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Associations between COVID-19-related stress and obsessive-compulsive disorder symptoms among adolescents in Southern California

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Abstract

Objectives: The COVID-19 pandemic led to widespread public health measures such as quarantine and social distancing. While critical for disease mitigation, these interventions might have exacerbated stress, anxiety, and other adverse mental health outcomes among youth. This study examined the association between COVID-19-related stressors and Obsessive-Compulsive Disorder (OCD) symptoms among adolescents.

Methods: Data were drawn from three waves of a cohort study in Southern California, collected during lockdown due to COVID-19 (spring 2021; n=2,235), and in the following two years (spring 2022; n=3,765; spring 2023; n=3,917). Adjusted logistic regression models estimated cross-sectional associations between COVID-19-related stressors (participant COVID diagnosis [2021–2022], disease severity among friends/family [2021–2022], perceived COVID-related stress [2021, 2023], life stressors during lockdown [2021]), and OCD symptoms measured using the Revised Children's Anxiety and Depression Scale (RCADS).

Results: The prevalence of OCD symptoms declined over time, from 15.1 % in 2021 to 9.7 % in 2023. In 2021, adolescents who had COVID themselves, had friends or family who died from COVID, expressed extreme stress related to COVID, or experienced any of several COVID life stressors had higher odds of OCD symptoms (OR range=1.48–15.8; p<0.05). In 2022, having friends or family who had severe COVID (OR=1.42; 95 % CI=1.00, 2.00), required hospitalization (OR=1.82; 95 % CI=1.17, 2.82), or died from COVID (OR=1.68; 95 % CI=1.14, 2.47) was associated with greater odds of OCD symptoms. In 2023, adolescents reporting somewhat (OR=1.56; 95 % CI=1.11, 2.18), very (OR=2.28; 95 % CI=1.43, 3.64), or extremely high stress over COVID-19 (OR=3.02; 95 % CI=1.58, 5.75) had significantly elevated odds of OCD symptoms.

Conclusions: These findings underscore the significant association of pandemic-related stressors and adolescent OCD symptoms, even several years after the onset of the pandemic. Targeted mental health interventions are needed to support vulnerable youth during and after public health crises.

Keywords: COVID-19; obsessive-compulsive disorder; mental health; adolescents; pandemic stress

Introduction

Obsessive-compulsive disorder (OCD) is an often-debilitating chronic mental disorder characterized by persistent and unwanted intrusive thoughts, repetitive behaviors, and/or cognitive rituals [1]. OCD presentations are heterogeneous and span multiple dimensions. Common obsessional themes include contamination, harm (to oneself or others), as well as symmetry or ordering behaviors with corresponding compulsions that are performed to reduce distress, though patterns vary widely across individuals [2–4]. Historically, studies classified OCD as a rare condition; however, recent community surveys suggest that OCD is among the most prevalent mental disorders [5, 6]. Indeed, OCD-associated symptoms have been reported in 1–3 % of both adult and pediatric populations [2, 7]. While the etiology of OCD remains complex and multifaceted, both genetic and environmental factors (including stress) have been implicated [8–11]. For example, evidence from prior public health emergencies, such as the 2003 Severe acute respiratory syndrome outbreak and the H1N1 influenza pandemic, indicates that environmental stressors, including perceived health threats and disruptions to daily routines, may interact with individual vulnerabilities such as genetic predisposition and elevated anxiety sensitivity to contribute to the onset or exacerbation of OCD symptoms in susceptible individuals [12, 13].

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The 2020 COVID-19 pandemic was an unprecedented public health emergency, the effects of which are still not fully known. As a result of the highly virulent nature of COVID-19, coupled with the lack of an effective COVID-19 vaccine in the early stages of the pandemic, public health measures such as quarantine and social distancing were implemented to mitigate the rapid spread of the virus. Between February and March 2020, 122,653 cases of COVID-19 were reported in the United States [14]. Consequently, on March 19, 2020, California proclaimed a state of emergency that ordered all individuals to stay-at-home, becoming the first state in the United States to implement a statewide stay-at-home order in response to the COVID-19 pandemic [15]. These measures were not lifted until more than a year later in June 2021 [15]. While stay-at-home orders proved effective in slowing the spread of COVID-19 globally [16, 17], this intervention gave rise to deleterious mental and physical health effects such as social isolation, emotional distress, and decreased levels of physical activity [18]. These disruptions were especially consequential for adolescents, many of whom transitioned to remote learning during a developmentally sensitive period that peer interactions and school routines may shape [19]. Previous studies have noted that the psychological repercussions of the COVID-19 outbreak may have exacerbated symptoms in a subset of individuals who were already affected by OCD, particularly those who fear contamination [20–24]. However, the impact of the pandemic on OCD symptoms in adolescents and potential factors that may have exacerbated symptoms in this population are not well understood.

