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When a nightmare comes true: Change in obsessive-compulsive disorder over the first months of the COVID-19 pandemic

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ABSTRACT

The outbreak of the COVID-19 pandemic has particularly affected people with obsessive-compulsive disorder (OCD). Exacerbation of obsessive-compulsive symptoms (OCS) has been suspected for those with contamination-related OCD (C-OCD). However, the course of OCS over the ongoing pandemic remains unclear. We assessed 268 participants with OCD ($n = 184$ with C-OCD) in an online survey at the beginning of the pandemic in Germany, reassessing 179 participants (66.8%, 104 C-OCD) three months later. We assessed severity of OCD (OCI-R), depression (PHQ-9), experiential avoidance, as well as functional and dysfunctional beliefs. Overall, OCS and depressive symptoms did not substantially change over time. However, when people with and without C-OCD were compared, symptoms improved in patients without C-OCD (nC-OCD) but remained stable in patients with C-OCD over time. Symptom improvement was associated with male gender, higher initial OCI-R, and nC-OCD. Experiential avoidance and beliefs at the beginning of the pandemic did not generally predict change in OCS. People with OCD, particularly those with nC-OCD, showed tentative signs for signs of adapting, whereas distress in those with C-OCD remained at a high level, underlining the burden for these patients. Clinicians should be informed about how to maintain effective treatment for C-OCD during a pandemic.

1. Introduction

1.1. Mental health during the COVID-19 pandemic

On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. Early on, mental health experts predicted negative effects for people with mental disorders in accordance with the diathesis-stress model (Pfefferbaum & North, 2020; Yao, Chen, & Xu, 2020), for example, because of the increase of stressors such as social isolation with a simultaneous decrease in psychiatric care. These predictions have largely been fulfilled, and negative effects on people with mental disorders, such as symptom aggravation and increased risk of a COVID-19 diagnosis, have been reported (Fancourt, Steptoe, & Bu, 2020; Sun, Qin, Basta, Chen, & Li, 2021; Taquet, Luciano, Geddes, & Harrison, 2020). However, the pandemic likely exerts heterogeneous effects. In a Dutch study by Pan et al. (2020) comparing people with and without depression, anxiety, or obsessive-compulsive disorders (OCD), negative effects (emotional reactivity) were smaller in people with a mental disorder compared to those without. Moreover, the group of people with the highest degree of chronicity and severity of their disorder, surprisingly even showed a decrease in symptoms. Results were explained by the change in general routines due to lockdowns (e.g., allowing for a more structured daily routine and less discrepancy with the rest of the world) and regression to the mean. Generally, it is unclear whether negative effects shown early in the pandemic persisted or increase or whether people recovered (and if so to what degree) from their disorder over the course of the pandemic).

OCD is one of the mental disorders that has been focused on since the start of the COVID-19 pandemic (Fineberg et al., 2020; Fontenelle & Miguel, 2020). The disorder is characterized by intrusive thoughts (*obsessions*) and ritualized behaviors (*compulsions*) as well as behavior to avoid triggers for obsessions and compulsions (*avoidance behavior*). The

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interest in OCD during the COVID-19 pandemic stems predominantly from a specific phenotype of OCD, which is primarily characterized by fears about contamination (C-OCD). This subgroup encompasses approximately 56% of the people with OCD (Mataix-Cols et al., 2002). The obsessions of people with C-OCD, who are also known as washers, focus on fear of contaminating themselves or others (e.g., with a serious disease). These obsessions are neutralized by compulsions, particularly cleaning (e.g., washing one's hands or clothes) and avoidance behavior (e.g., wearing gloves, not touching surfaces frequently touched by others, or, in severe cases, not leaving the house at all). Despite clear differences with regard to, for example, time, quantity/excessiveness, rigidity, and experienced distress, there is some overlap with the content of thoughts and recommended hygiene-related behavior of the majority of the general population during the COVID-19 pandemic, for example, disinfecting hands regularly (Knowles & Olatunji, 2021). Hence, at the start of the pandemic, when the duration and the extent of the pandemic was unclear, it was expected that the OCD incidence rate might increase in the general population and that obsessive-compulsive symptoms (OCS) might increase in people with a pre-pandemic manifestation of OCD (Storch, Schneider, Guzick, McKay, & Goodman, 2020).

1.2. Course of obsessive-compulsive disorder during the pandemic

The majority of studies have confirmed that people with OCD showed an increase in symptom severity at the beginning of the pandemic (Benatti et al., 2020; Højgaard, Duholm, Nissen, Jensen, & Thomsen, 2021; Jelinek, Moritz, Miegel, & Voderholzer, 2021; Khosravani, Aardema, Samimi Ardestani, & Sharifi Bastan, 2021; Nissen, Højgaard, & Thomsen, 2020; Prestia et al., 2020; Tanir et al., 2020), however, the evidence is inconclusive (Chakraborty & Karmakar, 2020; Schwartz-Lifshitz et al., 2021). Apart from the aforementioned study by Pan et al. (2020), which assessed patients with OCD and others, studies on the trajectories of OCS in people with OCD over the course of the pandemic are so far lacking. Currently, we must rely upon evidence in nonclinical samples. Jelinek, Göritz, Miegel, Moritz, and Kriston (2021) investigated 1207 participants from the general population between March and June 2020, evaluating OCD trajectories in the general population. In the total (nonclinical) sample, OCS increased over time, but only with a small effect size ($d = 0.15$). Furthermore, 18% of the participants scored above the Obsessive-Compulsive Inventory-Revised (OCI-R) cut-off score (= "clinical" score) at both assessments, and 6% showed a clinical OCI-R score at the first assessment but not at the second assessment three months later, presumably reflecting successful coping/adaptation. As the authors acknowledge, inferences may not apply to people with OCD. These results, together with findings from Pan et al. (2020) that indicated that the increase in mental health problems may be larger in individuals without preexisting mental health problems, suggest that OCD patients may not generally experience a worsening of symptoms over the course of the pandemic. Rather, these findings speak for a complex course with differences between and possibly also within diagnostic groups (Jelinek, Moritz et al., 2021). As a nonclinical (Jelinek, Göritz et al., 2021) and a mixed psychiatric sample (Pan et al., 2020) were investigated in these two studies, interpretations can only be made with caution.

