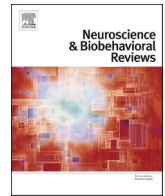




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Review article

## Obsessive-compulsive symptoms and the Covid-19 pandemic: A rapid scoping review

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### ABSTRACT

**Background:** There has been much speculation about untoward effects of the Covid-19 pandemic on psychological symptoms. OCD may be expected to be especially impacted. Our aim was to distil the current evidence base on relationships between the pandemic and obsessive-compulsive symptoms, in patients, and general population samples.

**Methods:** We conducted a rapid scoping review, in the form of a systematic literature search, coupled with narrative review. 32 relevant papers were identified.

**Results and interpretation:** (1) A sizable proportion of people with OCD (but not all) experienced/reported symptom worsening during the pandemic, especially during initial restrictions (approximately 20–65 % of cases in longitudinal studies); (2) contamination/washing symptoms appeared particularly susceptible; and (3) OCD symptoms in general population samples were associated with trait compulsivity and pandemic-related-stress. The literature was heterogeneous with various methodological issues being commonplace.

**Future directions:** The review identified important unaddressed issues: how should exposure based therapy be adapted during pandemics? How can we minimise harm from exacerbation of OCD in vulnerable individuals arising from public health messaging? Why do some but not all OCD patients experience worsening? And does Covid-19 infection affect (or lead to) OCD symptoms?

### 1. Introduction

The Covid-19 pandemic has led to profound changes in the way we live. This has included restrictions on movements and a pervasive media focus on potential adverse consequences of the pandemic on health. Consequently, many organisations, clinicians, and research groups have raised concerns about possible untoward effects of the pandemic (including restrictions) on people who have mental health problems (Holmes et al., 2020). Concerns have also been raised about potentially increased rates of emerging disorders, in those with pre-existing vulnerabilities (Holmes et al., 2020). Data from previous international crises (e.g. Blitz attacks during the 1939–1945 war) and other forms of traumatic experience (e.g. childhood trauma) indicate that some

individuals exhibit resilience to untoward mental health effects of a stressor (or set of stressors), whereas other groups are likely to be more vulnerable (Ioannidis et al., 2020; Jones, 2021). Also, it should not be assumed that all mental disorders have been impacted by the pandemic to the same extent or in the same ways. Impact on people with mental health disorders is likely to result from environmental (e.g. stress or other socioeconomic) factors of the pandemic as well as potentially direct ‘biological’ effects of the virus itself or via parainfectious mechanisms (e.g. inflammatory or other immune processes).

At the level of mental disorders, there is *a priori* reason to expect that at least a sizable proportion of people with Obsessive-Compulsive Disorder (OCD) would experience a worsening of their symptoms due to the pandemic; and indeed that patients with this disorder may be

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**Table 1**  
 Characteristics of longitudinal studies examining OCD and the pandemic, in patients with OCD (n = 9).

Authors	Location of study	Sample size	Nature of sample	Age range of sample	Measure(s) used to assess OCD severity/ obsessive-compulsive symptoms	Time points compared in the study	Principal findings	Additional comments
(Khosravani et al., 2021)	Iran	270 patients with OCD	Outpatient clinical sample	Adults, 17–67 years	Dimensional Obsessive-Compulsive Scale (DOCS), Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	<b>Pre-pandemic</b> (exact dates not specified) and <b>during pandemic</b> (May–July 2020)	Significantly increased OCD symptom severity during the pandemic.	–
(Davide et al., 2020)	Italy	30 patients with OCD	Outpatient clinical sample	Adults, 20–73 years	Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	<b>Pre-pandemic</b> (within the 6 months preceding) and <b>during pandemic</b> (April 2020)	Significantly increased Y-BOCS obsessions, compulsions, and total score during the pandemic.	–
(Pan et al., 2021)	The Netherlands	285 patients with OCD	Outpatient clinical sample	Adults, 18–65 years	No specific OCD severity scale used (Beck Anxiety Inventory [BAI] and De Jong Gierveld Loneliness Scale [DJGLS] used in OCD cohort)	<b>Pre-pandemic</b> (average of measures taken between 2006 and 2016) and <b>during pandemic</b> (April to May 2020)	No significant increase in loneliness or general anxiety symptoms in OCD reported (data from subset n~120 cases)	–
(Matsunaga et al., 2020)	Japan	60 patients with OCD	Outpatient clinical sample	Adults	Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	<b>Pre-pandemic</b> (before December 2019) and <b>during pandemic</b> (April–May 2020)	Minimal mean increases in OCD symptoms severity during the pandemic (5.5–5.7 in fully remitted patients and 12.2–13 in partly remitted patients). 6/60 subjects showed increased severity (total Y-BOCS score increase by >3).	–
(Sharma et al., 2021)	India	240 patients with OCD	Outpatient clinical sample	Adults	Yale-Brown Obsessive Compulsive Scale (Y-BOCS), Clinical Global Impression-Severity/-Improvement scales (CGI-S and CGI-I)	<b>Pre-pandemic</b> (October 2019–February 2020) and <b>during pandemic</b> (April–May 2020)	Pandemic cohort showed no significant difference in OCD symptom severity or in relapse rate to a historical cohort (followed up from 2018–2019).	–
(Schwartz-Lifshitz et al., 2021)	Israel	29 patients with OCD	Outpatient clinical sample	Children and adolescents, 8.2–18.9 years	Clinical Global Impression-Severity/-Improvement scales (CGI-S and CGI-I), Obsessive Compulsive Inventory- child version (OCI-CV)	<b>Pre-pandemic</b> (April 2019–March 2020) and <b>during pandemic</b> (April–May 2020)	No significant increase in OCD symptoms severity during the pandemic. Significant increase in general functioning score during the pandemic.	–
(Tanir et al., 2020)	Turkey	61 patients with OCD	Outpatient clinical sample	Children, 6–18 years	Clinical Global Impression-Severity Scale (CGI-S), Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS)	<b>Pre-pandemic</b> (September 2019–March 2020) and <b>during pandemic</b> (April 2020)	OCD symptom severity increased in 54.1 % of patients during the pandemic. Significant increases in contamination obsessions and cleaning/washing compulsions were noted.	–
(Carmi et al., 2021)	Israel	113 patients with OCD at 2-month follow up; 90 patients at 6-month follow-up.	Outpatient clinical sample	Adults	Adapted Clinical Global Impression-Improvement (CGI-I)	2 separate samples taken <b>during the pandemic</b> (April–May 2020 and September 2020)	Low rates of symptom exacerbation reported using cross-sectional data (84 % reported no exacerbation at 2-month follow-up; 96 % reported no exacerbation at 6-month follow-up).	No pre-pandemic baseline data
(Alonso et al., 2021)	Spain	127 patients with OCD	Outpatient clinical sample	Adults	Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	<b>Pre-pandemic</b> (December 2019–March 2020) and <b>during</b>	65.3 % of patients reported symptom worsening; 31.4 % had worsening >25 %; as	Very high sample retention

(continued on next page)

**Table 1** (continued)

Authors	Location of study	Sample size	Nature of sample	Age range of sample	Measure(s) used to assess OCD severity/ obsessive-compulsive symptoms	Time points compared in the study	Principal findings	Additional comments
						<b>pandemic</b> (April–May 2020)	compared to previous data. Baseline measures predicted symptom worsening: higher OCD and depression severity, presence of washing/ checking symptoms, lower perceived social support.	

**Table 2**

Characteristics of longitudinal studies examining OCD and the pandemic, in general population samples (n = 5).