This study examined the association between COVID-19 stressors and OCD symptoms in adolescents in Southern California in the first year of the pandemic (during lockdown) and in the two years following. Specifically, we collected variables designed to capture adolescents' exposure to and stress related to the COVID-19 pandemic. These included personal COVID-19 diagnosis, severity of illness among friends and family, perceived stress related to the pandemic, and stressors associated with lockdown conditions (e.g., family conflict, restriction of privacy, and social isolation). Since this cohort was initiated during the COVID-19 pandemic, we did not collect pre-pandemic baseline data on OCD symptoms. Thus, the present analyses are cross-sectional within each wave and are intended to characterize associations between COVID-19-related stressors and OCD symptoms rather than to establish causal effects. We assessed how these COVID-19-related exposures and stressors were associated with clinical and subclinical OCD symptoms over time. Understanding these relationships may serve to inform targeted mental health responses during future public health crises.

Methods

Participants and procedures

Data were from an ongoing prospective cohort study of adolescents from 11 high schools across five counties in Southern California. Recruitment and study design details are reported in more depth elsewhere [25]. Briefly, participants were recruited in the ninth grade during the fall of 2020 or the fall of 2021 (split cohort), and remote surveys administered via Zoom during classroom time were completed during each respective semester. In-classroom electronic surveys were collected in both the fall and spring semesters of each subsequent academic year. Students who were absent during data collection days were sent a link and invited to complete the survey remotely outside of their class time. The current study used survey data from three waves: spring 2021 (March 2021 – July 2021; during lockdown from COVID-19), spring 2022 (February 2022 – July 2022; first year back in classrooms after lockdown), and spring 2023 (February 2023 – June 2023; second year back in classrooms after lockdown). Since this data is from an ongoing cohort, some students participated in more than one survey wave, while others contributed data at only a single wave, resulting in partial overlap of participants across waves.

Ethics statement

The Institutional Review Board reviewed and approved this study. Prior to data collection, written parental consent and student assent were obtained.

Measures

COVID-19 factors

In spring 2021, participants reported whether they had ever been diagnosed with COVID-19 (yes/maybe vs. no), and severity of symptoms for any family member or friend diagnosed with COVID-19 (Select all that apply from: had COVID-19 and did not get sick or were only a little sick, had COVID-19 and got really sick, had COVID-19 and stayed overnight in the hospital, died from COVID-19). Analyses categorized participants according to the most severe symptom reported for any family member or friend. To assess COVID-19-related stress, participants were asked to rate their degree of concern, worry, or stress about COVID-19 in terms of its effect on them personally using a 5-point Likert scale (not at all, slightly, somewhat, very, extremely).

Participants also reported on an 18-item measure assessing how COVID-19 impacted their daily life (select all that apply). Sample items included questions such as, "I haven't been able to see my friends," "My parent or guardian lost their job," and "I have felt lonely or isolated." We conducted an exploratory factor analysis (EFA) on the 18 items assessing COVID-19's impact on daily life. A factor loading cutoff of 0.48 and eigenvalue cutoff of 1 were used to determine the number of factors and included items. Six items were retained for this scale: "I have had more arguments or fights with my parents/guardians, siblings, or others who live with me," (α=0.71), "I have not had enough freedom, privacy, or personal space," (α=0.72), "I have felt lonely or isolated," (α=0.68), "I have felt anxious, stressed, or depressed," (α=0.69), "It has been hard to adjust to doing schoolwork at home," (α=0.70), and "I have fallen behind on schoolwork at home," (α=0.70), with a total factor-alpha of 0.74. A continuous summed six-item scale representing the number of daily life activities adversely impacted by the COVID-19 pandemic was created and used for logistic regression analysis.