In the context of OCD, results on specific OCD subtypes, particularly C-OCD, need to be considered. In the study by Jelinek, Göritz et al. (2021), pre-pandemic C-OCD was related to a clinical OCI-R score at the start of the pandemic as well as three months later, with an odds ratio of 31.931 ($CI_{95\%}$ 11.923–85.514). This corresponds to findings in people with OCD in which symptom increase from before the pandemic to its first weeks was associated with C-OCD (Jelinek, Moritz et al., 2021; Prestia et al., 2020). It is thus likely that over the course of the pandemic, people with C-OCD were at particular risk. However, Khosravani, Aardema et al. (2021) reported that symptom worsening also occurs in other OC dimensions.

1.3. Predictors of change in symptomatology over the course of the pandemic

In line with the diathesis-stress model, first evidence has supported the hypothesis that the increase of symptomatology in people with OCD may be explained by a common stress-related response (Khosravani, Aardema et al., 2021; Khosravani, Samimi Ardestani, Sharifi Bastan, McKay, & Asmundson, 2021). Cognitive models of OCD (Salkovskis & McGuire, 2003) emphasize the role of functional and dysfunctional beliefs and behaviors in the development and maintenance of OCD. During other disease outbreaks, such as swine flu, Zika virus, and Ebola, anxiety regarding the specific virus was predicted by OC beliefs and OCS, health anxiety, and contamination fears as well as disgust sensitivity (swine flu; Brand, McKay, Wheaton, & Abramowitz, 2013; Wheaton, Abramowitz, Berman, Fabricant, & Olatunji, 2012) and overestimated contamination severity (Ebola: Blakey, Reuman, Jacoby, & Abramowitz, 2015; Zika virus: Blakey & Abramowitz, 2017). During the first weeks of the COVID-19 pandemic, we were able to show that dysfunctional hygiene-related beliefs were significantly higher in contamination-related than -unrelated OCD and that dysfunctional hygiene-related beliefs were associated with greater symptom progression from before the pandemic to the first weeks of the pandemic (Jelinek, Moritz et al., 2021). Moreover, intolerance of uncertainty (Wheaton, Messner, & Marks, 2021), experiential avoidance, emotional reactivity, and depression-anxiety (Seçer & Ulaş, 2020), fear and/or anxiety (Ji et al., 2020), and pre-pandemic insomnia symptoms (Cox & Olatunji, 2021) have been suggested as processes involved in the formation of OCD during the pandemic. The role of experiential avoidance, which is, according to Kashdan, Barrios, Forsyth, and Steger (2006), the "excessive negative evaluations of unwanted private thoughts, feelings, and sensations, an unwillingness to experience these private events, and deliberate efforts to control or escape from them" (p. 1301), is further supported by the longitudinal study by Jelinek, Göritz et al. (2021). Higher experiential avoidance at the start of the pandemic (March 21–30, 2020) predicted a clinical OCI-R score over the early course of the pandemic compared to a nonclinical OCI-R score.

Other general illness-related and sociodemographic factors have also been associated with the course of OCS during the COVID-19 pandemic. These include male gender (odds for men are almost twice as likely as for women for a continuous clinical OCI-R score but are also higher for a "recovery" trajectory in the study by Jelinek, Göritz et al., 2021, however see Ji et al., 2020), a clinical pre-pandemic OCI-R score (Jelinek, Göritz et al., 2021), and C-OCD (see above). In children and adolescents with OCD aggressive symptoms, poor insight (Nissen et al., 2020), duration of OCD and COVID-19-related behaviors and acts (information seeking and preoccupation with COVID-19, knowing someone with a COVID-19 diagnosis; Tanir et al., 2020) have also been suggested. Identifying predictors of change in symptomatology over the course of the pandemic is important to improve our understanding about the course of OCD and its predictors. This may also offer insight into which patients are at particular risk in future pandemics and opens the possibility of offering targeted interventions for them. As more pandemics are expected in the future (Hess et al., 2020), this is of great importance.

1.4. The current study

In summary, increased symptomatology in people with OCD after the outbreak of the pandemic has been reported (Benatti et al., 2020; Højgaard et al., 2021; Jelinek, Moritz et al., 2021; Khosravani, Aardema et al., 2021; Nissen et al., 2020; Prestia et al., 2020; Tanir et al., 2020). However, the course of symptomatology over the pandemic is unclear. Our study aimed to fill this gap by using longitudinal data and by investigating change in symptomatology in people with OCD, particularly with C-OCD, over the first months of the pandemic in Germany. Moreover, we wanted to explore predictors of change. At the time the study was set up, we did not have clear hypotheses; no data existed

regarding the course of OCS in people with OCD during a pandemic of such a large extent as the COVID-19 pandemic. According to the diathesis-stress model, an increase was likely at the start of the pandemic; however, whether over the next few months a further (or delayed) worsening of symptomatology or an improvement (e.g., due to regression to the mean) would occur in patients was unclear. Before we analyzed our data, Pan et al. (2020) reported symptom improvement in people with mental disorders, particular in those with high chronicity and severity. With more than 50% severe cases (Kessler et al., 2005), OCD is a mental disorder of high severity and chronicity (Hollander et al., 2016). Thus, in line with the findings of Pan et al. (2020), we expected that the severity of OCD during the pandemic would improve over time. Second, we hypothesized that people with C-OCD would be particularly affected by the pandemic and that the trajectories of their symptomatology would be worse than those of people without contamination-relevant OCD (nC-OCD). We hypothesized that the improvement in symptomatology would be associated with male gender, higher severity of OCD, and functional beliefs. The presence of C-OCD as well as experiential avoidance and dysfunctional beliefs, on the other hand, were expected to predict a worsening in symptomatology.

2. Material and methods

2.1. Recruitment and procedure

For a detailed description of the recruitment for the current study, see Jelinek, Moritz et al. (2021), which focused on the subjective changes in OCD from before to the start of the COVID-19 pandemic and reasons given for the changes. At the time of the first assessment (t0), the German federal states had mandated the first official lockdown, requiring, for example, restricted social contact and closed restaurants and bars, with slight variations between the federal states. Assessment was performed via an online survey using the software Unipark/Questback® (Globalpark AG). After the participants gave electronic informed consent, the survey started with questions about demographics (e.g., gender, age, medical history) and then psychopathological data (e.g., OCI-R, Patient Health Questionnaire [PHQ-9]). At the end of the survey, participants were asked to provide an email address if they agreed to be contacted again for a follow-up study (details on how to create an email address with nondisclosing personal information were provided). If they provided an email address, participants were recontacted three months after the first assessment (t1). At t1, sociodemographic and psychopathological data were again assessed (using the same measures as at t0). Additionally, questions were asked about the participants' treatment during the COVID-19 pandemic and their experiences with stigmatization (these results are not part of the current article, but we plan to report them in a separate publication). During both assessments, "cookies" precluded multiple logins from the same computer.

