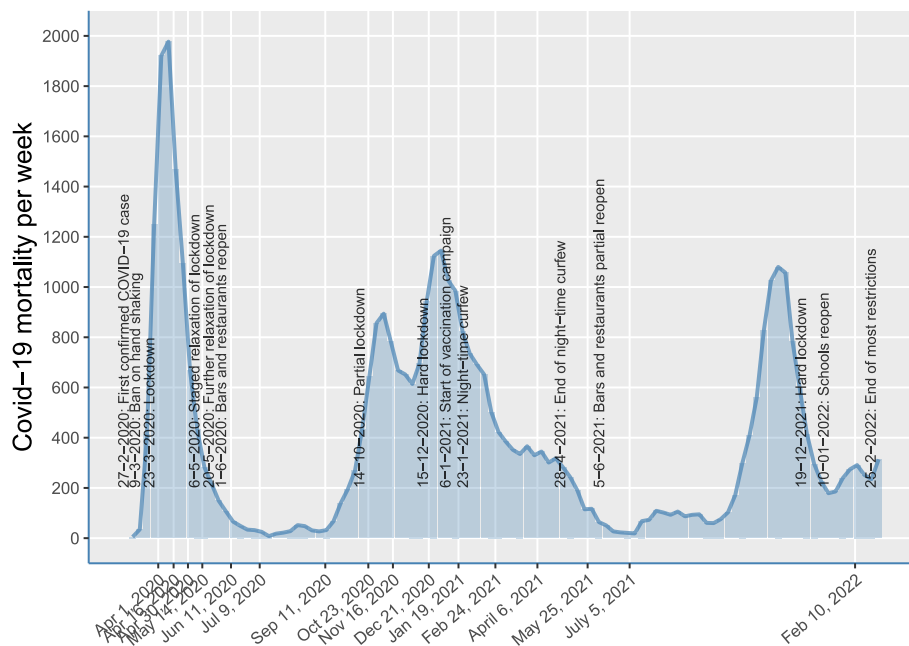


Fig. 1. COVID-19 mortality per week in the Netherlands, lockdowns, and the dates of the measurements.

collections, 138 persons with OCD (46%) and 373 healthy controls (71%) provided informed consent and completed at least one of the questionnaires.

2.2. Measures

The sample was characterised by the following demographic variables: age at the onset of the first COVID-19 wave, gender, and educational level. Educational level was rated as basic [elementary school], intermediate [lower vocational to general secondary education], and high [college or university].

Fig. 1 presents the COVID-19 mortality in the Netherlands (Centraal bureau voor de statistiek, 2023), lockdowns, and the dates of the 16 measurements.

2.3. COVID-19 questionnaires

We administered a self-developed 20-item questionnaire to assess participants' perception of the consequences of the pandemic. Responses were rated on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). This scale was divided into three dimensions, as determined by a previous factor analysis (Pan et al., 2021). For our analyses, we focused on the "fear of COVID" subscale, which comprised six questions such as "I fear becoming infected with COVID-19," "Due to the virus threat, I seldom leave my home," and "I am anxious about close contact due to the virus threat." The score for this dimension was calculated as the mean of the six items, each rated from 1 to 5. The Cronbach's alpha for this dimension was .73 (Kok et al., 2022).

2.4. Rating obsessive and compulsive symptoms in reaction to COVID-19

To assess contamination symptoms related to COVID-19, we used three items from the Padua Inventory (Sanavio, 1988): 1) 'I find it difficult to touch an object when I know it has been touched by strangers or by certain people', 2) 'I wash my hands more often and longer than necessary' and 3) 'I sometimes have to wash or clean myself simply because I think I may be contaminated'. These questions were rated on a scale ranging from 0 (not at all) to 4 (very much). We analyzed these three items individually. These items were measured in wave 1 till 12, while all other measures were recorded up to wave 16.

2.5. Mental health questionnaires

Anxiety symptoms were assessed using the Beck Anxiety Inventory (BAI), with a range of 0–63 (Beck et al., 1988). Depressive symptoms were measured using the 16-item Quick Inventory of Depressive Symptoms (QIDS), with a range of 0–27 (Rush et al., 2003).

