



Resilience predicts positive mental health outcomes during the COVID-19 pandemic in New Yorkers with and without obsessive-compulsive disorder

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ABSTRACT

There has been substantial concern about the mental health effects of the COVID-19 pandemic, particularly for those with obsessive-compulsive disorder (OCD) given the overlap between OCD symptoms (e.g., excessive handwashing) and appropriate disease prevention measures. However, the pandemic has demonstrated heterogeneous mental health effects, suggesting that individual-level factors could play a role in buffering or exacerbating its deleterious impact. This study aimed to understand how individual differences in resilience were associated with trajectories of obsessive-compulsive, depression, and anxiety symptoms among healthy adults and those with OCD residing in New York City, considered the epicenter of the pandemic in the United States at its onset. The sample consisted of healthy individuals ($n = 30$) and people with OCD ($n = 33$) who completed clinical interviews and self-report questionnaires that assessed baseline resilience, OCD symptoms, depression, anxiety, and perceived positive effects of the pandemic at four assessment timepoints: baseline (April 2020) and one, two, and six months later. Linear mixed-effects growth models revealed that greater resilience was associated with stable trajectories of symptoms over time. Conversely, less resilience was associated with worsening obsessive-compulsive symptoms from the two-month to six-month assessment timepoints and worsening depressive symptoms at six months across both groups, and with worsening anxiety symptoms in individuals with OCD at six months. Resilience was correlated with the ability to appreciate “silver linings” of the pandemic. These findings highlight resilience as a potential treatment target for bolstering mental health outcomes among individuals with and without psychopathology during sustained and unprecedented periods of stress.

The novel coronavirus (COVID-19) has infected millions and, by September 2021, had resulted in over 684,000 deaths in the United States alone (Centers for Disease Control and Prevention, 2021). Moreover, many people experienced economic and emotional stress due to job loss, fear of contracting the disease, and physical distancing and quarantine measures. Given data that prior pandemics – all shorter, less widespread, and less fatal than COVID-19 – have negatively impacted mental health (Lee et al., 2007; Yuan et al., 2021), there was widespread concern about the mental health effects of COVID-19 for those with and without psychopathology (Pfefferbaum and North, 2020). Individuals with obsessive-compulsive disorder (OCD) were considered particularly vulnerable given the overlap between OCD symptoms (e.g., contamination concerns, excessive handwashing) and behaviors and attitudes

considered appropriate in the fight against COVID-19 (Fineberg et al., 2020; Fontenelle and Miguel, 2020).

In fact, findings from early studies examining the effect of the pandemic on people with OCD across the globe were mixed. Studies of patients with a known OCD diagnosis indicated that in samples ranging from 61 to 123 people, between 4% and 36% of adults (Benatti et al., 2020; Carmi et al., 2021) and 54% of children (Tanir et al., 2020) reported worsening of symptoms; another study found a mean increase in severity of OCD symptoms across a sample of 279 adults (Khosravani et al., 2021). Online studies of people who self-identified as having OCD showed a similarly large range of outcomes, with between 33% and 76% of samples reporting symptom worsening (Jelinek et al., 2021; Littman et al., 2020; Wheaton et al., 2021). However, Tandi et al. (2021) found

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that after an initial worsening of symptoms, individuals with OCD subsequently experienced symptom improvement, and others found that children (Schwartz-Lifshitz et al., 2021) and some adults (Littman et al., 2020) reported improved functioning months into lockdown.

It remains unclear what accounts for this variation in response to the pandemic. One factor that might explain this heterogeneity is the individual difference factor of resilience. Described as one's ability to successfully adapt to challenges (Wagnild, 2009), resilience involves incorporating elements of stressful experiences to move beyond baseline capacities by developing stronger resources or finding new benefits (Tomich and Helgeson, 2004). Highly-resilient individuals have been found to experience less psychological distress after exposure to stressors including traumatic life events (Bensimon, 2012). In a non-specific sample of 515 individuals recruited online, resilience was inversely correlated with state anxiety during the initial outbreak of COVID-19 (McCleskey and Gruda, 2021). Whether resilience might also play a role in the longitudinal trajectories of symptom severity in people with (and without) OCD is unknown.

The present study was designed to examine this question. We followed healthy individuals and patients with a known OCD diagnosis over a six-month period of the COVID-19 pandemic, assessing resilience at baseline and obsessive-compulsive, depressive, and anxiety symptom severity at multiple time points. The sample originated in New York, which was the epicenter of the pandemic in spring of 2020 (Thompson et al., 2020) when data collection started, with rates of over 5000 new cases and over 800 deaths per day at its peak (The New York Times, 2021; Wadhera et al., 2020). We hypothesized that all individuals would experience worsening of psychiatric symptom severity over the six-month period, but that high baseline levels of resilience would be associated with less symptom exacerbation relative to low baseline resilience.