Obsessive-compulsive disorder (OCD) symptoms

The primary outcome was the presence of OCD symptoms assessed via the 6-item OCD subscale of the Revised Children's Anxiety and Depression Scale (RCADS) [26], which evaluated the frequency of intrusive thoughts and repetitive behaviors (e.g. "I have to keep checking that I have done things right", "I can't seem to get bad or silly thoughts out of my head"). Each item was rated on a 4-point Likert scale ranging from 0=Never to 3=Always to indicate how often that experience occurred. A total sum score for the OCD subscale was calculated and transformed into a standardized score based on sex at birth and grade level to determine the corresponding clinical threshold category: normal, borderline clinical, and clinical. Participants were categorized using a dichotomized OCD cutoff score (subclinical/clinical vs. no symptoms).

Covariates

We collected data on gender identity (male, female, transgender male, transgender female, gender variant/nonbinary, other, declined to respond), race/ethnicity (White, Hispanic/Latinx, Asian, Multi-racial, American Indian or Alaska Native, Black or African American, Native Hawaiian or Pacific Islander, other), subjective family financial status (pretty well off financially, financially struggling or in poverty, it varied), and sexual identity (heterosexual, asexual, bisexual, gay, lesbian, pansexual, queer, questioning/unsure, another identity not listed here [LGBTQA+], prefer not to disclose).

Data analysis

This sample included participants with non-missing data on OCD symptoms, COVID-19 factors, and sociodemographic characteristics at each time point (spring 2021 n=2,235; spring 2022 n=3,765; and spring 2023 n=3,917). Descriptive statistics of sociodemographic factors and COVID-19 factors were generated for the overall sample at each wave.

Primary analysis consisted of logistic regression models to analyze the association between each COVID-19 factor and OCD symptoms at each corresponding wave: COVID-19 diagnosis (2021, 2022), family/friend symptom severity (2021, 2022), COVID-19 worry and stress (2021, 2023) and COVID-19 life stressors (2021). Data were analyzed separately by wave to investigate associations of COVID-19 stressors and OCD symptoms at distinct time points related to the COVID-19 pandemic (i.e., during lockdown, first year after lockdown was lifted, two years after the start of the pandemic). All models adjusted for gender identity, race and ethnicity, subjective family financial status, and sexual identity; estimates are reported as adjusted odds ratios (OR) and 95 % confidence intervals (CI). All analyses were conducted in R version 4.2.2.

Results

Demographic characteristics

The sample in each wave was demographically diverse, with a slightly higher percentage of females and a small percentage of individuals identifying as a gender minority, which included individuals who identify as transgender or nonbinary (3.7–5 .0%; Table 1). Additionally, the sample was predominantly Hispanic/Latinx (48.1–49.1 %), followed by Asian participants (32.8–35.6 %) and White participants (6.7–8.0 %). Approximately half of the study participants reported average subjective financial status (49.1–55.6 %). Furthermore, approximately one-quarter of the sample identified as

Table 1: Demographic Characteristics of the sample at each wave.

Demographic characteristics	2021[d] n, %	2022[d] n, %	2023[d] n, %
	n=1986	n=3,065	n=3,122
Gender identity			
Male	795 (40.0 %)	1,318 (43.0 %)	1,344 (43.0 %)
Female	1,055 (53.1 %)	1,549 (50.5 %)	1,574 (50.4 %)
Gender minority[a]	74 (3.7 %)	153 (5.0 %)	144 (4.6 %)
Decline to respond	62 (3.1 %)	45 (1.5 %)	60 (1.9 %)
Race/ethnicity			
White	158 (8.0 %)	204 (6.7 %)	231 (7.4 %)
Hispanic/latinx	966 (48.6 %)	1,504 (49.1 %)	1,502 (48.1 %)
Asian	651 (32.8 %)	1,041 (34.0 %)	1,110 (35.6 %)
Multi-racial	153 (7.7 %)	228 (7.4 %)	168 (5.4 %)
All other races[b]	58 (2.9 %)	88 (2.9 %)	81 (2.6 %)
Subjective financial status			
Pretty well off	531 (26.7 %)	833 (27.2 %)	828 (26.5 %)
About average	1,104 (55.6 %)	1,677 (54.7 %)	1,534 (49.1 %)
Struggling	124 (6.2 %)	174 (5.7 %)	301 (9.6 %)
Varied	227 (11.4 %)	381 (12.9 %)	459 (14.7 %)
Sexual identity			
Heterosexual	1,467 (73.9 %)	2,249 (73.4 %)	2,178 (69.8 %)
LGBTQA+[c]	440 (22.2 %)	727 (23.7 %)	825 (26.4 %)
Prefer not to disclose	70 (4.0 %)	89 (2.9 %)	119 (3.8 %)