Persons with OCD who exhibited contamination symptoms before the pandemic were identified using the Padua Inventory Revised (PI-R) (Van Oppen et al., 1995) which was administered prior to the pandemic in the NOCDA study. Persons with OCD with a score greater than 0 on the contamination obsessions and washing compulsions subscale were classified as having pre-pandemic contamination symptoms. 81% of these individuals could be classified based on the PADUA during the six-year follow-up assessment of the NOCDA study (2010–2015); for the remaining 19%, data from other earlier waves of NOCDA were used. Pre-pandemic OCD severity was quantified using the Yale–Brown Obsessive-Compulsive Scale (Y-BOCS) (Goodman et al., 1989a, 1989b). Y-BOCS scores from the six-year follow-up assessment in the NOCDA study were available for 86% of the participants, with data from previous waves of the NOCDA study utilised for the remaining 14%.

2.6. Statistical analysis

To investigate the levels of fear of COVID-19, the three Padua items, the BAI and QIDS, we estimated marginal mean scores at each wave using linear mixed models, with a random intercept for participants and adjusting for age, gender, and education level. As patients with pre-pandemic contamination symptoms exhibited significantly higher OCD severity, as measured by the Y-BOCS, compared with patients without these symptoms, outcomes of the analyses on persons with OCD were adjusted for pre-pandemic Y-BOCS scores in a subsequent analysis.

To compare trajectories, relative changes were based on z-standardised values with the baseline assessment of this study (April 2020) as the reference point. The descriptive analyses were conducted using SPSS, while other mixed model analyses employed packages in R: 'lme4' (v1.1-30) and 'emmeans' (v1.8.2).

3. Results

3.1. Attrition

There were no significant differences in gender ($X^2(1) = 2.2; p = .16$), pre-pandemic Y-BOCS scores ($M = 15.4; SD = 9.0$ versus $M = 15.5; SD = 9.8, t(298) = -.14, p = .89$), and pre-pandemic contamination symptoms ($X^2(1) = .6; p = .43$) between patients with OCD in this study and those who declined participation in this study. Participating patients were significantly older ($M = 48.7$ years; $SD = 10.4$) than non-participants ($M = 46.0$ years; $SD = 10.2, t(298) = -2.2, p = .03$). There were no significant differences in gender ($X^2(1) = .19; p = .67$) between healthy persons who participated and those who declined to participate in this study. The mean age of those who participated ($M = 58.4$ years; $SD = 14.5$) was significantly higher than those who declined ($M = 53.2$ years; $SD = 15.8; t(560) = -3.86, p < .001$). The mean number of COVID measurements waves was 7.8 (patients 7.4, healthy controls 8.0).

3.2. Descriptive statistics

Table 1 describes the characteristics of the participants. Healthy controls were significantly older than persons with OCD ($M = 58.4$ years; $SD = 14.5$ vs. $M = 48.7$ years; $SD = 10.4; t(339) = 8.4, p < .001$). Persons with OCD had a mean pre-pandemic Y-BOCS score of 15.5 ($SD = 9.8$). There was a substantial difference in pre-pandemic Y-BOCS score between persons with OCD with and without pre-pandemic contamination symptoms ($M = 17.3; SD = 9.8$ vs. $M = 10.5; SD = 8.0; t(136) = 3.77, p < .001$). A significantly higher percentage of women had pre-pandemic contamination symptoms (66%) compared to those without these symptoms (36%) ($X^2(1) = 9.553; p = .002$).

3.3. Comparison of persons with OCD with and without pre-pandemic contamination symptoms, and healthy controls

Fig. 2 presents the absolute outcomes of patients with and without pre-pandemic contamination symptoms and of healthy controls. Patients with pre-pandemic contamination symptoms consistently demonstrated significantly higher scores on all measures across all assessment points compared to persons with OCD without pre-pandemic contamination symptoms and healthy controls. The scores for fear of

COVID-19 and the three contamination items in the patients without pre-pandemic contamination symptoms closely mirrored those of the healthy controls. Patients without pre-pandemic contamination symptoms scored intermediate values between healthy controls and patients with pre-pandemic contamination symptoms on the BAI and QIDS. Especially the fear of COVID-19, but also to a lesser extent the items 'hesitant to touch things', 'washing hands', and 'washing myself', seemed to fluctuate in response to mortality rates and restrictions due to the pandemic.