1. Materials and methods

1.1. Participants

The sample consisted of 63 adults who had previously participated in research between 2018 and 2020 at the New York State Psychiatric Institute/Columbia University's Center for OCD and Related Disorders in Manhattan. Participants included healthy controls ($n = 30$) and individuals diagnosed with OCD ($n = 33$) who had received a diagnostic assessment when they had enrolled in research prior to the pandemic and again when entering this study (as described below). The only exclusion criterion was acute suicidality, which no participant endorsed. We received approval to conduct this study from the New York

Psychiatric Institute's Institutional Review Board.

1.2. Study procedures

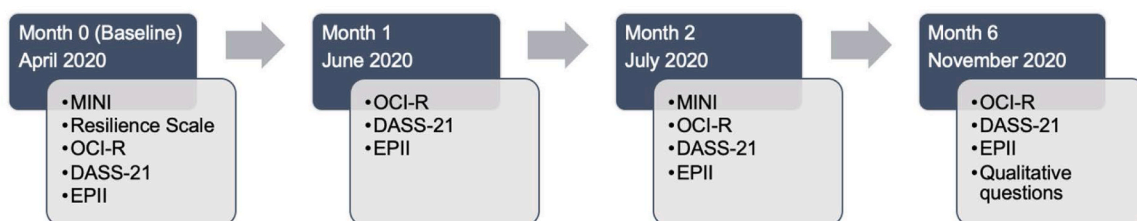
After New York City was placed on mandatory lockdown in March 2020, prior research participants were invited to enroll in a remote research study that included a baseline clinical evaluation and three follow-up assessments over six months (see Fig. 1). Baseline assessments began in April 2020 (Month 0), when NYC was the epicenter of the pandemic with thousands of new cases reported per day. Participants were then evaluated one month later in May/June (Month 1) and again in July/August (Month 2) when COVID-19 cases and deaths were drastically lower (in the 300s and 200s, respectively). Finally, a six-month follow-up (Month 6) occurred in November/December 2020 when cases were again on the rise in NYC with thousands of new infections daily (The New York Times, 2021).

After obtaining study consent, doctoral-level clinicians (PhD and MD) conducted semi-structured diagnostic interviews via telephone with the MINI International Neuropsychiatric Interview (Sheehan et al., 1998) at Month 0 and at Month 2. At all timepoints, participants were emailed a link to a Qualtrics survey where they completed several self-report measures to assess resilience (Month 0), obsessive-compulsive, depressive, and anxiety symptom severity, and perceived positive effects of the pandemic (Months 0, 1, 2, and 6). At Month 6, participants were also asked to qualitatively report how the pandemic had affected their mental health and/or OCD symptom severity.

1.3. Self-report measures

The Resilience Scale, a 25-item self-report measure, was used to assess individuals' baseline ability to respond adaptively to adversity (Wagnild, 2009). The scale examines different components of resilience, including perseverance and finding purpose in life, and yields scores ranging from 14 (*very low resilience*) to 175 (*very high*). Tested in a range of age groups, the scale possesses strong psychometric properties with high internal consistency and strong content and construct validity. The total score is often used as a psychometrically valid global measure of resilience (Wagnild, 2009).

The Obsessive-Compulsive Inventory-Revised (OCI-R) is an 18-item self-report measure that asks people to rate how distressing obsessional thoughts and ritualistic behaviors (e.g., cleaning, checking, arranging) have been on a scale of zero (*not at all*) to four (*extremely*) over the past month (Foa et al., 2002). The OCI-R yields a total score ranging from zero to 72, with higher scores indicating greater symptom severity.



Note. Dates indicate when data collection for each timepoint began. MINI = Mini International Neuropsychiatric Interview; OCI-R: Obsessive-Compulsive Inventory-Revised; DASS-21: Depression Anxiety Stress Scales; EPII = Epidemic-Pandemic Impacts Inventory

Fig. 1. Assessment Timepoints. *Note.* Dates indicate when data collection for each timepoint began. MINI = Mini International Neuropsychiatric Interview; OCI-R: Obsessive-Compulsive Inventory-Revised; DASS-21: Depression Anxiety Stress Scales; EPII = Epidemic-Pandemic Impacts Inventory.

Validated in both nonclinical and clinical samples, the measure has been found to accurately discriminate people with OCD from those with anxiety disorders (Abramowitz and Deacon, 2006).

The Depression Anxiety Stress Scales (DASS-21), a 21-item self-report questionnaire, was used to measure symptoms of depression, anxiety, and stress (Lovibond and Lovibond, 1995). Yielding severity scores ranging from zero to 21 for each of the three subscales, the DASS-21 has good validity and reliability and is commonly used in both research and clinical settings to screen for symptoms and measure treatment progress (Henry and Crawford, 2005).