[a]Gender minority includes individuals who responded as transgender male, transgender female, gender variant/non-binary, and additional gender category/identity. [b]All other races include African Americans, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, another race/racial identity not listed here, don't know, and decline to respond. [c]LGBTQA+ includes individuals who responded as asexual, bisexual, lesbian, pansexual, queer, questioning, and another identity. [d]There is a partial participant overlap in the sample across years. As such, these demographic characteristics may not represent entirely independent samples.

LGBTQIA+, highlighting a notable representation of sexual minority youth in the study.

Prevalence of OCD symptoms and COVID-19 factors

The prevalence of OCD symptoms decreased across the three waves, with 15.1 % reporting clinical or subclinical symptoms in 2021, 13.5 % in 2022, and 9.7 % in 2023. Overall,

Table 2: Prevalence of OCD symptoms and COVID-related stressors at each wave.

Variable	2021 n, %	2022 n, %	2023 n, %
OCD symptoms			
No	1,687 (85.0 %)	2,651 (86.5 %)	2,820 (90.3 %)
Clinical/subclinical	299 (15.1 %)	414 (13.5 %)	302 (9.7 %)
COVID-19 diagnosis			
No	1,608 (85.0 %)	1,828 (59.6 %)	N/A
Yes/maybe	378 (19.0 %)	1,237 (40.4 %)	N/A
Family/friends			
Not diagnosed with COVID-19	757 (38.1 %)	564 (18.4 %)	N/A
They had COVID-19 and did not get sick or were only a little sick	625 (31.5 %)	766 (25.0 %)	N/A
They had COVID-19 and got really sick	319 (16.1 %)	970 (31.6 %)	N/A
They had COVID-19 and stayed overnight in the hospital	102 (5.1 %)	270 (8.8 %)	N/A
They died from COVID-19	183 (9.2 %)	495 (16.2 %)	N/A
COVID-19 worry and stress			
Not at all	192 (9.5 %)	N/A	1,080 (34.6 %)
Slightly	275 (24.6 %)	N/A	1,057 (33.9 %)
Somewhat	498 (24.6 %)	N/A	730 (23.4 %)
Very	609 (30.1 %)	N/A	186 (6.0 %)
Extremely	452 (22.3 %)	N/A	69 (2.2 %)
COVID-19 life-stressors			
Participants were not affected by COVID-19 life-stressors	275 (13.8 %)	N/A	N/A
Had more arguments or fights with my parents/guardians, siblings, or others who live with me	258 (13.0 %)	N/A	N/A
I have not had enough freedom, privacy, or personal space	271 (13.6 %)	N/A	N/A
I have felt lonely or isolated	328 (16.5 %)	N/A	N/A
I have felt anxious, stressed, or depressed	318 (16.0 %)	N/A	N/A
It has been hard to adjust to doing schoolwork at home	289 (14.6 %)	N/A	N/A
I have fallen behind on schoolwork	247 (12.4 %)	N/A	N/A
Variable	2021 n (%)	2022 n (%)	2023 n (%)

Table 2: (continued)