Supplemental Fig. 1 presents the absolute results of individuals with OCD, with and without pre-pandemic contamination symptoms, adjusted for pre-pandemic Y-BOCS scores. This adjustment mitigated the pre-existing differences among the groups. Still, patients with pre-pandemic contamination symptoms consistently scored significantly higher on all measures across all assessment points compared to patients without pre-pandemic contamination symptoms, regardless of pre-existing OCD severity.

3.4. Differences in symptom fluctuations between patients with and without contamination symptoms and healthy controls

Fig. 3 presents changes over time relative to the baseline assessment conducted in April 2020.

There were no substantial differences between the trajectories of fear of COVID-19 and 'being hesitant to touch things' among the three groups. However, patients without pre-pandemic contamination symptoms showed, relatively to their baseline scores, a decrease of anxiety and depressive symptoms whereas patients with pre-pandemic contamination symptoms did not. Patients with pre-COVID-19 contamination symptoms showed the highest scores relatively to baseline on the items 'washing hands' and 'washing myself'. Throughout the pandemic, their scores on the item 'washing myself' remained elevated compared to baseline, while in the other groups, these symptoms either remained stable or decreased over time.

4. Discussion

Considering the COVID-19 pandemic as a large naturalistic 'symptom provocation experiment', this study explored the impact of the pandemic on the mental health of persons with OCD compared to

Table 1
Characteristics of the participants.

	Total Sample	OCD sample	Healthy controls	
		Total OCD sample	Contamination symptoms	No contamination symptoms
	mean, (SD)	mean, (SD), %	mean, (SD), %	mean, (SD), %
	n = 511	n = 138	n = 102	n = 36
Pre-COVID characteristics				
Adjusted age (years)	55.7 (14.2)	48.7 (10.4)	48.0 (10.5)	50.4 (10.0)
Gender (woman) (%)	56	58	66	36
Education (%)				
- Basic	2	3	3	3
- Intermediate	49	54	59	39
- High	49	44	38	58
Pre-COVID clinical characteristics				
Y-BOCS score range (0–40)	n/a	15.5 (9.8)	17.3 (9.8)	10.5 (8.0)
Y-BOCS severity categories				
- Subclinical 0-7		24	39	19
- Mild 8-15		26	39	22
- Moderate 16-23		25	8	31
- Severe 24-31		19	14	21
- Extreme 31-40		6	0	8
Mean number of waves	7.8	7.4	7.4	7.5
Median participated range (1-16)	7	6	5	6.5
	IQR = 3-13	IQR = 2-13	IQR = 2-13	IQR = 2-12
				8
				IQR = 3-15

IQR = Interquartile Range.