The Epidemic-Pandemic Impacts Inventory (EPII) is a recently developed 92-item self-report measure that assesses the effects of pandemics and epidemics on various domains, including work and home life (Grasso et al., 2020). We used the 19-item positive change subscale to evaluate the extent to which participants experienced “silver linings” of the pandemic, including having more time to spend with loved ones or developing new hobbies, feeling more appreciative of things taken for granted, and being more attentive to one’s health. The number of “silver linings” endorsed were totaled to provide a sum score ranging from zero (no positive effects) to 19 (significant positive effects).

1.4. Data analytic plan

To examine trajectories of obsessive-compulsive, depression, and anxiety symptom severity over four timepoints (Months 0, 1, 2, and 6), we fit three linear mixed-effects growth models, which account for clustering of repeated measures within subjects (Baayen et al., 2008). All models were fit with subject-level random intercepts using Stata 14 (StataCorp, 2015); the primary predictors were diagnostic group, total resilience, and time. Time was treated as a fixed factor and the Month 0 assessment timepoint was used as the reference. Significant interactions were probed using a simple-slopes methodology at the 16th (low) and 84th (high) percentiles of resilience to ensure that the probed points of the continuous moderator were within the observed range of data, in line with published recommendations (Hayes, 2018). Post-hoc pairwise comparisons were used to determine differences in predictive margins, adjusting for multiple comparisons.

To understand how preexisting group differences in demographics might contribute to outcomes in this study, we repeated the main models with each variable that could be meaningful included as an independent variable in the model, which is the standard recommendation for addressing such potential confounds (Miller and Chapman, 2001; Verona and Miller, 2015). Age, sex, race, and ethnicity were not significantly associated with any outcome (all p -values $>.25$) and each contributed to worse model fit when included and thus were excluded from primary analyses.

Pearson bivariate correlations without correction for multiple comparisons were used to examine the association of baseline resilience with the appreciation for “silver linings” subscale of the EPII, which was measured at all four timepoints. We report standardized effect sizes (Cohen’s d) for all correlational r -values, with benchmarks of 0.2, 0.5, and 0.8 representing small, medium, and large effects, respectively (Cohen, 1969).

2. Results

2.1. Sample characteristics

We consented 68 individuals who expressed interest in completing the study; ultimately, two individuals were omitted from analyses because they did not complete any assessment timepoint after providing consent and three others were excluded because they only provided data for one assessment point after baseline. The final sample ($n = 63$) consisted of 45 (71%) females and had a mean age of 27.4 years ($SD = 7.0$). With a mean age of 26.5 years ($SD = 8.1$), healthy controls ($n = 30$) included 22 (73%) females and seven (23%) Hispanic, 15 white (50%),

nine (30%) Asian, three (10%) Black, and three (10%) other race/unknown individuals. The OCD group ($n = 33$) had a mean age of 28.2 years ($SD = 5.9$) and consisted of 23 (70%) females, and two (6%) Hispanic, 26 (79%) white, four (12%) Asian, two (6%) Black, and one (3%) other race/unknown people.

Clinical information by group is presented in Table 1. As expected, the OCD group had significantly higher ratings of obsessive-compulsive, depressive, and anxiety symptom severity than healthy participants at all time points. Resilience scores were distributed similarly in both diagnostic groups (see Fig. 2), although the OCD group had significantly lower levels of resilience at baseline (see Table 1). At Month 0, OCD patients reported an average of 1.2 ($SD = 1.15$) comorbid disorders. At Month 2, only two participants with OCD had a change in diagnosis: one had developed panic disorder and another no longer met OCD criteria. No healthy participants met diagnostic criteria for a psychiatric disorder at Months 0 or 2.

There were no significant changes across timepoints in obsessive-compulsive, depressive, or anxiety symptom severity within each diagnostic group. Over the course of the study, 19 of the 33 OCD participants were receiving treatment: one (3%) received ERP only; seven (21%) received a combination of ERP and medication (four of whom started a new medication during the pandemic); six (18%) had non-CBT therapy and medication (three of whom started a new medication during the pandemic); four (12%) were taking psychiatric medication only (two of whom started medication during the pandemic); and one (3%) was receiving a non-CBT therapy only. Although no healthy participants met diagnostic criteria for a psychiatric illness at Months 0 or 2, seven (23%) reported being in supportive therapy at one or more assessment timepoints (none was on psychiatric medication).

Participants’ qualitative responses describing their experiences of the pandemic, assessed at Month 6, are summarized by diagnostic group in Table 2. Overall, most healthy participants endorsed that they perceived no change in their mental health whereas the majority of participants diagnosed with OCD perceived worsening.