For the current study, inclusion criteria were age between 18 and 80 years, a diagnosis of OCD made by a clinician (e.g., psychiatrist, psychotherapist), completion of the OCI-R, no stereotypical answer patterns in psychopathology ratings, and provision of an email address at t0. We conducted the study in accordance with the Declaration of Helsinki and its revisions, and ethical approval was granted by the responsible ethics committee (#LPEK-0131). As compensation for each assessment, participants received a link to download a PDF manual. For the first assessment, the manual provided techniques to improve self-esteem, and for the second assessment, the manual provided cognitive-behavioral self-help techniques to deal with distress associated with the COVID-19 pandemic.

2.2. Participants

As described in Jelinek, Moritz et al. (2021), 1905 participants accessed the first survey, and of these 611 gave electronic informed consent. Based on the inclusion and exclusion criteria for the current study, 343 participants in the original study were excluded ($n = 80$ did not complete the OCI-R, $n = 13$ were older than 80 or younger than 18, $n = 61$ did not report a verified OCD diagnosis by a mental health expert, $n = 3$ showed stereotypical answer patterns in psychopathology ratings, $n = 182$ did not leave an email address to be contacted, $n = 4$ had to be excluded due to technical difficulties). The final sample at t0 comprised 268 participants (gender: 193 females [72%], 73 males [27.2%], 2 diverse [0.8%]; age: $M = 39.62$, $SD = 11.75$; mean illness duration in years: $M = 19.38$, $SD = 12.88$), thus represents a subsample of the sample reported by Jelinek, Moritz et al. (2021), for which OCI-R and PHQ-9 as well as functional and dysfunctional beliefs have already been reported for t0. Differences in sample size between the current study and Jelinek, Moritz et al. (2021) may be explained by differences in inclusion and exclusion criteria. In the current study, OCD severity was moderate to severe (OCI-R score: $M = 27.78$, $SD = 11.58$), and severity of depression was moderate (PHQ-9: $M = 12.10$, $SD = 6.37$). At the beginning of the t0 survey, participants indicated that the following symptoms were at the core of their OCD: obsessions ($n = 184$, 68.7%), washing/cleaning ($n = 151$, 56.3%), checking ($n = 139$, 51.9%), symmetry/ordering ($n = 43$, 16.0%), hoarding ($n = 20$, 7.5%), and other ($n = 39$, 14.6%).

2.3. Assessment

For assessment of OCS, we used the Obsessive–Compulsive Inventory-Revised (OCI-R; Foa et al., 2002; Gönner, Leonhart, & Ecker, 2008). We calculated the total score as well as the original six subscales (washing, obsessing, checking, neutralizing, hoarding, and ordering). We used the total score of the German version of the Patient Health Questionnaire (PHQ-9; Löwe, Kroenke, Herzog, & Gräfe, 2004) to assess severity of depression, for which Kroenke, Spitzer, and Williams (2001) have reported the following norm values: 5 points = mild, 10 points = moderate, 15 points = moderately severe, and 20 points = severe depression.

Dysfunctional (e.g., overestimation of threat, positive beliefs about rituals) and functional beliefs (based on the adaptive coping scale of the Maladaptive and Adaptive Coping Styles Questionnaire (MAX; Moritz et al., 2018)) associated with the COVID-19 pandemic and rated on a Likert scale ranging from 1 = *does not apply at all* to 5 = *totally applies* (for items, see Table 2) were assessed (see Jelinek, Moritz et al., 2021).

Experiential avoidance was assessed using the Acceptance and Action Questionnaire for Obsessions and Compulsions adapted to the COVID-19 pandemic (AAQ-OCD-COVID, Jelinek, Göritz et al., 2021), which is based on the AAQ-OCD (Jacoby, Abramowitz, Buchholz, Reuman, & Blakey, 2018). In the AAQ-OCD-COVID, participants' experiential avoidance of obsessions and compulsions related to the COVID-19 pandemic is assessed by 13 items (example: "My intrusive thoughts related to the COVID-19 pandemic determine the actions that I take"), which are rated on a 7-point Likert scale ranging from 1 (*never true*) to 7 (*always true*). When the 13 items of the AAQ-OCD-COVID as assessed in the final sample at t0 ($n = 268$) were included in an exploratory principal component analysis with varimax rotation, scree plot inspection supported a one-factor solution, which explained 70.15% of the variance (eigenvalue: 9.12). Factors with an eigenvalue greater than 1 were taken into account, and items were only assigned to a factor if their respective loading was at least .5. In the current study, internal consistency for the factor was good, with a Cronbach's $\alpha = 0.96$, and was comparable to the internal consistency of AAQ-OCD-COVID reported by Jelinek, Göritz et al. (2021) (Cronbach's $\alpha = 0.93$).

2.4. Strategy of data analysis

All analyses were conducted with IBM SPSS® Statistics version 26 and JASP, version 0.14.1 (JASP Team, 2020). We used paired sample *t*-

tests to investigate change over time. To compare change in symptom severity between groups with and without C-OCD (group membership was based on the participants' responses at the beginning of the assessment regarding their predominant OCS), we calculated ANCOVAs with different scores (t0–t1, e.g., OCI-R total scores at t0 minus OCI-R total scores at t1) as the dependent variable and scores at t0 as covariate (e.g., OCI-R total scores at t0). Analyses were recalculated with missing data imputed by multiple imputations based on the assumption that data were missing at random, conditional on information regarding gender, age, duration of OCD, and all relevant outcomes across the two time points of the assessment. We created 520 imputed datasets. Second, analyses were calculated for all patients with available data at both assessment points (complete cases).

We applied Bayesian statistical approaches to quantify evidence for the alternative relative to the null hypotheses. First, we used complementary Bayesian paired *t*-tests with weakly informative priors (Cauchy distribution width = 0.707). Bayes factors (BF_{10}) indicate the likelihood of the alternative hypothesis (the severity of OCS during the pandemic would improve, i.e. decrease, over time) compared to the null hypothesis (the severity of OCS during the pandemic would not improve over time) in light of the data. For example, a $BF_{10} = 20$ implies that the alternative hypothesis is 20 times more likely than the null hypothesis. Second, we computed complementary Bayesian ANCOVAs to quantify evidence for or against the inclusion of the effect of group (i.e., C-OCD vs. nC-OCD) into the models. Weakly informative Cauchy prior scales were used (r scale fixed effects = 0.5; random effects = 1; covariates = 0.354; Rouder, Morey, Speckman, & Province, 2012). Bayes factors included (BF_{Inc}) yield evidence for ($BF_{Inc} > 1$) or against ($BF_{Inc} < 1$) the inclusion of the effect of group into the model (Raftery, 1995; Wagenmakers et al., 2018). To investigate predictors of change, we calculated multiple hierarchical regression models. Models A1–A4 analyzed change in OCS over time (OCI-R total scores at t0 minus OCI-R total scores at t1) entered as the dependent variable. Demographic background variables (age, gender) were entered as first block predictors (model A1) and psychopathology at t0 (OCI-R total score, PHQ-9 total score, C-OCD vs. nC-OCD) as the second block predictors (model A2). Experiential avoidance (AAQ-OCD-COVID) was entered as the third block (model A3). Cognitive functional and dysfunctional beliefs were included as predictors in the fourth block (model A4). Analyses were recalculated (models B1–B4) with a changed order (cognitive beliefs: block B3; EA: block B4).