Variable	2021 n, %	2022 n, %	2023 n, %
OCD symptoms			
No	1,687 (85.0 %)	2,651 (86.5 %)	2,820 (90.3 %)
Clinical/Subclinical	299 (15.1 %)	414 (13.5 %)	302 (9.7 %)
COVID-19 diagnosis			
No	1,608 (85.0 %)	1,828 (59.6 %)	N/A
Yes/maybe	378 (19.0 %)	1,237 (40.4 %)	N/A
Family/friends			
Not diagnosed with COVID-19	757 (38.1 %)	564 (18.4 %)	N/A
They had COVID-19 and did not get sick or were only a little sick	625 (31.5 %)	766 (25.0 %)	N/A
They had COVID-19 and got really sick	319 (16.1 %)	970 (31.6 %)	N/A
They had COVID-19 and stayed overnight in the hospital	102 (5.1 %)	270 (8.8 %)	N/A
They died from COVID-19	183 (9.2 %)	495 (16.2 %)	N/A
COVID-19 worry and stress			
Not at all	192 (9.5 %)	N/A	1,080 (34.6 %)
Slightly	275 (24.6 %)	N/A	1,057 (33.9 %)
Somewhat	498 (24.6 %)	N/A	730 (23.4 %)
Very	609 (30.1 %)	N/A	186 (6.0 %)
Extremely	452 (22.3 %)	N/A	69 (2.2 %)
COVID-19 life-stressors			
Participants were not affected by COVID-19 life-stressors	275 (13.8 %)	N/A	N/A
Had more arguments or fights with my parents/guardians, siblings, or others who live with me	258 (13.0 %)	N/A	N/A
I have not had enough freedom, privacy, or personal space	271 (13.6 %)	N/A	N/A
I have felt lonely or isolated	328 (16.5 %)	N/A	N/A
I have felt anxious, stressed, or depressed	318 (16.0 %)	N/A	N/A
It has been hard to adjust to doing schoolwork at home	289 (14.6 %)	N/A	N/A
I have fallen behind on schoolwork	247 (12.4 %)	N/A	N/A

19.0 % of participants reported that they had ever been diagnosed with COVID-19 in 2021, and 40.4 % had ever been diagnosed as of the 2022 survey (Table 2). In 2021, 38.1 % reported none of their family or friends had been diagnosed with COVID-19. Among those who did report exposure, 31.5 % had family or friends with a mild illness, 16.1 % had family or friends who got really sick, 5.1 % knew someone who was hospitalized, and 9.2 % knew someone who died from COVID-19. In 2022, reports of more severe illness increased: 31.6 % had family or friends who got really sick, 8.8 % reported someone who was hospitalized, and 16.2 % reported knowing someone who died from COVID-19. In 2021, more than half of participants reported that they were either very stressed (30.1 %) or extremely stressed (22.3 %) about COVID-19; two years later, in 2023, less than 10 % were either very stressed (6.0 %) or extremely stressed (2.2 %). In 2021, the prevalence of each reported life stressor (e.g., increased arguments, feelings of loneliness) ranged from 12 % to 16 %.

Association of COVID-19 factors with OCD in 2021

Self-reported diagnosis of COVID-19 was significantly associated with OCD symptoms in 2021 in adjusted models (OR=1.48; 95 % CI=1.09, 2.02) (Table 3). Those who had a family member or friend died from COVID-19 also had greater odds of reporting OCD symptoms (OR=2.54; 95 % CI=1.64, 3.92). Individuals who reported that they were extremely stressed about COVID-19 had three times the odds of meeting the criteria for clinical or subclinical OCD symptoms (OR=3.32; 95 % CI=1.81, 6.10). Life stressors specific to the COVID-19 lockdown were also strongly associated with OCD symptoms (with the exception of increased arguments or fights, which was not significant). Elevated odds were observed for not having freedom, privacy, or personal space (OR=3.74; 95 % CI=1.49, 9.39), feeling lonely or isolated (OR=6.95; 95 % CI=2.89, 16.7), feeling anxious, stressed, or depressed (OR=7.95; 95 % CI=3.32, 19.03), having difficulty adjusting to schoolwork at home (OR=10.6; 95 % CI=4.44, 25.37), and falling behind on schoolwork (OR=15.8; 95 % CI=6.58, 37.88).

Association of COVID-19 factors with OCD in 2022

In comparison to 2021, in 2022, there was no association between COVID-19 diagnosis with sub-clinical or clinical OCD

Table 3: Associations of covid-19-related stressors with clinical/subclinical OCD symptoms.