2.2. Primary models

Model 1: Overall Obsessive-Compulsive Symptom Severity. Estimates of fixed effects from the linear mixed-effects growth model predicting overall obsessive-compulsive symptom severity across all timepoints are summarized in Table 3. Neither the three-way interaction of diagnostic group, resilience, and time, nor the two-way interactions with diagnostic group were significant, all p -values $>.06$. These parameters were therefore removed from the model to reduce collinearity and maximize the available degrees of freedom, increasing the stability and precision of the effect estimates.

In the reduced model, there was a significant interaction of resilience and time at Month 2, $\beta = 0.08$, $p = .01$. As illustrated by Fig. 3a, post-hoc pairwise comparisons revealed that regardless of diagnostic group, low-resilience individuals demonstrated greater total obsessive-compulsive symptom severity than high-resilience individuals at Month 2, $p < .001$. Moreover, low-resilience was associated with a significant decrease in symptom severity from Month 0 to Month 2, $p < .0001$, and an increase in symptom severity from Month 2 to Month 6, $p = .001$, whereas high resilience was associated with no significant change in the severity of symptoms between these timepoints. Additional post-hoc comparisons confirmed that low-resilience individuals exhibited greater obsessive-compulsive symptom severity relative to high-resilience individuals at Months 0, 1, and 6, all p -values $< .0001$. The lack of a diagnostic group by resilience interaction meant that high resilient patients with OCD demonstrated comparable symptom levels and symptom trajectories as low resilient healthy controls (see Fig. 3b).

Model 2: Depression. Estimates of fixed effects from the linear mixed-effects growth model predicting depression are summarized in Table 3. As illustrated in Fig. 4, there was a significant two-way interaction of resilience and time at Month 6, $\beta = -0.92$, $p = .009$. Post-hoc

Table 1
Descriptive statistics for healthy controls (HC) and patients with obsessive-compulsive disorder (OCD) at all assessment timepoints.

	Baseline		Month 1		Month 2		Month 6	
	HC	OCD	HC	OCD	HC	OCD	HC	OCD
	<i>n</i> = 30	<i>n</i> = 33	<i>n</i> = 29	<i>n</i> = 31	<i>n</i> = 29	<i>n</i> = 30	<i>n</i> = 29	<i>n</i> = 33
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Obsessive- Compulsive Symptoms (OCI-R)	3.2 (4.14)	20.8 (9.6)*	3.5 (4.3)	17.1 (11.1)*	3.2 (4.7)	16.3 (11.1)*	4.55 (5.65)	20.9 (12.9)*
Depression (DASS)	.37 (.49)	5.0 (4.22)*	.72 (1.7)	5.1 (4.3)*	.66 (1.7)	4.5 (5.1)*	.76 (1.7)	6.1 (5.5)*
Anxiety (DASS)	.30 (.91)	4.5 (3.9)*	.59 (1.6)	3.6 (3.4)*	.76 (1.4)	3.2 (3.7)*	.55 (1.0)	4.4 (4.5)*
Resilience	149.3 (16.4)	125.8 (21.7)*	–	–	–	–	–	–
Silver linings (EPII)	9.2 (3.2)	7.1 (3.4)*	9.5 (3.8)	7.5 (4.1)	9.2 (3.8)	6.86 (4.1)*	9.5 (3.7)	7.4 (4.3)*

Note: HC = Healthy control; OCD = Obsessive-Compulsive Disorder; Mo = Month; M = Mean; SD = Standard deviation; OCI-R = Obsessive-Compulsive Inventory-Revised, DASS = Depression Anxiety Stress Scales; EPII = Epidemic-Pandemic Impacts Inventory; * indicates significant difference from healthy controls at *p*-value < .05.