Authors	Location of study	Sample size	Nature of sample	Age range of sample	Measure(s) used to assess OCD severity/obsessive-compulsive symptoms	Time points compared in the study	Principal findings	Additional comments
(Meda et al., 2021)	Italy	358	Healthy volunteers, university students	Adults, 18–30 years	Obsessive-Compulsive Inventory- Revised (OCI-R)	<b>Pre-pandemic</b> (October–December 2019), <b>during national lockdown</b> (April 2020) and <b>post-lockdown</b> (May–June 2020)	No significant increase in obsessive-compulsive symptoms seen during lockdown, though lifting of lockdown was associated with reduced symptoms. Mean Y-BOCS score decreased significantly over time, from 7.9 (survey 1) to 4.7 (survey 2) and 4.3 (survey 3). Intensity of COVID fears was associated with high Y-BOCS scores.	Depressive symptoms increased during the lockdown.
(Ji et al., 2020)	China	4006	Healthy volunteers, university students	Adults, 17–50 years	Yale-Brown Obsessive Compulsive Scale (Y-BOCS)	3 separate samples taken <b>during the pandemic</b> (February, March and April 2020 respectively)	Significantly reduced contact behaviour for OCD (RR: 0.69) after introduction of lockdown. This had not returned to pre-lockdown levels by the end of the study in July 2020.	–
(Mansfield et al., 2021)	United Kingdom	>9 million	Electronic health records from primary care	Aged 11 years and older	OCD severity not measured. (Number of primary care contacts for OCD were measured)	<b>Pre-pandemic</b> (January 2017– July 2020) and <b>during pandemic</b> (March–July 2020)	Significant increase in OCI-R obsessive-compulsive washing symptoms over the study period.	Similar changes seen in depression and anxiety.
(Knowles and Olatunji, 2021)	United States	108	Healthy volunteers, university students	Adults, 18–22 years	Padua Inventory-Contamination, Obsessions and Washing Compulsions Subscale and Obsessive-Compulsive Inventory-Revised (OCI-R)	<b>Pre-pandemic</b> (January 2020) vs. <b>early pandemic</b> (February–March 2020)	OC symptoms related to Covid-19 related anxiety and behaviours	–
(Meşterelu et al., 2021)	Romania	159 (56 at second assessment)	Unspecified, recruited via social media	Adults, 18–80 years	Obsessive-Compulsive Inventory (OCI)	2 separate samples <b>during the pandemic</b> (March–April 2020 and November–December 2020 respectively)		–

particularly vulnerable (Fineberg et al., 2020b; Fontenelle and Miguel, 2020). Specifically, the hallmark symptoms of OCD involve unwanted intrusive thoughts (obsessions); and/or repetitive habitual acts undertaken in a ritualistic fashion or in response to obsessions (American Psychiatric Association, 2013). While OCD is heterogeneous, its symptoms can be distilled into a relatively small set of common, replicable ‘symptom domains’ that exhibit relative stability over time: contamination/cleaning and obsessions/checking are two common types of symptomatology (Mataix-Cols et al., 2005). These domains are directly relevant to the pandemic, both in terms of Covid-19 being a virus-spread disease, and because of the high numbers of (population appropriate) health messages about washing hands, being careful with hygiene, and minimising contact with others to reduce risk of contamination. Such legitimate concerns may exacerbate OCD symptoms for some patients

(Fontenelle and Miguel, 2020). In addition, there have been reports of high levels of depression during the pandemic (Nochaiwong et al., 2021). OCD and depression are frequently found in the same individual and it may be predicted that depression per se could have a worsening effect on OCD symptomatology. As well as considering how the pandemic may have impacted OCD at the level of disorder, it is also highly relevant to consider subclinical symptoms at the level of the general population. It is also possible that direct neuropsychiatric effects of Covid-19 could contribute to symptoms in some individuals. For example, immune and infective processes have been implicated in some cases of OCD, if we consider historical cases of encephalitis lethargica; or paediatric autoimmune neuropsychiatric disorder associated with streptococcal infections (Swedo and Grant, 2005; Lutters et al., 2018).

There have already been a few recent reviews of the effects of Covid-

**Table 3**

Characteristics of cross-sectional studies examining OCD and the pandemic, in OCD patients (n = 10).

Authors	Location of study	Sample size	Nature of sample	Age range of sample	Measure(s) used to assess OCD severity/ obsessive-compulsive symptoms	Time of data collection	Principal findings	Additional comments
(Nissen et al., 2020)	Denmark	102 patients with OCD	Outpatient clinical sample, recruited from a clinic (n = 65) or survey (n = 37)	Children and adolescents, age 7–21 years	Questions adapted from Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS)	April-May 2020	Over both samples, 54.9 % of patients reported increased OCD severity during the pandemic (26.5 % reported no change and 18.6 % reported improved symptoms).	–
(Jelinek et al., 2021)	Germany	394 patients with OCD	Outpatient clinical sample	Adults, 18–80 years	Obsessive-Compulsive Inventory-Revised (OCI-R)	March-May 2020	Most patients (71.8 %) reported an increase in OCD severity during the pandemic.	–
(Højgaard et al., 2021)	Denmark	201 patients with OCD	Outpatient clinical sample	Adults	Questions adapted from Yale-Brown Obsessive-Compulsive Scale (Y-BOCS)	April 2020	Most patients (61.2 %) reported an increase in OCD severity during the pandemic.	–
(Benatti et al., 2020)	Italy	123 patients with OCD	Outpatient clinical sample, recruited from 3 tertiary clinics	Age range not stated	Not stated	Not stated	35.8 % of patients reported worsening of symptoms during the pandemic, which was associated with developed of new obsessions and compulsions	–
(Chakraborty and Karmakar, 2020)	India	84 patients with OCD	Outpatient clinical sample	Age range not stated	Yale-Brown Obsessive-Compulsive Scale (Y-BOCS)	April-May 2020	12 % of patients had a >5% worsening of OCD severity on the Y-BOCS.	–
(Kaveladze et al., 2021)	United States	196 patients with OCD	Outpatient sample, patient recruited from 3 anonymous OCD online peer support communities	Age range not stated, (mean age 24.8 years)	Questions adapted from Dimensional Obsessive-Compulsive Scale (DOCS)	June-August 2020	92.9 % of responders reported a worsening of OCD symptoms during the pandemic.	Some participants were self-diagnosed with OCD
(Tundo et al., 2021)	Italy	29 patients with OCD	Outpatient clinical sample	Adults, ≥18 years	Yale-Brown Obsessive-Compulsive Scale (Y-BOCS)	March-June 2020	13.8 % of OCD patients reported worsening symptoms, higher than the other psychiatric illnesses included in the study.	–
(Storch et al., 2021)	US-based, international recruitment	137 patients with OCD	Outpatient clinical sample, all currently receiving exposure and response prevention treatment (ERP)	4–77 years	Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), National Institute for Mental Health- Global Obsessive-Compulsive Scale (NIMH-GOCS)	July-August 2020	Despite receiving ERP, 38.1 % of patients had worsening OCD symptoms and 47 % had unchanged symptom severity.	–
(Wheaton et al., 2021b)	US-based, international recruitment	252 patients with OCD	Outpatient sample, recruited for OCD support websites and web forums	Age range not stated, (mean age 32.2 years)	Dimensional Obsessive-Compulsive Scale (DOCS)	Jan-Dec 2020	Most OCD patients (76.2 %) reported worsening of symptoms during the pandemic.	–
(Cost et al., 2021)	Canada	347 patients in total (an unspecified subset of these had OCD)	Outpatient sample, recruited from 4 study cohorts	Children and adolescents, 2–18 years	International CRISIS questionnaire	April-June 2020	Worsening in obsessions/ compulsions was reported in 20–23% of responders (only a subset of these responders had OCD).	–

19 on OCD. Two recent review papers had a much narrower scope than the current study (e.g., Zaccari et al., 2021 considered only clinical samples and Liu et al., 2021 reviewed a much smaller number of papers). The third recent review (Guzick et al., 2021) had a different emphasis from the current study. Our current study proposes to highlight the large

scale data focusing on OCD patients and their relationship to usual sources of mental health care during the pandemic, the role of trait compulsivity, what constitutes clinically significant deterioration in OCD, the public health importance of considering the impact of public health messaging on people with OCD, and key areas of focus for future

work. Therefore, the aim of this scoping review is to distil the evidence-base in terms of relationships between OCD and the Covid-19 pandemic, and – in contrast to previous literature – to amplify key issues that may help inform policy makers, guide service-provision, and enhance clinical decision-making.