For effect sizes, Cohen's *d*s (with $d \approx .2$, $d \approx .5$, and $d \approx .8$, corresponding to small, medium, and large effects) and η_p^2 (with $\eta_p^2 \approx .01$, $\eta_p^2 \approx .06$, and $\eta_p^2 \approx .14$, corresponding to small, medium, and large effects) were calculated. To interpret the BFInc and BF10, we used the following heuristic (Raftery, 1995) The evidence provided can be weak (BF of 1–3 or 1–0.33), moderate (BF of 3–20 or 0.33–0.05), strong (BF 20–150 or 0.05–0.0067), or very strong (BF > 150 or 0.0067–0). Standardized regression weights (β) of .1, .3, and .5 were considered weak, medium, and strong effects, respectively.

3. Results

Of the total sample assessed at t0 ($N = 268$), 179 participants (66.8%) also participated in the second assessment. Demographic and psychopathological information of participants with available data at both assessment points ($n = 179$) did not differ with regard to most demographic and psychopathological information from the participants who only participated at t0 ($n = 89$). On average, however, participants who completed both assessments (t0, t1) were older ($M = 40.60$; $SD = 11.61$) and scored higher on the OCI-R ordering subscale ($M = 4.19$, $SD = 3.49$) than participants with available data only at t0 (age: $M = 37.64$, $SD = 11.85$, $t(266) = 1.955$, $p = .052$; OCI-R ordering: $M = 3.15$, $SD = 3.33$, $t(266) = 2.342$, $p = .020$). Results on psychopathological data are displayed in Table 1; experiential avoidance as well dysfunctional and functional beliefs related to COVID-19 at t0 are displayed in Table 2 (for data on beliefs at t0 of the larger sample, see Jelinek, Moritz et al., 2021).

3.1. Change in psychopathology over the course of the pandemic, t0–t1

When participants with available data at both assessment points were divided into participants with C-OCD ($n = 104$) and nC-OCD ($n = 75$), the two groups did not differ with regard to age (nC-OCD: $M = 41.19$, $SD = 12.53$, C-OCD: $M = 40.18$, $SD = 10.94$, $t(177) = 0.570$, $p = .569$) or gender (nC-OCD: 51 [68.0%] female, 23 [30.7%] male, 1 diverse [1.3%]; C-OCD: 84 [80.8%] female, 19 [18.3%] male, 1 diverse [1.0%]; Cramer-V = 0.147, $p = .121$). Table 1 displays the psychopathological data of the groups over time. Considering all participants, obsessive-compulsive (OCI-R, see Fig. 1) and depressive (PHQ-9) symptoms did not substantially change over time (Cohen's $d \leq 0.2$) and weak evidence emerged against a change in symptoms over time (OCI-R: $BF_{10} = 1.52$, PHQ-9: $BF_{10} = 1$). However, change in symptomatology between the two assessments during the pandemic was related to the subtype of OCD. While symptoms remained stable in C-OCD, there was tentative evidence for improvement of symptomatology in nC-OCD over time. When multiple imputation was performed to control for missing data, this was only statistically significant for the OCI-R washing subscale ($p = .003$), the effects for the OCI-R total score ($p = .059$) and the PHQ-9 ($p = .092$) only reached trend level. For the analyses of complete cases, groups differed significantly with a small effect size on the OCI-total score ($\eta_p^2 = .028$), the OCI-R washing subscale ($\eta_p^2 = .049$), and the PHQ-9 total score ($\eta_p^2 = .022$, see Table 1). Complementary Bayesian analyses yielded very strong evidence for symptom changes in the OCI-R washing subscale ($BF_{10} = 1148.96$) and moderate evidence for the effect of group on these changes ($BF_{Inc} = 5.55$). Models including the effect of group were 5.55 times more likely compared to similar models excluding the effect. Further, moderate evidence emerged against the inclusion of the effect of group in the OCI-R subscales obsessing ($BF_{Inc} = 0.30$), hoarding ($BF_{Inc} = 0.24$), and ordering ($BF_{Inc} = 0.18$, Table 1).

3.2. Prediction of change in psychopathology

Results of the regression models A1–A3, which used change in the OCI-R total score as outcome, are presented in Table 3. From the expected risk factors, in model 1 gender (1 = male, 2 = female) predicted change in OCI-R total score at a small effect ($\beta = -0.171$, $p = .026$) indicating a higher decrease in men. In model A2, OCI-R total score at t0 ($\beta = 0.216$, $p = .007$) and OCD subtype (0 = nC-OCD, 1 = C-OCD, $\beta = -0.159$, $p = .033$) were significant predictors suggesting that at a small effect a decrease in symptoms over the early stage of the pandemic was predicted by higher severity of OCD at t0 and nC-OCD. When experiential avoidance was entered in model A3, it was not significant ($\beta = -0.142$, $p = .105$); when functional and dysfunctional beliefs were entered in model A4, only higher endorsement at t0 of the functional belief "The threat associated with coronavirus makes me realize how exaggerated my compulsions are" predicted a higher decrease in the OCI-R total score over the subsequent months of the pandemic until t1 ($\beta = 0.206$, $p = .008$). Model A2 explained an additional 7.1% of variance of data in comparison to model A1 ($F = 4.507$, $df = 3, 171$, $p = .005$). Model A3 explained an additional 1.4% and model A4 an additional 6.9% of variance of data, but change in R^2 was not significant for models A3 and A4 (model A3: $F = 2.658$, $df = 1, 170$, $p = .105$; model A4: $F = 1.514$, $df = 9, 161$, $p = .147$). The final model was significant ($R = 0.428$, $F = 2.414$, $df = 15, 161$, $p = .003$), explaining 18.4% of the variance. When analyses were recalculated (models B1–4), results remained unchanged (see Online Supplement).