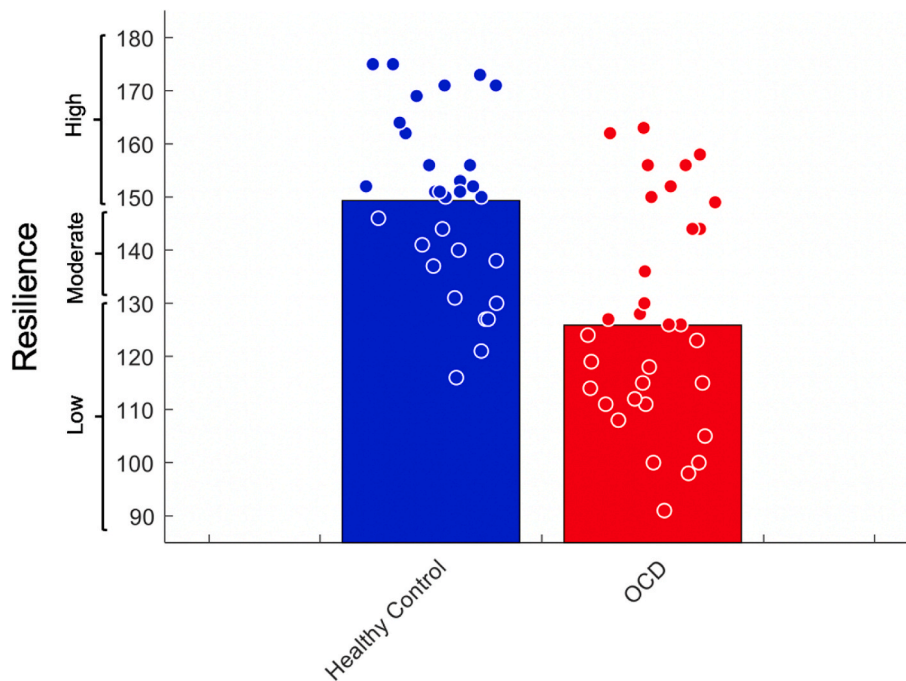


Fig. 2. Distribution of Resilience Scores by Diagnostic Group at Baseline.

pairwise comparisons involving this timepoint revealed that at low levels of resilience, depression severity at Month 6 was greater than at all preceding timepoints, *p* < .01 for all timepoints.

Diagnostic group did not significant interact with resilience or time. A main effect of diagnostic group demonstrated that patients diagnosed with OCD demonstrated greater depression symptom severity throughout the entire assessment period, $\beta = 3.90, p < .0001$.

Model 3: Anxiety. Estimates of fixed effects from the linear mixed-effects growth model predicting anxiety are summarized in Table 3. As illustrated in Fig. 5, there was a significant three-way interaction of diagnostic group, resilience, and time at Month 6, $\beta = -0.04, p = .02$. Post-hoc pairwise comparisons involving this timepoint revealed that high-resilience patients with OCD demonstrated significantly less anxiety severity than low resilience patients with OCD at Month 6, *p* = .02.

Correlational analyses with appreciation for “silver linings.” To examine how resilience might be associated with other related individual-level factors measured at each timepoint, we conducted a Pearson bivariate correlational analysis with the positive change subscale of the EPII, which quantifies the degree to which an individual experiences perceived “silver linings” of the pandemic. Baseline resilience was significantly associated with appreciation for “silver linings” at Month 0, *r* = 0.27, *p* = .003, *d* = 0.56, Month 1, *r* = .26, *p* = .04, *d* =

0.54, and Month 2, *r* = 0.39, *p* = .002, *d* = 0.85, and trending to significance at Month 6, *r* = 0.22, *p* = .08, *d* = 0.45.

3. Discussion

The present study examined how individuals with OCD and healthy controls were psychologically impacted by the COVID-19 pandemic over a period of six months. We hypothesized that all participants would experience worsening of obsessive-compulsive, depressive, and anxiety symptom severity, with high resilience demonstrating a protective effect. Our data showed that, in fact, overall psychiatric symptoms remained stable between timepoints within diagnostic groups, but as hypothesized, resilience moderated this trajectory such that low resilience was associated with greater symptom severity variability. Baseline resilience also correlated with participants’ appreciation for pandemic “silver linings” at all time points but Month 6.

Although on average the OCD group had significantly higher levels of obsessive-compulsive symptom severity and lower levels of baseline resilience, high levels of resilience were associated with lower obsessive-compulsive symptom severity regardless of diagnostic group at every assessment timepoint. In contrast, individuals with low resilience showed symptom variation across timepoints, with a pattern that

Table 2

Qualitative report of perceived impact of the COVID-19 pandemic on mental health for healthy controls (HC) and patients with obsessive-compulsive disorder (OCD).

	HC (change in mental health)	OCD (change in OCD)
Change in mental health at 6-month assessment	<ul style="list-style-type: none"> Improved: 16.1% (n = 5) Worsened: 25.8% (n = 8) No change: 51.6% (n = 16) 	<ul style="list-style-type: none"> Improved: 24.2% (n = 8) Worsened: 39.3% (n = 13) No change: 30% (n = 11)
Reasons for improvement	<ul style="list-style-type: none"> More time to be present (n = 2) Development of improved coping skills (n = 1) More time at home (n = 1) Increased life stability (n = 1) 	<ul style="list-style-type: none"> Less exposure to triggering cues due to lockdown measures (n = 3) Increased motivation/commitment to addressing OCD symptoms (n = 5)
Reasons for worsening	<ul style="list-style-type: none"> Pandemic-related fears about health and infection (n = 4) Greater isolation (n = 4) 	<ul style="list-style-type: none"> Increase in COVID-19 specific worries (n = 5) Decreased socialization (n = 1) Fear of harming others by infecting people with COVID-19 (n = 1) Fear about health after contracting COVID-19 (n = 1) More time to think and worry (n = 3) Increase in general life stress (n = 3)