## 2. Methods

We used a two-step approach to evaluate the evidence base relating the pandemic to OCD symptoms. First, we conducted a systematic review on PubMed in June 2021 (PubMed covers literature from 1966 onwards). Second, having identified relevant papers, these were described in a narrative review focusing on the most salient findings capable of addressing the study aim.

A soft literature search was conducted using PubMed on 19/June/2021, using the terms: (OCD OR compulsive OR obsessive-compulsive) AND (Covid OR Covid-19). We refer to the literature search as a ‘soft search’ as although it used a pre-specified search string, it was not designed to be exhaustive, nor did it involve pre-registration. Rather, it was designed to enable rapid scoping of the available literature. Papers were included if they examined OCD symptoms in OCD patients or general population samples during the pandemic, and either addressed

cross-sectional relationships within the pandemic or longitudinal changes in symptoms, or provided useful information about clinical presentations of OCD patients in relation to the pandemic. We also included papers if they examined direct effects of Covid-19 infection on OCD symptoms (new symptoms, or worsening of existing illness).

## 3. Search results

The initial search yielded 231 results. On reading abstracts, 92 were excluded as not being relevant. From the remaining 139 papers, the following were excluded after inspection of written content, for the specified reasons: 62 were deemed not relevant (e.g. OC symptoms were not a main focus of the paper, involved out-of-scope samples, or the paper could not directly address the current study aim), 13 did not quantify OCD reasonably appropriately (e.g. use of measures not specific or validated for OCD), 1 was purely descriptive, 21 were found to be review papers/editorials/letters, 10 did not provide significant insights, and 3 were excluded due to having very small samples (<10 subjects). Three additional directly relevant ‘in press’ papers were identified. This resulted in a total of 32 papers of particular interest, which are presented in Tables 1–4 below, categorised by methodological approach and focus.

**Table 4**  
Characteristics of cross-sectional studies examining OCD and the pandemic, in general population samples (n = 8).

Authors	Location of study	Sample size	Nature of sample	Age range of sample	Measure(s) used to assess OCD severity/obsessive-compulsive symptoms	Time of data collection	Principal findings	Additional comments
(Fontenelle et al., 2021)	United States	829	Non-clinical sample, online recruitment	Adults, ≥18 years	Dimensional Obsessive-Compulsive Scale (DOCS), Vancouver Obsessional Compulsive Inventory- Mental Contamination (VOCI-MC)	July 2020	Responders reported worsening of obsessive-compulsive symptoms during the pandemic (median DOCS score increased from 6 [pre-pandemic] to 16).	–
(Seçer and Ulaş, 2020)	Turkey	598	Non-clinical sample, students	Adolescents, 14–18 years	Obsessive Compulsive Inventory- Child Version	Not stated	Fear of COVID-19 was shown to directly predict severity of obsessive-compulsive symptoms.	–
(Robillard et al., 2020)	Canada	6040 (OCD symptoms measured in 4920)	Non-clinical sample, recruited via websites, social media, and hospitals	Adults and children ≥12 years	Dimensional Obsessive-Compulsive Scale (DOCS)	April-May 2020	Mean DOCS score was 6.1 during the pandemic in this cohort. Severity of obsessive-compulsive symptoms were associated with perceived stress related to the pandemic.	–
(AlHusseini et al., 2021)	Saudi Arabia	2186	Non-clinical sample, online recruitment	Adults, ≥18 years	Obsessive-Compulsive Inventory-Revised (OCI-R)	Not stated	62.4 % of responders had an OCI-R score ≥21, suggestive of a diagnosis of OCD.	–
(Albertella et al., 2021)	Australia	878	Non-clinical sample, online recruitment	Adults, ≥18 years	Obsessive-Compulsive Inventory-Revised (OCI-R)	May-June 2020	Problematic obsessive-compulsive symptoms increased during the pandemic.	–
(Wheaton et al., 2021a)	United States	738	Non-clinical sample, online recruitment	Adults (mean age 36.9 years)	Dimensional Obsessive-Compulsive Scale (DOCS)	March 2020	Mean DOCS score was 13.73. Concern about COVID-19 was positively correlated with all domains of OCD symptoms (most strongly for contamination/ washing symptoms dimension).	–
(Fernández et al., 2020)	Argentina	4408 (644 in secondary replication study)	Non-clinical sample, online recruitment	Adults, 18–92 years	Brief Symptom Inventory-53 (BSI-53)	April 2020	25.1 % of responders reported elevated symptoms of obsessive-compulsive symptoms during the pandemic.	–
(Samuels et al., 2021)	United States	2117	Non-clinical sample, online recruitment	Adults, 18–89 years	Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS), Obsessive-Compulsive Inventory-Revised (OCI-R)	September 2020	Increases in obsessive-compulsive symptoms were associated with increased performance of COVID-19 related behaviours (e.g. handwashing, use of hand sanitiser, etc.)	–

## 4. Narrative overview

### 4.1. Longitudinal studies in OCD patients

Nine studies were identified that examined symptoms in OCD patients during the pandemic with at least two time points, either using a within-subject design or large scale design in potentially different samples.

In a study of treatment-seeking patients with a primary diagnosis of OCD, conducted in Iran, previously assessed patients were re-contacted during the pandemic (during the first Covid-19 ‘wave’) (Khosravani et al., 2021). A total of 270 patients responded from 764 invited (35.3 %) and who had previously been assessed. Self-report measures of OCD symptoms were collected including the self-report Yale-Brown Obsessive-Compulsive Scale (YBOCS), and Dimensional Obsessive-Compulsive Scale (DOCS). Paired t-tests indicated that total OCD severity scores (including DOCS sub-scores for contamination, responsibility for harm, unacceptable thoughts, and symmetry) significantly increased from pre-pandemic to during the pandemic. To give an example, average total YBOCS went from a mean of 19.6 (SD 9.1) to 28.7 (SD 8.2), indicative of a substantial clinical worsening. These changes were associated, in regression modelling, with another measure quantifying stress response regarding pandemic impact (Khosravani et al., 2021) – suggesting that the changes were related (i.e. a substantial amount of change was related to) to the perceived pandemic stress response.

In OCD outpatients in Italy who had attended clinic in the six-months prior to quarantine, and who were already receiving stable pharmacological treatment, interviews were conducted 6-weeks after the lockdown began (Davide et al., 2020). The 30 OCD patients who participated showed a significant worsening of YBOCS scores from pre-pandemic to during the pandemic – this was significant for YBOCS obsessions, compulsions, and total scores. For example, the mean total YBOCS score changed from average of 16.0 [SD 8.0] to 20.5 [SD 8.5], indicative of some degree of clinical worsening. In multivariate modelling, higher deterioration in symptom severity was significantly associated with pre-quarantine contamination symptoms, living with a relative in the same house during quarantine, and remission status prior to the quarantine. The latter result suggests that OCD patients whose symptoms had previously remitted may have been more susceptible to re-developing clinically marked symptoms during the pandemic.