4. Discussion

The primary aim of the current study was to investigate the course of

Table 1
Group differences across time for the total sample and the subsamples (C-OCD vs. nC-OCD).

	t0 (n = 179)		**t1 (n = 179)**		*Paired t-tests*		**t0 nC-OCD (n = 75)**		**C-OCD (n = 104)**		**t1 nC-OCD (n = 75)**		**C-OCD (n = 104)**		*ANCOVA*	
	M/n	*SD/ %*	*M/n*	*SD/ %*	*MI*	*CC*	*M/n*	*SD/ %*	*M/n*	*SD/ %*	*M/n*	*SD/ %*	*M/n*	*SD/ %*	*MI*	*CC*
OCI-R total score	28.40	12.01	27.23	12.24	$t(9119) = 0.988$, $p = .323$	$t(178) = 2.448$, $p = .015$, Cohen's d [$CI_{95\%}$] = −0.096 [−0.30, 0.11], $BF_{10} = 1.52$	26.73	11.09	29.60	12.55	24.55	11.09	29.16	12.71	$B = 1.613$, $t = 1.891$, $p = .059$	$F(1, 176) = 5.155$, $p = .024$, $\eta_p^2 = .028$, $BF_{Inc} = 1.63$
Washing (OCI-R)	7.20	4.10	6.60	4.13	$t(8844) = 4.545$, $p < .001$	$t(178) = 4.521$, $p < .001$, Cohen's d [$CI_{95\%}$] = −0.146 [−0.35, 0.06], $BF_{10} = 1148.96$	3.59	3.08	9.80	2.42	3.00	2.99	9.19	2.61	$B = 1.126$, $t = 2.946$, $p = .003$	$F(1, 176) = 9.098$, $p = .003$, $\eta_p^2 = .049$, $BF_{Inc} = 5.55$
Obsessing (OCI-R)	6.84	3.54	6.30	3.69	$t(6705) = 3.442$, $p = .001$	$t(178) = 3.279$, $p = .001$, Cohen's d [$CI_{95\%}$] = −0.149 [−0.36, 0.06], $BF_{10} = 14.24$	7.55	3.46	6.33	3.52	6.71	3.59	6.01	3.75	$B = 0.273$, $t = 0.872$, $p = .383$	$F(1, 176) = 1.156$, $p = .284$, $\eta_p^2 = .007$, $BF_{Inc} = 0.30$
Hoarding (OCI-R)	2.64	2.89	2.57	2.81	$t(8951) = 1.059$, $p = .289$	$t(178) = 0.581$, $p = .562$, Cohen's d [$CI_{95\%}$] = −0.025 [−0.23, 0.18], $BF_{10} = 0.10$	2.80	2.87	2.53	2.91	2.57	2.75	2.57	2.87	$B = 0.107$, $t = 0.491$, $p = .623$	$F(1, 176) = 0.789$, $p = .376$, $\eta_p^2 = .004$, $BF_{Inc} = 0.24$
Ordering (OCI-R)	4.19	3.49	3.91	3.44	$t(7955) = 0.516$, $p = .606$	$t(178) = 2.126$, $p = .035$, Cohen's d [$CI_{95\%}$] = −0.081 [−0.29, 0.13], $BF_{10} = 0.75$	4.47	3.55	3.99	3.44	4.21	3.31	3.68	3.52	$B = 0.174$, $t = 0.720$, $p = .472$	$F(1, 176) = 0.227$, $p = .634$, $\eta_p^2 = .001$, $BF_{Inc} = 0.18$
Checking (OCI-R)	4.83	3.58	5.07	3.57	$t(7841) = 2.392$, $p = .017$	$t(178) = 1.592$, $p = .113$, Cohen's d [$CI_{95\%}$] = −0.067 [−0.14, 0.27], $BF_{10} = 0.29$	5.17	3.62	4.59	3.54	5.05	3.54	5.08	3.61	$B = 0.395$, $t = 1.424$, $p = .155$	$F(1, 176) = 3.337$, $p = .069$, $\eta_p^2 = .019$, $BF_{Inc} = 0.79$
Neutralizing (OCI-R)	2.70	3.32	2.79	3.24	$t(7636) = 2.591$, $p = .010$	$t(178) = 0.789$, $p = .431$, Cohen's d [$CI_{95\%}$] = −0.027 [−0.18, 0.24], $BF_{10} = 0.11$	3.16	3.41	2.37	3.23	3.00	3.25	2.63	3.25	$B = 0.217$; $t = 1.054$, $p = .292$	$F(1, 176) = 2.254$, $p = .135$, $\eta_p^2 = .013$, $BF_{Inc} = 0.49$
PHQ-9	12.47	6.42	11.60	6.03	$t(7444) = 1.815$, $p = .070$	$t(178) = 2.260$, $p = .025$, Cohen's d [$CI_{95\%}$] =−0.14 [−0.35, 0.07], $BF_{10} = 1.00$	11.72	6.59	13.01	6.28	10.36	5.71	12.50	6.13	$B = 1.141$; $t = 1.686$, $p = .092$	$F(1, 176) = 3.893$, $p = .050$, $\eta_p^2 = .022$, $BF_{Inc} = 0.95$

Note. Means and standard deviations were calculated for study completers. OCI-R = Obsessive-Compulsive Inventory-Revised; PHQ-9 = Patient Health Questionnaire, ANCOVA: baseline scores as covariate; C-OCD = contamination-related OCD, nC-OCD = contamination-unrelated OCD; CC: complete cases calculated for $n = 179$; MI: multiple imputation calculated for $N = 268$.

Table 2
Experiential avoidance as well as dysfunctional and functional beliefs related to COVID-19 in participants with OCD at t0 ($n = 178$).

	M	*SD*
AAQ-OCD-COVID	36.55	20.01
Other people are now realizing how dangerous viruses and germs are.[a]	3.17	1.38
Coronavirus is the result of people being very careless about hygiene.[a]	2.16	1.26
My fears about the dangers in the world are confirmed.[a]	2.77	1.35
The threat associated with coronavirus makes me realize how exaggerated my compulsions are.[a]	2.24	1.14
Coronavirus does not frighten me as much as I thought it would.[a]	2.85	1.29
Coronavirus frightens me less than other people around me.[a]	2.68	1.29
The general panic about the coronavirus calms me down.[a]	2.33	1.29
Coronavirus has also increased some of my other fears.[a]	3.19	1.42
I believe that the coronavirus is unmanageable.[a]	2.45	1.09

Note. AAQ-OCD-COVID = Acceptance and Action Questionnaire for Obsessions and Compulsions (COVID-19 adaption).
[a] Rated on a 5-point Likert scale ranging from 1 = *Does not apply at all* to 5 = *Totally applies.*

symptoms in people with OCD in Germany during the early phase of the COVID-19 pandemic. In the total sample, neither OCS nor depressive symptoms substantially changed from the first assessment in the early weeks of the pandemic to the second assessment three months later. OCS even decreased across the first three months in patients without contamination-related OCD (nC-OCD) but remained at a similar level in patients with contamination-related OCD (C-OCD). In addition, symptom decrease over the course of the pandemic was more frequent among males and those with higher initial OCS. Unexpectedly, experiential avoidance as well as functional and dysfunctional beliefs at the beginning of the pandemic did not predict the overall course of OCS.