seemed to reflect the number of COVID-19 cases in New York City: greatest severity of obsessive-compulsive symptoms was observed at Month 0 (April–May 2020) when COVID-19 cases in NYC were highest and fewer symptoms were reported at Months 1 and 2 (June–August 2020) when COVID-19 cases were drastically lower. Similarly, Hawes et al. (2021) found that the mental health trajectory of healthy adolescents and young adults in New York mirrored the number of COVID-19 cases in 2020, with anxiety and depressive symptoms peaking in the spring before subsiding in the summer. Moreover, we found that individuals with low resilience showed another increase in obsessive-compulsive symptom severity at Month 6 (November–December 2020) during the second wave of COVID-19 infections. That this pattern was consistent among both healthy controls and patients suggests that resilience is not only protective in people without mental illness, but also buffers against developing more symptoms in times of extreme stress for individuals with OCD. These findings are in line with an aspect of resilience that has been highlighted by prior research: the ability of a person to maintain equilibrium or “relatively stable, healthy levels of psychological and physical functioning” (p. 20) in the face of difficult circumstances (Bonanno, 2004).

Interestingly, we found that high-resilience individuals with OCD and low-resilience healthy participants did not significantly differ in obsessive-compulsive symptom severity (even though those with OCD had higher mean ratings). Though below the clinical threshold, healthy controls’ elevated scores are likely explained by items that capture fears and behaviors directly relevant to the pandemic. For example, the OCI-R includes questions about upsetting thoughts (“I am upset by unpleasant thoughts that come into my mind against my will”) and cleaning behaviors (“I find it difficult to touch an object when I know it has been touched by strangers or certain people”), both of which have been known to intensify in the general population during pandemics, and through the COVID-19 outbreak specifically (Taylor, 2019; Taylor et al., 2020). One possibility that might explain why high-resilience people with OCD reported subthreshold levels of obsessive-compulsive

Table 3

Estimates of fixed effects from model predicting OC symptoms, depression, and anxiety.

	β	<i>p</i>	95% CI	
			LL	UL
Obsessive-Compulsive Symptoms				
Diagnostic Group	10.92	<.0001	6.78	15.06
Resilience	-.22	<.0001	-.31	-.14
Time				
Month 1	-3.17	.49	-12.23	5.89
Month 2	-13.04	.005	-22.1	3.97
Month 6	-3.89	.38	-12.73	4.94
Time x Resilience				
Month 1	.01	.72	-.05	.08
Month 2	.08	.01	.014	.14
Month 6	.02	.42	-.03	.09
Depression				
Diagnostic Group	3.90	<.0001	2.34	5.45
Resilience	.007	.53	-.01	.03
Time				
Month 1	.12	.92	-2.4	2.64
Month 2	-.34	.79	-2.86	2.17
Month 6	3.91	.002	1.39	6.42
Time x Resilience				
Month 1	-.0006	.95	-.02	.02
Month 2	.0004	.96	-.02	.02
Month 6	-.02	.009	-.04	-.006
Anxiety				
Diagnostic Group	1.75	.53	-3.78	7.28
Resilience	-.005	.74	-.04	.02
Time				
1-Month	-.65	.78	-5.26	3.94
2-Month	-.14	.95	-4.74	4.46
6-Month	-.88	.70	-5.48	3.72
Diagnostic Group x Resilience	.02	.42	-.02	.05
Diagnostic Group x Time				
Month 1	.09	.97	-5.10	5.28
Month 2	-.62	.81	-5.82	4.56
Month 6	4.88	.06	-.31	10.08
Resilience x Time				
Month 1	.006	.69	-.02	.03
Month 2	.003	.81	-.02	.03
Month 6	.007	.63	-.02	.04
Diagnostic Group x Resilience x Time				
Month 1	-.01	.58	-.047	.026
Month 2	-.01	.60	-.046	.02
Month 6	-.04	.02	-.08	-.007

Note: LL = Lower limit; UL = Upper limit.

symptoms despite the fact that they met criteria for the disorder when assessed with a clinical interview is that they used the pandemic as motivation to confront their OCD symptoms. Alternatively, lockdown measures may have effectively permitted people to avoid situations that would otherwise exacerbate their symptoms, leading to artificially low OCI-R scores. Both explanations are partially supported by qualitative reports summarized in Table 2, with some OCD participants attributing perceived symptom improvement to less exposure to certain stimuli and others stating they used it as opportunity to seek treatment. A third explanation is that those with higher resilience are simply better equipped to manage their symptoms and persist with treatment regardless of outside factors, such as the pandemic. Thus, the groups’ varying symptom trajectories could be due to normal longitudinal fluctuations in symptom severity, with the group differences explained by resilience.