In a longitudinal study using pooled data from three case-control cohorts in The Netherlands, questionnaire data were collected from 1517 responders around first lockdown, of whom 78 % had a lifetime OCD, anxiety, or depressive disorder (Pan et al., 2021). The study included controls (i.e. those without those disorders) but the group differed from cases on a number of variables e.g. age, gender, and educational level. OCD patients were recruited from mental health-care institutions, and had received historical assessments albeit some years previously. Number and chronicity of disorders were linked to higher self-perceived mental health impact of the pandemic. However, loneliness and anxiety scores did not significantly change from pre-pandemic to during the pandemic in the OCD participants, nor generally in the other diagnostic groups, in statistical modelling (Pan et al., 2021). The anxiety measure was not OCD-specific. Potential changes in OCD symptom severity specifically was not documented using a suitable instrument.

In a Japanese study, 60 patients who had experienced full or partial remission from OCD were recruited, and their symptoms were descriptively compared from pre-pandemic to during the pandemic (Matsunaga et al., 2020). Mean total YBOCS scores changed from 12.2 (SD 2.2) to 13.0 (2.3) in previously partially remitted individuals; and from 5.5 (SD 1.4) to 5.7 (SD 1.5) in the previously fully remitted patients. However, 6 patients were found to have experienced a marked deterioration during the pandemic, and all had notable contamination/washing symptoms, apart from 1 patient who had symmetry / repeating / ordering

symptoms (Matsunaga et al., 2020).

Sharma and colleagues conducted a relatively large study in India with two groups of participants who were mostly receiving stable treatments: 240 OCD patients with a follow-up during the pandemic (conducted approximately two months after the World Health Organization confirmed Covid-19 pandemic status); and 207 historical OCD patients with a follow-up prior to the pandemic (Sharma et al., 2021). The clinical assessments were particularly rigorous, and the two groups were well-matched on demographic and clinical baseline characteristics. Approximately 20 % of each group experienced a relapse of symptoms between initial and follow-up assessment, and this rate did not differ significantly between the groups. Similarly, linear mixed modelling did not find evidence that the pandemic had differentially impacted symptom severity trajectories versus the reference group (Kaveladze et al., 2021).

Schwartz-Lifshitz et al. recruited young people (aged 8–18y) with OCD referred to an outpatient department in Israel in the preceding year (Schwartz-Lifshitz et al., 2021). Follow-up during Covid-19 was conducted using telephone calls, with input from parents when appropriate. Fifty individuals were identified, of whom 29 participated in the study. The authors reported no significant change in symptom severity as measured using CGI Severity and Obsessive-Compulsive Inventory Child Version (OCI-CV) total scores; there was some evidence on CGI Improvement and functioning scales that more participants reported improvement rather than deterioration, when analyses were conducted using a categorical approach (Schwartz-Lifshitz et al., 2021).

In research conducted at an academic psychiatric department in Turkey, young people (aged 6–18 years) were identified from their medical records who had previously been diagnosed with OCD and for whom pre-Covid measures of OCD symptoms were available (Tanir et al., 2020). Sixty-one individuals were included and 29 were excluded (due to lack of the necessary previous measures or other reasons). Participants and/or their parents were interviewed via telephone or online, during the first period of the pandemic. The authors reported that 54.1 % of OCD patients had an increase in symptom severity (Children’s YBOCS [CY-BOCS] and Clinical Global Impression Severity [CGI-S]), 34.4 % reported no change, and 11.4 % reported a decrease in severity. Comparing scores from pre-pandemic to during the pandemic, CY-BOCS obsessions, compulsions, and total scores were all significantly higher during the pandemic. When examining changes in specific OCD symptom domains, contamination obsessions increased significantly, as did cleaning/washing compulsions, but the other OCD symptom domains did not (Tanir et al., 2020). In multivariate modelling, change in CY-BOCS total scores was significantly related to talking/searching in the social environment about Covid-19, being preoccupied with Covid-19, longer duration of OCD diagnosis, and diagnosis of OCD in someone familiar.

In a study from Israel, Carmi et al. (2021) followed 113 OCD patients treated with Exposure and Response Prevention (ERP) and pharmacotherapy for 6 months during the pandemic (Carmi et al., 2021). Individuals were recruited around the first peak of the pandemic, and were evaluated at 2 months and again at 6 months. The majority of patients (84 % at 2 months and 96 % at 6 months) reported that the pandemic had not been associated with worsening of their therapeutic course, based on retrospective recall. Note these figures do not relate to longitudinal data but rather retrospective recall on a cross-sectional basis.

Alonso et al. (2021) conducted clinical interviews and ratings (Y-BOCS) in 127 OCD patients contacted during the pandemic in Spain (around first peak) (Alonso et al., 2021). Patients were receiving treatment through a specialist outpatient clinic (including stable medication), and the response rate (i.e. proportion of patients entering the analysis of those contacted) was excellent (127 out of 136). 65.3 % of patients had a worsening of OCD symptoms during the pandemic, with 31.4 % experiencing an increase of >25 % from pre-pandemic Y-BOCS scores. The average change in Y-BOCS across the sample was 2.7 points, and around 7.0 points in those who did report a notable worsening. In

regression modelling, symptom worsening during the pandemic was statistically predicted by the following pre-pandemic measures: presence of contamination/washing symptoms, more severe OCD and depression symptoms, and lower perceived social support (Alonso et al., 2021).

#### 4.2. Longitudinal studies in general population samples

Five studies were identified that examined obsessive-compulsive phenomena (diagnostic label and/or symptoms) in general population samples (i.e. samples not focusing deliberately on a clinical cohort).

At the University of Padua, Italy, students were contacted to take part in 'ECOS' study (Eating, Compulsive, and Obsessive Symptoms in young adults) during the pandemic – they had provided self-report data six months previously, and the new data were collected during and after lockdown (Meda et al., 2021). OCD symptoms were assessed using the Obsessive Compulsive Inventory Revised (OCI-R) in a total of 358 students. The authors reported that OC symptoms (as measured using the OCI-R) were not significantly different between pre-pandemic and during the pandemic, but did reduce significantly after lifting of lockdown; similar results were observed for anxiety symptoms (Meda et al., 2021). In contrast, depression scores did show a significant increase during lockdown.

University students in China participated in a study in three waves: one wave conducted during the winter break at a time of a high quarantine level; a second wave conducted during online teaching with moderate quarantine levels; and a third wave conducted when students continued to learn at home but with quarantine levels being relatively low (Ji et al., 2020). OCD symptoms were quantified using the self-report YBOCS. There were 4006 participants who provided data at all three time points. The average Y-BOCS score at each time point in the sample was 7.9 (SD 5.5), 4.7 (SD 4.9), and 4.3 (SD 4.9) – these were significant changes overall, which appeared attributable to relative reductions in symptoms as the pandemic eased. However, a limitation of the study was the use of Y-BOCS, which is not generally regarded as suitable for measuring OCD symptoms in normative populations.