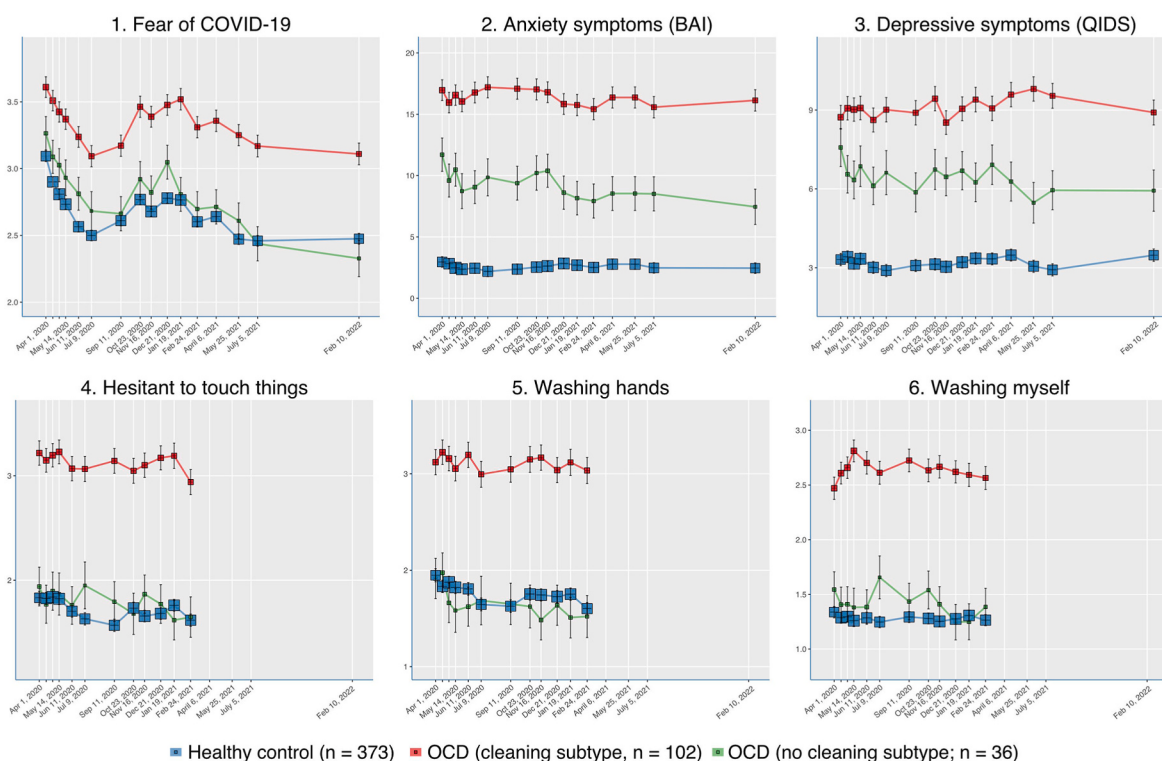


Fig. 2. Absolute values.

healthy controls. We found that among all participants fear of COVID-19, but also to a lesser extent contamination symptoms seemed to fluctuate in response to mortality rates and restrictions due to the pandemic. Persons with OCD with pre-pandemic contamination symptoms exhibited on average much more fear of COVID-19 and more contamination symptoms over the first two years of the pandemic than healthy controls and persons with OCD without pre-pandemic contamination symptoms. Patients without pre-pandemic contamination symptoms experienced levels of fear of COVID-19 and contamination symptoms that were largely similar to those observed in healthy controls. Healthy controls did experience some degree of fear of COVID-19 and contamination symptoms, but these were notably less severe than in persons with OCD with pre-pandemic contamination symptoms.

We only assessed contamination symptoms, we did not assess the severity of other OCD symptoms during the COVID-19 waves, our finding that patients with pre-pandemic contamination symptoms displayed significantly more fear of COVID-19 and contamination symptoms appears consistent with other studies indicating that pre-COVID-19 contamination symptoms were significantly associated with a higher increase in OCD symptom severity during the pandemic (Alonso et al., 2021; Davide et al., 2020; Guzik et al., 2021; Wilkerson and., 2024). Patients without pre-pandemic contamination symptoms did not exhibit more contamination symptoms and fear of COVID-19 than healthy controls, suggesting that based on the mean score of this group, it is unlikely that a significant percentage of persons with OCD without pre-pandemic contamination symptoms developed contamination symptoms during the pandemic.

There are many population studies showing that individuals without per-pandemic OCD have developed OCD-like symptoms and, when measured with the Y-BOCS and the OCI-R, have met the diagnostic criteria for OCD (Alhujaili et al., 2021; AlHusseini et al., 2021; Munk et al., 2020). While healthy individuals may develop OCD-like symptoms, our study identified significant differences in the severity of contamination symptoms and fear of COVID-19 between healthy controls and those with OCD exhibiting pre-pandemic contamination

symptoms. This suggests that, even though other studies have found that healthy controls developed OCD-like symptoms, these symptoms were possibly less severe than those observed in individuals with pre-pandemic contamination symptoms of OCD.

Significant differences were observed in anxiety and depressive symptoms among the three groups, with patients having pre-pandemic contamination symptoms scoring the highest and healthy controls scoring the lowest. This may be attributed to pre-existing differences, as OCD is frequently associated with a high current comorbidity of anxiety and depressive disorders (37% anxiety disorders, 18% major depressive disorder, 6% dysthymic disorder) (Hofmeijer-Sevink et al., 2013). To our knowledge, no other longitudinal studies have compared anxiety or depressive symptoms in patients with OCD and healthy controls during the pandemic. Therefore, we cannot currently place our results into the context of previous findings.