The pattern for depressive and anxiety symptoms were slightly different. In both diagnostic groups, people with low resilience had comparable depressive symptom severity to those with high resilience at every timepoint until the six-month follow-up, when low resilience individuals’ scores started to increase. As was the case with obsessive-compulsive symptoms, it is possible that high-resilience individuals are more able to adapt to stressors over time, leaving them less vulnerable than their low-resilience counterparts to increases in

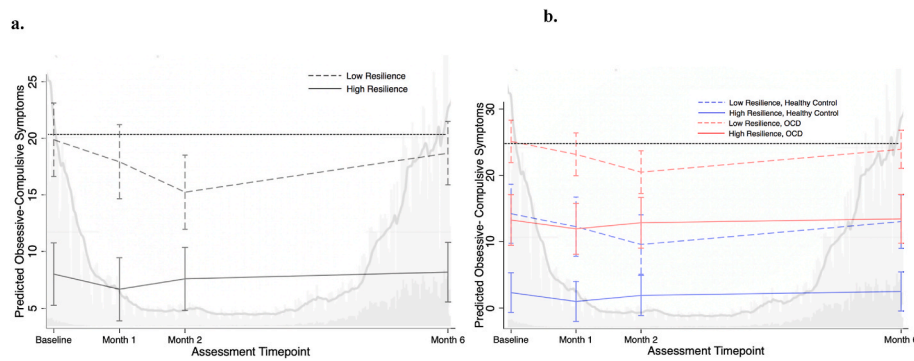
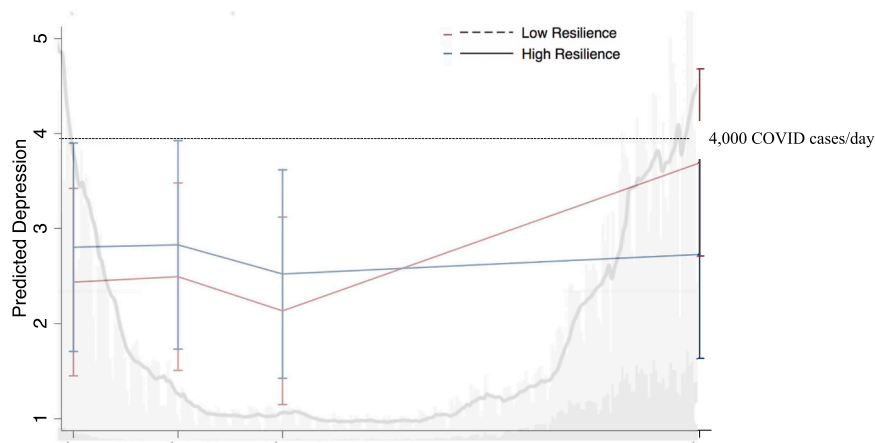


Fig. 3. a–b Trajectories of Obsessive-Compulsive Symptoms at Low (16th Percentile) and High (84th Percentile) Levels of Resilience (a) and by Diagnostic Group (b).



Note: Number of reported daily cases of COVID-19 in New York City are plotted in grey-scale (New York Times, 2021). The dotted line represents 4,000 citywide COVID-19 cases per day.

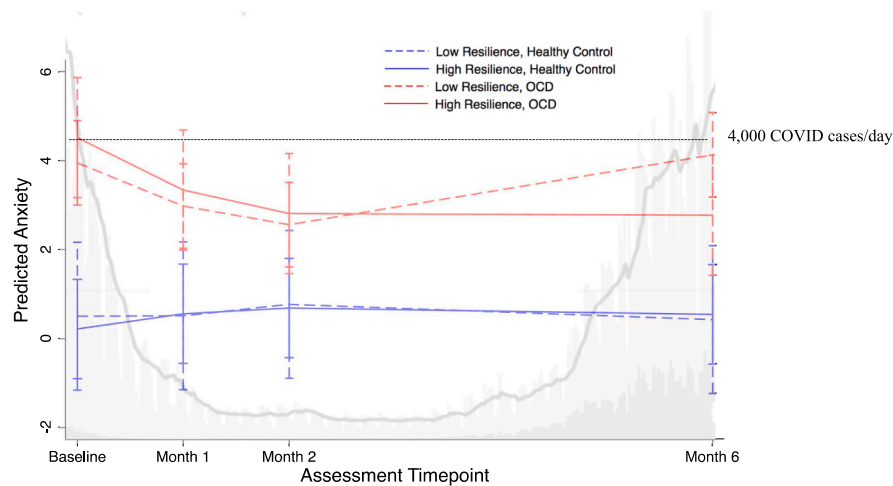
Fig. 4. Trajectories of Depression at Low (16th Percentile) and High (84th Percentile) Levels of Resilience. **Note:** Number of reported daily cases of COVID-19 in New York City are plotted in grey-scale (The New York Times, 2021). The dotted line represents 4000 citywide COVID-19 cases per day.