In a large scale UK-based study using de-identified electronic health records from >9 million people aged 11y and older, Mansfield and colleagues calculated weekly primary care contacts with different conditions (Mansfield et al., 2021). Overall, it was found that primary care contacts from patients dropped markedly during the pandemic restrictions, across different disorders. The odds ratio for presenting with OCD was 0.69 versus pre-pandemic (95 % confidence interval 0.64–0.74): by July 2020, presentations had still not generally returned to pre-Covid levels. These findings may indicate that people with OCD, as with other mental health conditions, experienced a detachment from usual clinical care in the wake of the emerging pandemic. Information about OCD related only to presence of absence of the diagnostic label, rather than gold-standard measures such as relating to symptom types or severity.

At a private US university, undergraduate students were recruited around the time of January 2020, to complete an online survey that included the OCI-R washing subscale, and subsequently around February–March 2020 (in the early stages of the pandemic), to complete a follow-up survey (Knowles and Olatunji, 2021). There were 108 participants, who received study credit for taking part. It was found that OCI-R washing symptoms increased from baseline (mean 1.87 [SD 2.19]) to during the pandemic (mean 2.86 [SD 2.76]), this being significant and of medium effect size.

In a longitudinal study conducted in Romania, with recruitment via social media, 159 people provided baseline data in March–April 2020 (during the pandemic) (Meşterelu et al., 2021). Of these, 59 (35.2 %) provided follow-up data in late 2020. Higher symptoms on the Obsessive-Compulsive Inventory (OCI) predicted statistically significantly worse Covid-19 related anxieties and behaviours.

#### 4.3. Cross-sectional studies in OCD patients

Ten studies were identified that collected cross-sectional data in OCD patients during the pandemic and examined associations with relevant measures. One major inherent limitation is the reliance in most studies on retrospective self-report in terms of assessing changes in OCD symptoms.

Nissen et al. explored the immediate impact of the pandemic in young people with OCD (aged 7–21 years), using a self-report survey (Nissen et al., 2020). This comprised two samples: 64 newly diagnosed young people from a specialist OCD clinic in The Netherlands, and another 37 young people from the Danish OCD association. The authors used adapted questions from the Y-BOCS. In the pooled sample, approximately 65 % were receiving psychotherapy and around 40 % were receiving selective serotonin reuptake inhibitor medication (some were receiving other medication classes). In the clinic group, 44.6 % of patients reported a worsening of OCD during the pandemic (Average 3.2 [SD 1.8] on adapted Y-BOCS). In the other group, 73 % reported a worsening of OCD during the pandemic (Average 4.2 [SD 2.6]).

In a study that recruited through a non-profit organisation (German Society for Obsessive Compulsive Disorders), and psychiatric institutions in Germany, OCD patients completed an online survey during lockdown restrictions (Jelinek et al., 2021). A total of 1905 participants accessed the survey materials and the final sample comprised 394 participants (exclusions were due to multiple reasons, including those who did not report they had a formal OCD diagnosis from an expert). OCD symptoms were quantified using the OCI-R, and changes relating to the pandemic were quantified using a 5-point Likert scale approach. Average severity scores on the OCI-R were in the moderate to severe range in the sample overall. 71.8 % of the sample reported a worsening of OCD symptom severity from pre-pandemic to during the pandemic, which related statistically to reduced mobility and increased interpersonal conflict. 6.5 % of the sample reported a decrease in symptoms, and 21.7 % reported no change. There were correlations between change in symptoms on the 5-point scales and OCI-R total scores, but of small effect size by correlation coefficients. Thus, the method used to quantify change in OCD symptoms provided some insight but may not have been ideal.

In a study in Denmark, adult patients with OCD were recruited via the Danish OCD Association, and completed a self-report survey. Lockdown restrictions differed somewhat over the sampling period (Højgaard et al., 2021). The survey was sent to approximately 600 email accounts, and the final sample size comprised 201 participants. Based on adapted Y-BOCS questions, 61.2 % of patients reported worsened OCD symptoms since the pandemic outbreak, 10.4 % reported an improvement, and 28.4 % reported no change. In multivariate modelling (final model), female gender, contamination symptoms, and psychiatric comorbidities were significantly associated with increased OCD worsening during the pandemic, explaining 13.7 % of the variance. Opting to isolate at home also showed a link to symptom worsening, but did not retain statistical significance in the final model.

Benatti and colleagues collected data from tertiary OCD specialist clinics in Italy using interviews conducted by telephone (94 %) or in person (6%) (Benatti et al., 2020). There were a total of 123 outpatients with OCD, and 35.8 % of patients experienced a worsening of symptoms during the pandemic based on clinical interviews. As compared to patients not experiencing clinical worsening, those patients who experienced a worsening had significantly higher rates of new obsessions, increase in new and past compulsions, and increased avoidance behaviours. Those with a clinical worsening also showed more global impairment as evidenced by higher medication adjustments, higher suicidal ideation, more internet checking for reassurance, family accommodation, and sleep disturbances. The groups did not differ significantly in terms of age, gender, other phenotypes, or comorbidity rates (Benatti et al., 2020).

In a study conducted in India (one month after initiation of a



lockdown), 84 OCD patients completed telephone and/or videocall interviews (from 104 meeting eligibility criteria). Patients were screened based on previous contact with clinical services and having obsessions relating to contamination and compulsion related to washing of hands and cleaning household items, who also had good medication adherence and had visited outpatient clinics on-time previously (Chakraborty and Karmakar, 2020). Age was not available. 6% of patients reported an exacerbation of symptoms during the pandemic and those individuals were not taking medication at the time of assessment due to unavailability of medication. When comparing Y-BOCS to previous scores however, 12 % reported at least a 5% worsening, 39.3 % reported a slight worsening (less than 5% increase), and 48.8 % percent reported no change or a decrease in severity. As such, some degree of worsening appeared relatively common based on Y-BOCS but uncommon according to the patients' perspectives and the study authors' interpretation of the data.

An online US survey recruited people via three anonymous online OCD peer support communities and posts on social media pages. The participants were asked to rate to what extent their symptoms in four OCD relevant domains had changed since the pandemic began (Kaveladze et al., 2021), based on questions from the DOCS. The sample of 196 respondents included people who reported being self-diagnosed, suspected they had OCD, or had been professionally diagnosed. 92.9 % of those who took part reported worsening of their symptoms since the pandemic began (large effect size); the changes were less marked for symmetry and completeness symptoms compared to other symptom dimensions.

Tundo et al. recruited a sample of patients with OCD in Italy, via a private clinic for mood and anxiety disorders (Tundo et al., 2021). The sampling frame covered start of a lockdown through to 1.5 months after a lockdown had ended, and most interviews (80 %) were conducted online with the remainder (20 %) being in-person. The study examined not only OCD but also other conditions. There were 29 OCD patients, and they reported a higher rate of symptom worsening due to pandemic stress (13.8 % of OCD patients) as compared to patients with depression (2.9 %). The authors reported that OCD was the only identified predictor of an increased risk of relapse/symptoms worsening.

Storch and colleagues conducted an online survey in which they contacted 595 clinicians who were part of the International OCD Foundation (IOCDF) database, who regularly provide CBT to people with OCD and/or anxiety disorders (of any age) (Storch et al., 2021). Clinicians were asked to recall information regarding OCD patients they had seen; as well as to complete rating scales for patients' symptoms relating to (retrospectively) beginning of treatment and just prior to pandemic; as well as currently (i.e. during the pandemic). Adapted instruments for this purpose included the Y-BOCS and the National Institute of Mental Health-Global Obsessive-Compulsive Scale (NIMH-GOS). 227 individuals opened the survey and began to complete it, of whom 137 provided complete clinical rating scores for at least one patient. Most clinicians provided information about one of their patients, though some provided data on more (maximum five patients from each individual). The clinicians felt that 38 % of their patients had experienced symptom deterioration during the pandemic, 47 % had been unchanged, and 10 % had improved (Storch et al., 2021). The authors reported that OCD symptoms across the whole sample tended to improve from pre-treatment to the point before the pandemic, then these gains levelled off and symptoms worsened for some.