We also analyzed the trajectories of symptoms in patients with and without pre-pandemic contamination symptoms, as well as healthy controls. During the second COVID-19 wave starting sept 2020 fear of COVID increased in both patients with OCD and healthy controls. The observed differences in fluctuations relatively to baseline between the groups were minimal. Consequently, we assume that these differences are not clinically significant. Nevertheless, despite the small variations in trajectories, substantial disparities in baseline values resulted in significant differences in absolute values during the pandemic.

Our findings suggest several clinical implications. Our study revealed that during the pandemic, individuals without pre-pandemic contamination symptoms did not exhibit a higher degree of compulsive behavior or fear of COVID-19 when compared to healthy controls. If we consider the pandemic as a form of symptom provocation, our study suggests that persons with OCD without pre-pandemic contamination symptoms did not develop contamination-related symptoms beyond what would be expected in healthy subjects. This implies that, for example, in group therapy, discussing OCD symptoms unrelated to the patient's specific symptom domain is unlikely to provoke additional OCD symptoms, as the response is expected to be similar to that of healthy persons. This

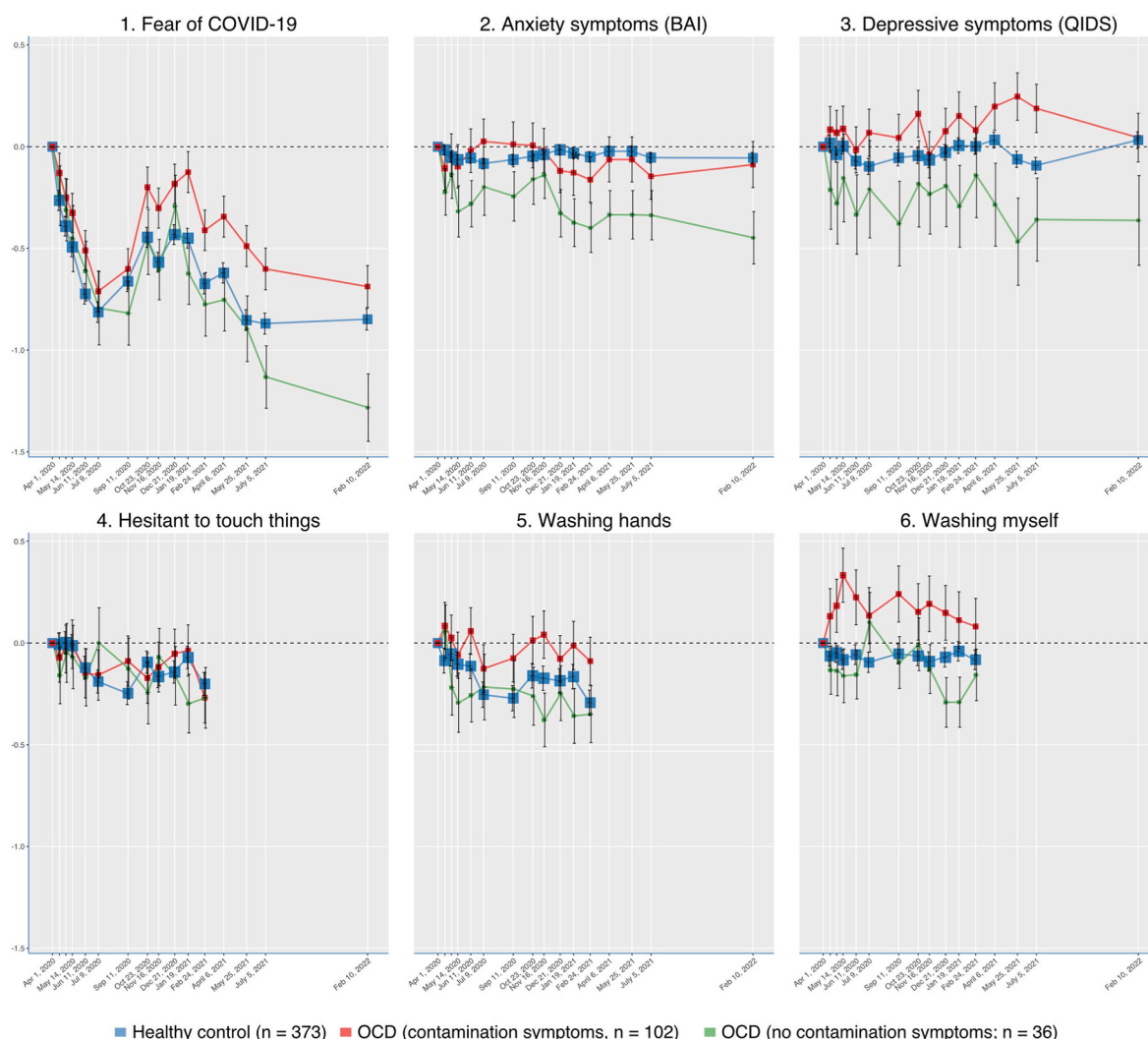


Fig. 3. Relative changes to the baseline assessment April 2020.

also has implications for laboratory settings, such as neuroimaging studies on OCD, where symptoms are provoked. It is advisable to use triggers closely related to the specific topic of OCD. Participants without pre-pandemic contamination symptoms did not exhibit a greater fear of COVID-19 during the pandemic than healthy controls, suggesting that individuals with OCD do not experience more stress than health include controls when the source of stress is unrelated to their specific OCD symptoms.

Early in the pandemic, Aardema (2020) wrote that the effects of the pandemic could be stronger in some persons with OCD than in others. This study underscores this selectivity of the pandemic's effects among persons with OCD. In this study, we compared subgroups of persons with OCD based on pre-pandemic contamination obsessions and compulsions. Fears and obsessions in OCD are usually highly selective. For example, one could have contamination obsessions about HIV but not about Hepatitis B, despite both being viruses with similar modes of transmission. Additionally, persons with pre-pandemic contamination symptoms could have a wide range of obsessions, such as those related to asbestos, chemicals, disinfectants, radiation, germs, parasites, etc. Therefore, it is possible that there could be within-group differences among persons with pre-pandemic contamination symptoms, with some developing substantially more COVID-19-related symptoms than others. Feared self-perceptions seem to make individuals vulnerable to developing contamination symptoms (Audet et al., 2023). In future studies, it is important to examine not only symptom categories but also within-