psychopathological symptoms as the stressors of the pandemic were prolonged. Yarrington et al. (2021) found that when surveyed about their emotions over several timepoints via a mental health app, a non-specific sample consisting of 157,213 American adults similarly reported an increase in depressive *emotions* after several months of the pandemic. However, their sample failed to show a rise of depressive *symptoms* when measured with a brief self-report measure of depression (Kroenke et al., 2001). Conversely, a cross-sectional study conducted between March–April 2020 reported a three-fold increase in depressive symptoms in a nationwide sample when compared to pre-pandemic depression levels (Ettman et al., 2020). In our study, mean depression scores were in the “normal” range for low- and high-resilience individuals across all timepoints, suggesting that the increase we observed in low-resilience people at six months was not yet cause for clinical intervention. With regards to anxiety, individuals with OCD reported higher levels of anxiety than healthy participants at all timepoints regardless of baseline resilience. Healthy participants showed comparable anxiety severity across low and high levels of resilience. Within the OCD sample, the symptom trajectory did not vary between those with high and low resilience until six months, when symptoms in low resilience individuals started to rise.

Taken together, our data for obsessive-compulsive, depressive and anxiety symptom severity are in line with the observation that resilience

is not simply an absence of psychopathology, but rather a stable trajectory of functioning over time regardless of brief perturbations (Bonanno, 2004). That is, in response to a prolonged stressor, highly resilient individuals seemed more likely to maintain stable trajectories whereas those with low levels of resilience were less likely to do so. Given that resilience was correlated with the ability to find “silver linings,” we speculate that the stable symptom trajectories exhibited by highly resilient participants were attributable in part to their ability to find these “silver linings” in a period that was otherwise marked by enormous upheaval and loss.

Our study had several limitations. First, our sample was relatively small, included individuals from one clinic in NYC, and consisted of those willing to participate in research, who may not be representative of the general population. Second, some (both OCD and healthy controls) were receiving or started treatment during the study. Thus, it is not possible to fully disentangle the relationship between treatment and resilience in our sample. Treatment may increase people’s level of resilience (e.g., some studies indicate that certain psychoactive medications change the brain on a neuronal and molecular level, thus reducing vulnerability and increasing resilience to depression; Bagot et al., 2017; Friedman et al., 2014) or, as noted above, highly-resilient people may be more likely to seek and/or engage with treatment; there may also be a bidirectional relationship. Finally, our modest



Note: Number of reported daily cases of COVID-19 in New York City are plotted in grey-scale (New York Times, 2021). The dotted line represents 4,000 citywide COVID-19 cases per day.

Fig. 5. Trajectories of Anxiety at Low (16th Percentile) and High (84th Percentile) Levels of Resilience and by Diagnostic Group. *Note:* Number of reported daily cases of COVID-19 in New York City are plotted in grey-scale (The New York Times, 2021). The dotted line represents 4000 citywide COVID-19 cases per day.

sample size precluded an examination of how other variables such as socioeconomic status (including job loss) or COVID-19 infection may also have affected mental health trajectories. The sample size also leaves our findings more susceptible to symptom fluctuations – which may be due to factors unrelated to the pandemic – in a minority of subjects. Because we are not sufficiently powered to examine all potential confounding variables, it is important to further examine the relationship between resilience and response to chronic stressors in a larger sample.

4. Conclusion

Despite widespread concern about the effect of the pandemic on the general population, and on those with OCD in particular, results from the present study are encouraging. Contrary to expectations, we did not observe a general worsening of symptoms in our sample. Rather, individuals with high levels of resilience – including both people with OCD and healthy participants – maintained stable levels of obsessive-compulsive, anxiety, and depressive symptom severity over our six-month assessment period. Conversely, people with low resilience showed more variability in symptom severity and exhibited heightened levels of symptom severity over time. Research suggests that it is possible to teach people skills to bolster resilience, and these skills have been associated with improved outcomes among individuals experiencing stressful events (Bower et al., 2009; Cohn et al., 2009). Thus, resilience could be a potential intervention target, particularly for reducing risk to psychopathology in future crises and sustained unavoidable stressors.

Author statement

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Declaration of competing interest

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