Wheaton et al. recruited presumably largely US individuals self-identifying as having OCD via online sources (n = 252), as well as a community sample of adults recruited via Mechanical Turk (n = 305) (Wheaton et al., 2021b). OCD symptoms were quantified using the DOCS. OCD was defined as those individuals reporting that they had previously received a diagnosis from a healthcare professional. OCD patients and controls differed significantly on a number of demographic variables such as age and gender. OCD individuals had elevated concerns about Covid-19 compared to putative controls; and the majority of

OCD respondents reported worsening after the outbreak albeit most frequently this was a slight worsening rather than substantial worsening. Self-reports indicated that pandemic-related worsening appeared more clearly related to contamination and harm responsibility symptoms than others.

Cost et al. pooled several datasets from Canadian cohorts of young people (aged 2–18y): two clinically-referred mental health / neuro-developmental cohorts and two community cohorts (Cost et al., 2021). This paper is included in the current section as a subset of these participants had OCD and a sizable proportion of the study was in clinical participants. Questionnaire data were collected from parents, as well as from probands where appropriate methodologically. Individuals were asked to rate obsessions/compulsions (and other symptom domains) compared to before the pandemic. 763 young people consented and 347 completed the outcome measures. The actual sample sizes varied considerably depending on the source of given information and nature of the variable considered. Overall, worsening of young people's obsessions/compulsions were reported in around 20–23% of responders, improvements in 3–4 % of responders. Worsening of obsession/compulsions was significantly associated with pre-Covid psychiatric diagnosis, greater economic concerns, and greater stress from social isolation. Note that these findings relate to the pooled sample, rather than comprising analyses specific to OCD patients.

#### 4.4. Cross-sectional studies in general population samples

Eight studies were identified that had examined OCD symptoms (or tendencies) in general population samples cross-sectionally, during the pandemic.

Fontenelle et al. explored correlates of obsessive-compulsive (and related) symptoms and pandemic impact (Fontenelle et al., 2021), in a sample of 829 US-based adults recruited via Amazon Mechanical Turk. OCD measured includes the DOCS, and Vancouver Obsessional Compulsive Inventory – Mental Contamination (VOCI-MC); and other symptoms quantified included: skin picking, hair-pulling, hoarding, body dysmorphic disorder, as well as psychological distress, disability, and quality of life. Trans-diagnostic measures of impulsivity and compulsivity were recorded using the Barratt Impulsivity Scale (BIS) and Cambridge-Chicago Trait Compulsivity Scale (CHI-T) respectively. Scores for all obsessive-compulsive and related symptoms significantly increased between prior to pandemic (based on retrospective recall) and currently (i.e. during the pandemic). Worsening of OCD symptoms was statistically predicted by female gender, more stressful events related to the pandemic, and higher trans-diagnostic compulsivity, as well as worse baseline OCD severity scores.

In Turkey, a sample of 598 young people (aged 14–18y) were enrolled via convenience sampling (Seçer and Ulaş, 2020), with data collection being conducted online. An adaptation of the Obsessive-Compulsive Inventory – Child Version was deployed, along with an emotional reactivity scale, fear of Covid-19, and measures of depression/anxiety, plus experiential avoidance. Structural modelling was used to test various hypotheses. Cross-sectionally, the statistically predictive effect of Covid-19 fear on OCD symptoms was found to relate to a number of potential mechanisms.

An online survey in Canada recruited people aged 12 or older via various sources (including media advertisements): people with chronic mental or physical illnesses, healthcare providers, and the general population (Robillard et al., 2020). OCD symptoms were quantified using the DOCS, though the main focus of the study was not OCD but rather stress occurring during the pandemic. 4920 of 6040 participants provided cross-sectional OCD scores, and the data were collected around the time of peak of the first wave in Canada. In multivariate modelling, higher scores on the DOCS contamination subscale was significantly related to reported worsening of perceived stress during the pandemic, as well as a number of other variables (e.g. presence of mental disorder, personality traits, alcohol consumption).

AlHusseini and colleagues conducted an online survey in Saudi Arabia during lockdowns, using the OCI-R (AlHusseini et al., 2021). There were 2186 respondents and the study was conducted in adults, recruited using social media platforms. The authors reported that older age, being male, being married, higher income groups, and higher levels of education were associated with OCD symptoms (using a binary threshold). The study reported extremely high rates of OCD, which may reflect recruitment bias and/or inappropriate use of probable diagnostic thresholds.

Using a mix of recruitment through the Prolific platform, and social media advertisements, Albertella recruited an online sample comprising complete data from 878 adults aged 18–84 years (Albertella et al., 2021). The study found that self-reported OCD symptoms (using the OCI-R) significantly increased from pre-pandemic to during the pandemic – this was of large effect size. Problematic internet use also was reported to have increased with large effect size, and other repetitive symptoms of small effect sizes. Regression modelling indicated that greater OCD problems during lockdown were associated with younger age, more Covid-related stressful events, more psychological distress, and higher trans-diagnostic compulsivity (Albertella et al., 2021).

In a US Mechanical Turk sample ( $n = 738$ ), Wheaton et al. explored a potential role for ‘intolerance of uncertainty’ in accounting for cross-sectional relationships with perceived Covid-19 threat, OCD, and health anxiety (Wheaton et al., 2021a). OCD was assessed using the DOCS, with these scores appearing somewhat elevated versus reference data, but not as high as would be found in clinical samples (Wheaton et al., 2021a). Data were collected relatively early on in the course of the pandemic outbreak. Significant moderate positive correlations were found between fear of Covid-19 spread and other measures including of OCD symptoms; and regression modelling suggested that intolerance of uncertainty partly statistically accounted for the link between Covid-19 concerns and OCD plus health anxiety symptoms.

Fernandez and colleagues collected cross-sectional data in Argentina during Covid-19 quarantine, in 4408 adult participants, and then in 644 adult participants for a smaller replication study (Fernández et al., 2020). Recruitment methods included through social media and institutional announcements. A variety of data analytic approaches were used but a main focus was on using Latent Class Analysis (LCA) to identify putative ‘psychological distress’ subtypes based on item-level scores on the Brief Symptoms Inventory (BSI) – the latter is a classic scale measuring diverse psychiatric symptoms including those relevant for OCD. This identified three classes, essentially reflecting different levels of overall severity irrespective of specific symptom domain. In follow-up analyses, it was found that Covid-19 related fear and coping skills partially statistically mediated the link between psychological distress (BSI) and other variables such as gender, age, and personality traits (Fernández et al., 2020).

Using the Qualtrics Platform (a method of recruitment from market research panels), a study conducted by Samuels et al. in the USA collected online questionnaire exploring Covid-19 related behaviours (such as hand wiping, or use of sanitisers...) and OCD symptoms (OCI-R and a subset of adapted items from the Dimensional Y-BOCS) in adults (Samuels et al., 2021). For the Dimensional Y-BOCS, participants were asked about their experiences at the earlier stage of the pandemic with lower public recognition of the emerging pandemic, and once it was more developed (i.e. a mix of retrospective recall of OCD experiences and recording of ‘current’ experiences). 2117 individuals took part. Covid-19 related behaviour scores were significantly related to pre-pandemic to current increases in OCD symptoms, as well as with (presumably current) contamination obsessions and contamination phobias. Interestingly, these relationships were significant whether or not a person reported a prior diagnosis of OCD.