group effects and underlying mechanisms, such as feared self-perceptions, that could make individuals vulnerable to developing contamination symptoms.

4.1. Strengths and limitations

The strength of this study lies in the frequent assessments over a substantial period, including measures not only of contamination symptoms but also fear of COVID-19, anxiety, and depression. Additionally we not only compared persons with OCD with and without pre-pandemic contamination symptoms, but we also compared them with healthy controls. To our knowledge, there are no other studies that have measured different symptoms as frequently over such an extended period during the pandemic and compared healthy controls with persons with OCD with and without pre-pandemic contamination symptoms.

This study has some limitations. First, pre-COVID contamination symptoms were rated between 2010 and 2015, and although existing literature suggests that symptom switches across dimensions are relatively rare (Fernandez de la Cruz et al., 2013; Fullana et al., 2007; Mataix-Cols et al., 2002) there could have been symptom changes during the period from 2010 to 2023.

Second, throughout the pandemic, our evaluation specifically focused on contamination symptoms, and unfortunately, we do not have information about changes in the severity of other OCD symptoms, such

as for example checking compulsions or aggressive obsessions. Although it is plausible that the severity of other OCD symptoms may have changed during the pandemic, it is important to highlight that persons with OCD without pre-pandemic contamination symptoms experienced a reduction in anxiety and depressive symptoms. This finding is particularly noteworthy because depressive symptoms typically arise in response to distress and functional impairment associated with OCD (Bartz & Hollander, 2006). Consequently, this suggests that other OCD symptoms did not intensify during the pandemic in persons without pre-pandemic contamination symptoms. One study describing the impact of the pandemic on OCD symptom dimensions reported an increase in symptoms across multiple dimensions (Khosravani et al., 2021). This study did not study the impact of pre-pandemic contamination symptoms on the increases across multiple dimensions. There is a possibility that mainly in persons with pre-pandemic contamination symptoms other OCD symptoms increased.