4.1. Course of symptomatology

The present results of a principally unchanged symptom severity in the overall sample during the first months of the pandemic and a decrease in symptomatology in patients with nC-OCD seems counter-intuitive at first glance, particularly as an increase of symptomatology in people with OCD as a result of a non-specific stress-related response has been suggested (Khosravani, Aardema et al., 2021; Khosravani, Samimi Ardestani et al., 2021). However, these assumptions refer to an increase from before the pandemic to during the pandemic. They do not refer to the course of OCD during the pandemic. Generally, our results correspond to findings in a mixed psychiatric sample by Pan et al. (2020). At t0, early in the COVID-19 pandemic, participants reported a subjective increase in OCS in the same sample compared to before the pandemic (Jelinek, Moritz et al., 2021), and thus their symptom level was likely to be generally elevated. However, we were not able to draw upon OCI-R and PHQ-9 data from before the pandemic. Thus, we can only speculate whether symptomatology in nC-OCD patients—though improved over the assessment period of three months—was still elevated at the second assessment in comparison to before the pandemic. Still, we take the results of a decrease in symptomatology in patients with nC-OCD as a sign that this subgroup of people with OCD had somewhat adapted to the pandemic.

Symptom decrease over the course of the pandemic in people with mental disorders has previously been explained by, for example, the change in general routines due to the lockdowns, allowing for a more structured daily routine and less discrepancy with the rest of the world and regression to the mean (cf. Pan et al., 2020). It has to be pointed out that in the current study the decrease in symptomatology and thus symptom improvement was rather small (on average 2 points on the OCI-R). According to norm values of the English version of the OCI-R (Abramovitch, Abramowitz, Riemann, & McKay, 2020) and the mean total score of 25 for the German version of the OCI-R in the current study, severity of OCD could still be considered “moderate” (total score

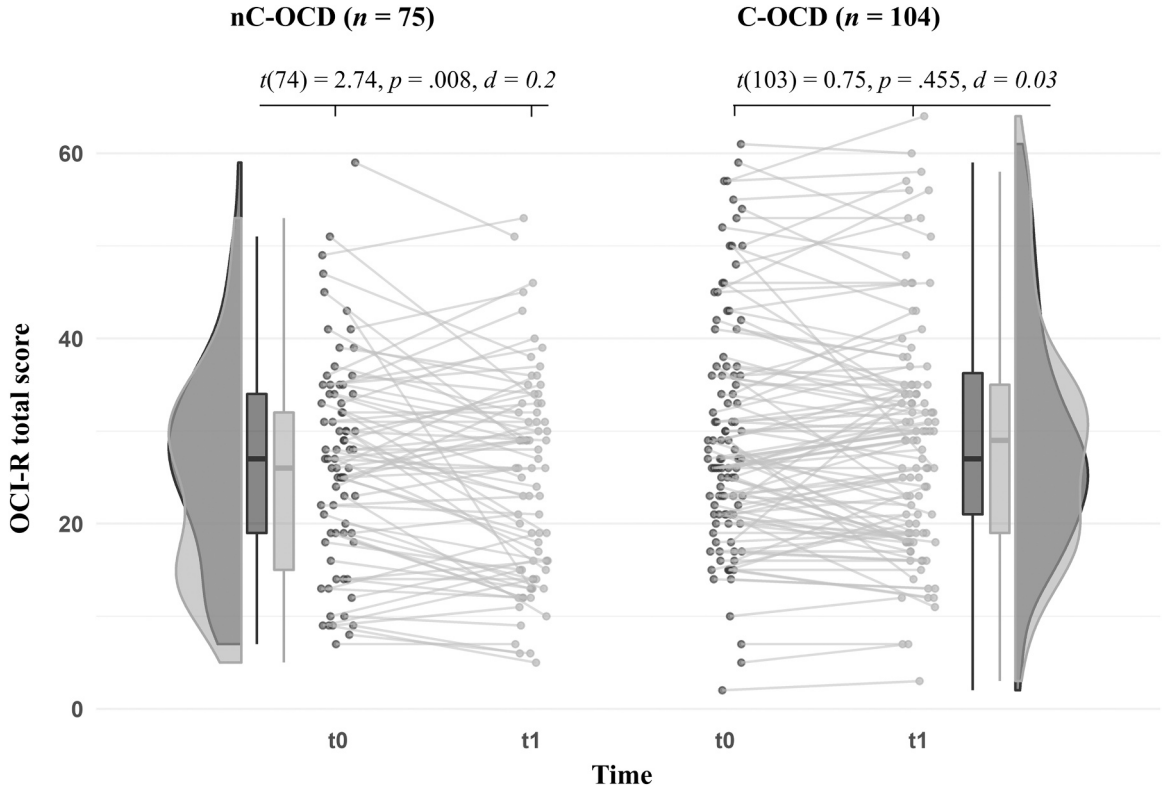

Fig. 1. Total Score of the Obsessive-Compulsive Inventory (OCI-R) for Participants with Contamination-Relevant OCD (C-OCD) and Contamination-Irrelevant OCD (nC-OCD) at the Start of the COVID-19 Pandemic (t0) and Three Months Later (t1) using the Script by Allen, Poggiali, Whitaker, Marshall, and Kievit (2019).

Table 3
Predictors of change in obsessive-compulsive symptoms as (outcome: change in OCI-R from t0 to t1), $n = 177$.