## 5. Conclusions, implications, and future directions

Overall, longitudinal studies suggested that a sizable proportion of

people with OCD, both adults and children, experienced an exacerbation of symptoms during the pandemic. Of longitudinal studies in people with OCD reporting absolute changes in severity using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), typical average symptom worsening reported in the studies ranged between 2.7–9.1 points (Davide et al., 2020; Alonso et al., 2021; Khosravani et al., 2021). The reported proportion of people with OCD experiencing worsening ranged from 20.0 %–65.3 % (Tanir et al., 2020; Alonso et al., 2021; Sharma et al., 2021), but one study in young people found little/no evidence for deterioration overall (Schwartz-Lifshitz et al., 2021). In people whose OCD symptoms had remitted prior to the pandemic emerging, one study found that prior remission was statistically associated with higher deterioration (Davide et al., 2020); and another reported relatively small changes (albeit, on average, worsening), noting that contamination/washing symptoms were common in patients who individually did experience symptom exacerbation (Matsunaga et al., 2020). In a particularly high-quality longitudinal study, several pre-pandemic measures were statistically predictive of OCD symptom worsening during the pandemic: worse baseline OCD and depression severities, presence of washing/checking symptoms, and lower perceived social support (Alonso et al., 2021). The average proportion of people with OCD reporting a worsening during the pandemic in cross-sectional data analyses ranged quite considerably, from 4.0 %–92.9 % across studies (Benatti et al., 2020; Chakraborty and Karmakar, 2020; Nissen et al., 2020; Carmi et al., 2021; Cost et al., 2021; Højgaard et al., 2021; Jelinek et al., 2021; Kaveladze et al., 2021; Storch et al., 2021; Tundo et al., 2021). The large range for cross-sectional studies may be due to a variety of factors including different study designs, and quantification methods, and variation in retrospective recall bias.

Clinical studies tended to report the percentage of patients reporting any OCD symptom worsening, or the average numerical or percentage change in symptoms. This is valuable to information, but ideally it would also be useful to determine the percentage/proportion of patients experiencing ‘clinically significant’ deterioration during the pandemic. The literature has largely not done so, likely due to a lack of consensus on what constitutes clinically significant deterioration *per se*. Potential definitions derived from non-pandemic contexts include 25 % or greater deterioration in the total Y-BOCS score (Fineberg et al., 2020a); or a 5-point worsening of Y-BOCS (Hollander et al., 2010). Future work should build consensus around a suitable definition that can then be more consistently applied in OCD research.

What are the likely reasons for the above-reported worsening of OCD symptoms in a sizable proportion of OCD patients during the pandemic? The pandemic in itself can be viewed as a general stressor (or series of stressors) and of course stress can worsen psychiatric symptoms, including through generalised increases in anxiety (which has a partly physiological role of preparing individuals to respond to threats). This is supported by a study that reported symptom changes were linked statistically to pandemic-related stress (Khosravani et al., 2021). However, the pandemic and public health messages (e.g. through the media, governmental guidance/restrictions, or other) has a specific relevance to contamination and checking type OCD symptoms. Fear of contamination and encouragement of related preventative habits may be legitimate public health messages but also, for those who already are impaired by excess concern in these domains, may lead to clinically impairing symptoms being worsened. Large parts of the global population have been urged to take precautions against potential contamination using steps that would be unusual in those cultures during normal circumstances – e.g. decontamination of hands with alcohol (or other chemicals) frequently through the day; washing hands for sustained periods of time; avoiding close proximity to other people and hugging or shaking hands; and/or wearing masks. There was ample evidence in the literature (from both longitudinal and cross-sectional studies) indicating that increases in contamination and washing/checking symptoms in people with OCD were especially evident during the pandemic, as contrasted to other symptom domains (Davide et al., 2020; Matsunaga et al.,

2020; Tanir et al., 2020; Højgaard et al., 2021; Kaveladze et al., 2021; Wheaton et al., 2021b).

A likely mechanism underpinning exacerbation of symptoms in some OCD patients during the pandemic is a reduced access to – as well as changes in the implementation of – therapeutic support and treatments. In the UK, the pandemic in the early stages was associated with a lower likelihood of clinical presentations with OCD to family doctors (Mansfield et al., 2021), suggesting a negative impact on ability of patients to be able to access professional support. Though under-studied, access to psychologists, psychiatrists, and other healthcare professionals will also have been reduced for patients during the pandemic due to shifts in healthcare resourcing/priorities as well as physical changes in services such that many face-to-face appointments were cancelled or deferred (Bakolis et al., 2021).

Another important consideration is that a core feature of first-line evidence-based psychological treatment for OCD is cognitive behavioural therapy with exposure and response prevention (ERP) (Drummond and Fineberg, 2007; Menchon et al., 2016; Reid et al., 2021). Exposure treatment aims to provide periods of contact with a feared situation until anxiety reduces through habituation and teaching the patient that their anxiety can reduce without engaging in compulsions. The individual thus learns to accept that the discomfort induced by the obsessive thoughts will naturally wane if the compulsions are not performed. Performing a compulsion gives short term relief which is usually followed by the desire to engage in more compulsive activity. Whereas many OCD symptoms could safely be tackled with ERP during the pandemic, there has been concern about applying this treatment for the substantial proportion of patients with contamination-related symptoms. ERP treatment for most contamination symptoms involves encouraging the patient to face up in a graded way to their feared contaminant e.g. touching feared items, without performing decontamination compulsions. The compulsions generally take the form of excessive and meticulous washing. During the pandemic the risks of encouraging people to take the risk of touching surfaces touched by others and then not washing excessively, as advocated in ERP treatment, became problematic. Governments emphasised the need for frequent handwashing and this together with the regularly publicised and alarming death rates lead to increased anxiety in vulnerable patients. The risks of exposure had to be weighed against the risks of the OCD itself. Pragmatic recommendations were made by an International Consortium concerning this issue which suggested that most ERP for contamination-related OCD be paused, adapted or only be applied in limited form at specialist centres during the pandemic (Fineberg et al., 2020b). The paper by Fineberg et al. was written shortly after the onset of the pandemic and when there was still considerable global concern about fomite spread of the virus as well as acute fear and the effect of Lockdown in many countries. At this time, the pandemic was predicted to last months and not years. A later paper by Storch and colleagues (Sheu et al., 2020) essentially proposed a similar approach to that recommended by Fineberg et al; i.e. that ERP should be adapted within current public health guidance.

The pandemic has left clinicians and patients uncertain about the extent to which ERP can be continued during the pandemic: on the one hand, OCD can be extremely impairing and distressing and so there is an impetus to continue evidence-based treatment; on the other, some of this treatment runs counter to government messages about exercising caution and avoiding potentially contamination-related situations. Various therapeutic strategies for contamination related OCD including pausing or adapting exposure treatment to meet with safety guidance have been proposed by different groups of expert clinicians, while the potential negative consequences of moving away from standard evidence-based application of exposure therapy have also been highlighted (Fineberg et al., 2020b, Sheu et al., 2020). However, in the literature identified in this paper, it is evident that there is a lack of evidence as to how treatment and clinical services should appropriately adapt during the pandemic and beyond it.