Third, there was attrition between those who gave permission to be contacted for further research activities and those who participated. The persons in this study were older than those who did not participate. However, even without attrition, the age of our sample would still be considered that of relatively older adults. It is possible that the pandemic had a different effect on different ages.

Fourth, persons included in the study did not participate in all measurements. It is possible that there was selective dropout for measures for example, at the moment their symptoms were more or less severe.

5. Conclusions

COVID-19 can be viewed as a distinct stressor that is likely responsible for generating fear of COVID-19 and contamination symptoms, especially in patients with pre-pandemic contamination symptoms. Persons without pre-pandemic contamination symptoms and healthy controls both exhibited fear of COVID-19 and contamination symptoms, although their scores were notably lower than those of patients with pre-pandemic contamination symptoms. These findings suggest that individuals with OCD who lacked pre-pandemic contamination symptoms were not more susceptible than healthy controls to manifest OCD-like behaviors and experience fear of COVID-19 in response to the pandemic.

6. Statement

During the preparation of this work the first author used ChatGPT 3.5 in order to improve English spelling and grammar. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Funding statements

COVID online data collection and analyses were partly funded by a 'fast track grant' from the Dutch Research Council (grant no 440.20.009) and by the RESPOND project which has received funding from the European Union's Horizon 2020 research and innovation programme Societal Challenges under grant agreement No 101016127. The infrastructure for the NESDA study is funded through the Geestkracht programme of the Netherlands Organisation for Health Research and Development (grant no 10-000-1002) and financial contributions by participating universities and mental health-care organisations (VU University Medical Center, Geestelijke Gezondheidszorg (GGZ) inGeest, Leiden University Medical Center, Leiden University, GGZ Rivierduinen, University Medical Center Groningen, University of Groningen, Lentis, GGZ Friesland, GGZ Drenthe, Rob Giel Onderzoekscentrum). The infrastructure for the NESDO study is funded through the Fonds NutsOhra (project 0701-065), Stichting tot Steun VCVGZ, NARSAD The Brain and Behavior Research Fund (grant id 41080), and by participating universities and mental health-care organisations (VU University

Medical Center, Leiden University Medical Center, University Medical Center Groningen, University Medical Center St Radboud, GGZ inGeest, GGNet, GGZ Nijmegen, GGZ Rivierduinen, Lentis, and Parnassia). The infrastructure for the NOCDA study is funded by participating universities and mental health-care organisations (Academic Department VU Medical Center, GGZ inGeest, Innova Research Center, Mental Health Care Institute GGZ Centraal, Marina de Wolf Anxiety Research Center, Center for Anxiety Disorders Overwaal, Dimence, GGZ Overijssel, Department of Psychiatry at Leiden University Medical Center, Vincent van Gogh Institute Mental Health Care Center, Academic Anxiety Center, PsyQ Maastricht University, Division Mental Health and Neuroscience, and Stichting tot Steun VCVGZ).

CRedit authorship contribution statement

Johanna A.M. du Mortier: Writing – original draft, Methodology, Conceptualization. **Erik J. Giltay:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Formal analysis. **Almar A.L. Kok:** Writing – review & editing, Conceptualization. **Patricia van Oppen:** Writing – review & editing, Project administration, Funding acquisition, Data curation, Conceptualization. **Merijn Eikelenboom:** Writing – review & editing, Project administration, Data curation. **Didi Rhebergen:** Writing – review & editing, Funding acquisition. **Richard C. Oude Voshaar:** Writing – review & editing, Funding acquisition. **Anton J.L.M. van Balkom:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Henny A.D. Visser:** Writing – review & editing, Supervision, Methodology.

Declaration of competing interest

Given their role as an Editorial Board Member, Prof. P. van Oppen had no involvement in the peer-review of this article and had no access to information regarding its peer-review.

Data availability

Requests to access the datasets should be directed to the authors and the datasets will be made available after a data analysis plan is approved and a data sharing form is filled out.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jocrd.2024.100889>.

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