	B [$CI_{95\%}$]	β	*p*
Step 1	**Model A1**		
Constant	5.65 [− 0.22, 11.52]		.059
Age	< 0.01 [− 0.08, 0.09]	< 0.01	.985
Gender[a]	− 2.57 [− 4.83, − 0.30]	− 0.17	.026
Step 2	**Model A2**		
Constant	1.64 [− 4.73, 8.00]		.613
Age	0.01 [− 0.08, 0.09]	0.01	.897
Gender[a]	− 1.91 [− 4.15, 0.33]	− 0.13	.095
OCI-R total score (t0)	0.11 [0.03, 0.20]	0.22	.007
PHQ-9 (t0)	0.05 [− 0.11, 0.21]	0.05	.532
OCD subtype (C-OCD/nC OCD)[b]	− 2.06 [− 3.98, − 0.17]	− 0.16	.003
Step 3	**Model A3**		
Constant	1.31 [− 5.04, 7.66]		0.68
Age	0.01 [− 0.07, 0.09]	0.02	0.78
Gender[a]	− 1.64 [− 3.90, 0.62]	− 0.11	0.15
OCI-R total score (t0)	0.14 [0.05, 0.22]	0.26	0.002
PHQ-9 (t0)	0.10 [− 0.06, 0.27]	0.10	0.23
OCD subtype (C-OCD/nC OCD)[b]	− 2.08 [− 3.96,− −0.20]	− 0.16	0.03
AAQ-OCD-COVID (t0)	− 0.05 [− 0.10, 0.01]	− 0.14	0.10
Step 4	**Model A4**		
Constant	0.02 [− 8.28, 8.33]		1.00
Age	> 0.01 [− 0.08, 0.09]	0.01	0.91
Gender[a]	− 1.41 [− 3.71, 0.88]	− 0.09	0.23
OCI-R total score (t0)	0.15 [0.07, 0.24]	0.29	0.00
PHQ-9 (t0)	0.09 [− 0.08, 0.27]	0.09	0.30
OCD subtype (C-OCD/nC OCD)[b]	− 2.08 [− 4.04, − 0.11]	− 0.16	0.04
AAQ-OCD-COVID	− 0.04 [− 0.10, 0.02]	− 0.13	0.21
Other people are now realizing how dangerous viruses and germs are.	− 0.15 [− 0.99, 0.69]	− 0.03	0.73
Coronavirus is the result of people being very careless about hygiene.	0.20 [− 0.70, 1.10]	0.04	0.65
My fears about the dangers in the world are confirmed.	− 0.58 [− 1.42, 0.26]	− 0.12	0.17
The threat associated with coronavirus makes me realize how exaggerated my compulsions are.	1.15 [0.31, 1.99]	0.21	0.01
Coronavirus does not frighten me as much as I thought it would.	− 0.21 [− 1.15, 0.74]	− 0.04	0.67
Coronavirus frightens me less than other people around me.	0.14 [− 0.83, 1.11]	0.03	0.77
The general panic about the coronavirus calms me down.	0.16 [− 0.59, 0.92]	0.03	0.67
Coronavirus has also increased some of my other fears.	0.20 [− 0.58, 0.97]	0.04	0.61
I believe that the coronavirus is unmanageable.	− 0.47 [− 1.38, 0.43]	− 0.08	0.30

Note. $R^2 = .030$, $F = 2.646$ ($p = .074$) for step 1; $\Delta R^2 = .071$, $F = 4.507$ ($p = .005$) for step 2, $\Delta R^2 = .014$, $F = 2.658$ ($p = .105$) for step 3; $\Delta R^2 = .069$, $F = 1.514$ ($p = .147$) for step 4. *b* = unstandardized regression coefficient, β = standardized regression coefficient. OCI-R = Obsessive-Compulsive Inventory-Revised; PHQ-9 = Patient Health Questionnaire; AAQ-OCD-COVID = Acceptance and Action Questionnaire for Obsessions and Compulsions (COVID-19 adaption); C-OCD = contamination-related OCD; nC-OCD = contamination-unrelated OCD; [a] 1 = male, 2 = female, [b] 0 = nC-OCD, 1 = C-OCD.

between 16 and 27), assuming that the benchmarks are transferable. Moreover, the further course of symptom severity needs to be investigated in further studies to determine, for example, whether this improvement lasted as the pandemic continued.

While people with nC-OCD seemed to have improved and potentially "adapted" during the first months of the pandemic, symptomatology of patients with C-OCD remained essentially at a similar level during this time. As in people with nC-OCD, we assume that symptom severity was generally elevated and thus stayed at this (increased) level during the first months of the pandemic. However, COVID-19 cases quickly decreased after the "first wave" (March – May 2020) in Germany (World Health Organization WHO, 2021), and when the second assessment was conducted. Thus, in line with the decrease in COVID-19 cases, distress may have generally decreased, causing an improvement in symptomatology in some patients. However, at both time points the average total OCI-R score in people with C-OCD of approximately 29 could be considered "severe" (Abramovitch et al., 2020). This is in line with previous data associating C-OCD with an increase in OCD during the early weeks of the pandemic (Jelinek, Göritz et al., 2021; Jelinek, Moritz et al., 2021; Prestia et al., 2020) and may be explained by the enduring threat of contamination, which might be "a nightmare come true" for some patients. People with C-OCD with a disorder imminent focus on hygiene and contamination thus seemed to be in a unique situation. People with nC-OCD, on the other hand, seemed to respond similarly to people with depression and anxiety (cf. Pan et al., 2020). As discussed by Pan et al. (2020), people with nC-OCD may potentially benefit over time from a more structured daily routine and less discrepancy with the rest of the world. Other explanations could be corrective experiences ("less bad than I feared"), increased self-efficacy ("I can deal with difficult situations"), or the temporary decrease in COVID-19 cases in Germany in the summer of 2020 (World Health Organization WHO, 2021) including a decrease of the suggested non-specific stress-related response (Khosravani, Aardema et al., 2021; Khosravani, Samimi Ardestani et al., 2021). Although "regression to the mean" has previously been suggested as a reason for the decrease in symptoms in people with particularly severe and chronic mental disorders (Pan et al., 2020), this does not apply to people with OCD in general. On average, people with C-OCD displayed higher symptom severity than people with nC-OCD but still did not improve over time.

It seems that the omnipresence of the novel coronavirus has not fostered symptom improvement or initiation of change similar to exposure in this population. People with C-OCD showed signs of continuous distress during the first months of the pandemic. One reason may be that helpful strategies, potentially learned during previous or ongoing treatment (i.e., Exposure and Response Prevention [ERP]), suddenly came under question due to risk of infection with COVID-19 (Fineberg et al., 2020). This may have increased insecurities in patients and professionals (McKay, Minaya, & Storch, 2020). Although ERP should still be considered the treatment of choice for OCD, it may require refinement in the context of a pandemic (Sheu, McKay, & Storch, 2020). This involves professional support, which was less available during the first months of the pandemic, further increasing the distress of people in need of help. If standard treatment is not available, online interventions should be considered (e.g., Schröder et al., 2020). Without treatment, the OC beliefs of some patients concerning how contamination occurs (e.g., touching contaminated surfaces) were not only consolidated but potentially amplified (e.g., to contamination through aerosols), which may have maintained symptom severity in people with C-OCD.