Lastly, in terms what may have contributed to changes in OCD from pre-pandemic to during it, non-specific factors are also likely to have played a role (“unknown unknowns”). For example, findings from one study using serial measurement suggested that relapse rates before the pandemic were similar to during it (Sharma et al., 2021). While it seems unlikely that the pandemic has had no impact on OCD, due to its obvious relevance to common OCD symptoms as well as profound impact on access to services, as well as the bulk of the literature suggesting to the contrary, non-specific factors will of course also have contributed in some cases of exacerbation. Relatedly, it is important to note that the impact of the pandemic is largely treated as a unitary ‘stressor’ whereas of course it comprises a number of different stressors that may differ across individuals. For this reason, it would be valuable for future OCD work to incorporate more widespread use of tools, such as COROTRAS, PanDemic General Impact Scale (PD-GIS-11), and natural language processing analysis of free text, in order to fractionate what specific contextual aspects of the pandemic account for any worsening in OCD symptoms (Fontenelle et al., 2021; Hampshire et al., 2021).

Whether dimensional measures of OC symptoms changed longitudinally in general population samples (i.e. people who for the most part did not have OCD) from pre-pandemic to during the pandemic is unclear: one study reported an increase (Tanir et al., 2020) but another did not (Meda et al., 2021). There was some evidence from two studies for a reduction in OC symptoms during the pandemic from one time point to another, possibly reflecting easing of restrictions (Ji et al., 2020; Meda et al., 2021). It seems logical to assume that changes in dimensional OC measures probably reflect a combination of: increases in rituals related to avoiding contamination that were not pathological, but rather a logical response to the pandemic; AND/OR an increase in actual OCD symptoms in subsets of these samples particularly vulnerable to developing (or already having) clinically significant symptoms. Nonetheless, cross-sectional studies in general population samples (which may include some people with OCD but most people would not have OCD) may provide insights into mechanisms through which the pandemic may have impacted particular aspects of OC-related symptom domains. We found that such studies captured a broader range of measures in some cases than patient work, such as other questionnaires relating to traits and pandemic-related fear/stress. There was evidence from several studies that OC symptoms during the pandemic (and increases in these symptoms), in general population samples, were associated with pandemic-related stress/fear (Robillard et al., 2020; Seçer and Ulaş, 2020; Albertella et al., 2021; Fontenelle et al., 2021), as well as with trait compulsivity (Albertella et al., 2021; Fontenelle et al., 2021).

While the clinical and public health focus should primarily be on addressing any worsening of OCD symptoms during the pandemic, it is noteworthy that a sizable proportion of people did not experience such deterioration – and indeed, some people experienced OCD symptom improvement. Future work should address this variability in pandemic impact on OCD, not only focusing on deterioration. This is important because understanding contextual variables linked to resilience in response to stressors could enable the development on new strategies to prevent deterioration; i.e. it may be possible to better understand why some people are more vulnerable than others, and therefore inform clinical and public health strategies.

Several limitations should be noted in terms of this review. First, this study was not a formal pre-registered systematic review, but rather a pragmatic scoping review; it does not claim to be a comprehensive review of the literature. Nonetheless, we hope this will form a springboard for a future rigorous systematic review. Second, being a narrative review, the paper focused on findings felt to be particularly pertinent. While conducted by experts in the field of OCD and related disorders, some findings may be important but not covered. Lastly, because the pandemic is evolving and literature is expanding rapidly, readers should be mindful that important new findings to help address the focus of this review are likely to emerge subsequently.

There are also limitations related to the literature itself, covered in

this review. Most studies focused on the initial pandemic lockdown and so we do not know if any changes persisted over time. Many studies were cross-sectional in nature. The identified longitudinal studies – while preferable methodologically to address impact on OCD symptoms as compared to cross-sectional designs – often lacked rigorous baseline data. There was also high heterogeneity, including in terms of variability of time points that were examined, geographical settings, sampling approaches, instruments used, and ways of presenting data regarding symptom changes. In terms of time points, negative impacts of the pandemic on other areas of mental health have appeared to lessen with time (Robinson et al., 2021). Another issue is that it is hard to know if clinical deterioration detected in some people with OCD relates to the impact of the pandemic itself, or other reasons; few studies had parallel serial control arms. Also, many individuals with OCD examined in the studies were receiving treatments (pharmacotherapy and/or psychological therapy) but the impact of treatments (and impacts of the pandemic on service provision and deployment of treatments) was not clear. One would expect a higher risk of symptom deterioration in people with OCD not receiving treatment and care during the pandemic, and the pandemic did reduce the likelihood of clinical presentations with OCD to family doctors according to UK data, at least initially (Mansfield et al., 2021). Other limitations in some of the literature include: use of instruments not necessarily extensively validated for the settings in which they were used, lack of control groups and more than 1–2 sampling time frames, not considering the contribution of various comorbidities or differential diagnoses, and/or understandable lack of formal clinical interviews during the pandemic.

Our literature search did not find studies attempting to specifically address whether Covid-19 infection itself could lead to *de novo* OCD symptoms or exacerbation of symptoms in people with OCD unrelated to the more general effects of the pandemic. In a very recent study, diagnostic information and psychiatric symptom measures (including for OCD) were collected from 226 Covid-19 pneumonia survivors (Mazza et al., 2021). Psychiatric symptoms, including OCD (quantified using the OCI) correlated negatively with duration of hospitalization. There was a significant increase in OCD symptoms between 1- and 3-month follow-up, unrelated to gender or psychiatric history, whereas post-traumatic stress disorder symptoms, state anxiety, and insomnia reduced between these time points; and depression did not change between the time points. Historically, infective and/or inflammatory processes have been implicated in some cases of OCD-like symptoms (Swedo, 2002; Lutters et al., 2018). Covid-19 infection commonly leads to loss of taste and/or smell, most likely via disruption of olfactory neuroepithelium but also potentially via olfactory nerve invasion (Whitcroft and Hummel, 2020). It should be noted that mechanisms underpinning neuropsychiatric consequences of Covid-19 remain unclear and under scientific debate (Solomon, 2021). However, the olfactory nerves are extensively connected with the orbitofrontal cortices which are implicated in the pathophysiology of OCD, as well as in vulnerability for OCD (Graybiel and Rauch, 2000; Chamberlain et al., 2005; Chamberlain et al., 2008). As such it would seem crucial to explore potential relationships between Covid-19 infection and emergence of new or exacerbation of OCD symptoms (Pallanti et al., 2020), but we are aware of virtually no data being collected on this topic, and found a poverty of such work in this review. Indeed, a meta-analysis of data on the neurological and psychiatric manifestations of COVID-19 from the first phase of the pandemic found no evidence that studies were appropriately screening for OCD symptoms (Rogers et al., 2021). Validated (including very brief practical) screening tools for OCD do exist, both categorically and dimensionally (Fineberg et al., 2008); as well as tools to quantify broad aspects of impulsivity and compulsivity (Hook et al., 2021). This is of interest given the link between such traits and impact of the pandemic (Albertella et al., 2021; Fontenelle et al., 2021; Hampshire et al., 2021). Yet research tends not to include such measures.

Overall, the key findings from this review are (1) that a sizable

proportion of people with OCD experienced or reported symptom worsening during the pandemic, especially around the time of initial social restrictions (typically approximately 20–65 % of cases in longitudinal studies); (2) contamination/washing symptoms appeared particularly susceptible to worsening; and (3) OCD symptom scores during the pandemic, in general population samples, were associated with perceived stress/fear related to the pandemic, as well as with trait compulsivity. The studies also draw attention to the need for proper research funding to more rigorously address who was most vulnerable to the negative impact of the pandemic and how this might be mitigated during pandemics; how well-intended public health messages might exacerbate OCD for some vulnerable individuals; as well as how evidence-based treatments should be adapted to ensure optimal care for patients. Future work should also consider whether Covid-19 infection itself might contribute to worsening of OCD in some people (or new onset symptoms as part of neuropsychiatric sequelae).

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