4.2. Predictors of change

Regarding predictors of change, results were less clear. As expected and largely in line with a previous study in the general population (Jelinek, Göritz et al., 2021, however, see Ji et al., 2020 for different results in university students), females appeared to be particularly vulnerable to experiencing ongoing mental health problems during the pandemic (Liu, Heinzel, Haucke, & Heinz, 2021). Regarding the assumption that the COVID-19 pandemic increased gender inequality (Connor et al., 2020), the current study found that a decrease in OCS was associated with male gender (β = −0.17). However, sociodemographic

variables (i.e., gender and age) measured in the first step predicted only 3% of the variance, and the model fell short of statistical significance ($p = .074$). The explained variance increased by 7.1% when psychopathological factors were included in the second step. As expected, higher severity of OCD and nC-OCD was associated with a weak to medium effect ($\beta = 0.2$), with a decrease in symptoms from the first to the second assessment during the pandemic. Surprisingly, severity of depression was not associated with change in OCS during the early course of the pandemic. Long-term studies show that people with OCD without comorbid depression are more likely to remit over time (Marcks, Weisberg, Dyck, & Keller, 2011), but this may not apply to the short period between assessments (three months) implemented in the current study.

In contrast to previous results and theoretical models of OCD, neither experiential avoidance (Jelinek, Göritz et al., 2021; Seçer & Ulaş, 2020) nor functional and dysfunctional beliefs (Jelinek, Moritz et al., 2021) during the first weeks of the pandemic predicted the course of OCS. When experiential avoidance and beliefs were included, the changes in the variance were nonsignificant, making a prediction beyond socio-demographic (age, gender) and psychopathological (OCI-R, PHQ-9, OCD subtype) factors rather unlikely. At item level, only the item "The threat associated with coronavirus makes me realize how exaggerated my compulsions are" of the assessed nine items on functional and dysfunctional beliefs was associated with a decrease in OCS ($\beta = 0.2$) at a weak to medium effect. Endorsement of this item had previously been associated with a decrease in severity of OCD from before the pandemic to the first weeks of the pandemic in people with C-OCD ($r = -0.191$, $p = .004$, Jelinek, Moritz et al., 2021). As reported in the same study, people with and without C-OCD specifically differed in hygiene-related dysfunctional beliefs, but beliefs at the start of the pandemic did not predict symptom severity three months later.

These unexpected results with regard to predictors of change require explanation. First, all people included in the current study had already suffered from OCD for many years. With a mean illness duration of 19 years, the course was rather chronic. Although we were able to show that people with and without C-OCD differed in the course of their OCD over the first three months of the pandemic, the change in symptoms was rather small in the overall sample (Cohen's $d = -0.1$), which is largely in line with research showing that OCD often takes a chronic course (Marcks et al., 2011). Previous data on the role of experiential avoidance in OCD during the COVID-19 pandemic was reported in samples of the general adult (Jelinek, Göritz et al., 2021) and high school student population (Seçer & Ulaş, 2020). It is thus likely that experiential avoidance was primarily involved in the development of OCD but not in the progression or regression of symptoms in people with OCD over the course of the pandemic. As for beliefs, COVID-19-specific beliefs during the first weeks of the pandemic did not seem to be a driving factor for OCS after three months. However, the time between assessments may have been too short. Moreover, other more general OCD-specific beliefs (e.g., inflated responsibility) as well as other vulnerability factors, such as a, intolerance of uncertainty as suggested by Wheaton et al. (2021), higher fear /anxiety (Ji et al., 2020) or non-specific distress (Khosravani, Aardema et al., 2021; Khosravani, Samimi Ardestani et al., 2021), and insomnia symptoms (Cox & Olatunji, 2021), should be investigated as potential predictors, particularly in view of our total model in which only 18.4% of the variance is explained, which can be considered a start but leaves room for improvement. To conclude, we were able to identify predictors (e.g., gender, psychopathological factors) that accounted for 18.4% of the variance. However, we were not able to build a conclusive model that would predict OC symptoms over the course of the pandemic. In our view, our analyses are nevertheless meaningful as we have contributed to the understanding of predictors for the course of OC symptoms during the pandemic.

4.3. Strengths and limitations

In the current study, we were able to recruit a large sample of people with pre-pandemic OCD at the start of the COVID-19 pandemic using established psychopathological measures as well as strict inclusion criteria (e.g., OCD diagnosis by a mental health expert) and exclusion criteria (e.g., exclusion of stereotypic response patterns). After three months (t1), the response rate (67%) was acceptable. Still, the following limitations need to be discussed.

First, we relied on self-report only. While this may have increased participation and the representativeness of the sample, particularly during the pandemic, it is certainly a limitation, and the results need to be confirmed using clinical interviews (SCID, Y-BOCS). Second, and as previously discussed (Jelinek, Moritz et al., 2021), assessment of functional and dysfunctional beliefs was exploratory in nature (item level) and assessment of experiential avoidance was based on an adapted version of the questionnaires. Still, the two questionnaires on beliefs and experiential avoidance were both based on previously used questionnaires (i.e., AAQ-OCD, MAX) and were carefully adapted based on expert consensus. Third, the representativeness of the sample may be open to criticism. The current sample with available data at both assessments was older and scored higher on the ordering OCI-R subscale than the sample for which data was only available at t0. However, we used multiple imputation for the main analyses to account for missing data. Moreover, severely affected people may not have been able to participate in the study (either one or both assessments), potentially underestimating the negative effects of the pandemic on OCD. On the other hand, people suffering from the circumstances of the pandemic may have been more motivated to participate in the study.

4.4. Conclusion

In summary, people with OCD, particularly those without contamination-related OCD, showed tentative signs of adapting to the pandemic over the first three months, but the distress of people with C-OCD seemed to remain at the same level. Male gender, a higher OCI-R score, and nC-OCD subtype were associated with symptom relief between the first weeks of the pandemic and three months later, and these may represent protective factors. However, whether these results also will remain over the long-term course of symptomatology remains to be investigated. Clinicians should be informed about the ways to provide effective treatment during a pandemic for people with C-OCD as this subgroup seems to be at particular risk for negative long-term effects.

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Ethical standards

The authors assert that all procedures contributing to this work complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Availability of data and materials

Data is available upon request.

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Conflicts of interest

The authors declare no conflict of interest.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.janxdis.2021.102493.

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