Variable	2021 n, %	2021 or (95 % CI)	2022 n, %	2022 or (95 % CI)	2023 n, %	2023 or (95 % CI)
COVID-19 diagnosis						
No	230 (14.0 %)	Ref.	246 (13.5 %)	Ref.	N/A	N/A
Yes/maybe	76 (19.7 %)	1.48 (1.09, 2.01)	168 (13.6 %)	1.00 (1.80, 1.25)	N/A	N/A
Family/friends						
Not diagnosed with COVID-19	88 (11.6 %)	Ref.	54 (9.6 %)	Ref.	N/A	N/A
They had COVID-19 and did not get sick or were only a little sick	96 (15.4 %)	1.35 (0.96, 1.90)	86 (11.2 %)	1.12 (0.77, 1.62)	N/A	N/A
They had COVID-19 and got really sick	47 (14.7 %)	1.13 (0.75, 1.71)	140 (14.4 %)	1.42 (1.00, 2.00)	N/A	N/A
They had COVID-19 and stayed overnight in the hospital	17 (16.7 %)	1.27 (0.70, 2.33)	48 (17.8 %)	1.82 (1.17, 2.82)	N/A	N/A
They died from COVID-19	51 (27.9 %)	2.54 (1.64, 3.92)	86 (17.4 %)	1.68 (1.14, 2.47)	N/A	N/A
COVID-19 worry and stress						
Not at all	14 (7.6 %)	Ref.	N/A	N/A	73 (6.8 %)	Ref.
Slightly	21 (7.9 %)	0.91 (0.96, 1.90)	N/A	N/A	100 (9.5 %)	1.25 (0.90, 1.72)
Somewhat	56 (11.4 %)	1.39 (0.74, 2.63)	N/A	N/A	84 (11.5 %)	1.56 (1.11, 2.18)
Very	89 (14.7 %)	1.60 (0.86, 2.95)	N/A	N/A	31 (16.7 %)	2.28 (1.43, 3.64)
Extremely	119 (27.0 %)	3.32 (1.81, 6.10)	N/A	N/A	14 (20.3 %)	3.02 (1.58, 5.75)
COVID-19 life-stressors						
Participants were not affected by COVID-19 life-stressors	6 (2.2 %)	Ref.	N/A	N/A	N/A	N/A
Had more arguments or fights with my parents/guardians, siblings, or others who live with me	12 (4.7 %)	2.26 (0.83, 6.14)	N/A	N/A	N/A	N/A
I have not had enough freedom, privacy, or personal space	24 (8.9 %)	3.74 (1.49, 9.39)	N/A	N/A	N/A	N/A
I have felt lonely or isolated	49 (14.9 %)	6.95 (2.89, 16.70)	N/A	N/A	N/A	N/A
I have felt anxious, stressed, or depressed	55 (17.3 %)	7.95 (3.32, 19.03)	N/A	N/A	N/A	N/A
It has been hard to adjust to doing schoolwork at home	70 (24.2 %)	10.6 (4.44, 25.37)	N/A	N/A	N/A	N/A
I have fallen behind on schoolwork	83 (33.6 %)	15.8 (6.58, 37.88)	N/A	N/A	N/A	N/A

OR, odds ratio; CI, confidence interval.

in adjusted models (OR=1.00; 95 % CI: 0.80, 1.25) (Table 3). However, individuals who reported that friends or family had COVID-19 and got really sick (OR=1.42; 95 % CI: 1.00, 2.00), stayed overnight in the hospital (OR=1.82; 95 % CI: 1.17, 2.82), or died from COVID-19 (OR=1.68; 95 % CI: 1.14, 2.47) all reported higher odds of OCD symptoms.

Association of COVID-19 factors with OCD in 2023

Although the level of stress related to the pandemic was substantially lower in 2023, those who reported they were somewhat stressed (OR=1.56; 95 % CI=1.11, 2.18), very stressed

(OR=2.28; 95 % CI=1.43, 3.64), or extremely stressed (OR=3.02; 95 % CI=1.58, 5.75) had higher odds of reporting OCD symptoms.

Discussion

In the current study, we examined trends of OCD symptoms and the prevalence of COVID-19, as well as the association between COVID-19 stressors and OCD symptoms in an adolescent sample in Southern California, over three waves from Spring 2021 to Spring 2023. Although OCD symptoms and COVID-19 stressors were assessed at three time points, the analyses were cross-sectional within each wave. Additionally, because the cohort was initiated during the COVID-19 pandemic, this study lacked pre-pandemic baseline data and cannot determine temporal ordering or quantify changes in OCD symptoms relative to pre-pandemic levels. Accordingly, findings should be interpreted as associations rather than evidence of causal effects. Overall, we found that in 2021, a significant association was found between self-reported COVID-19 diagnosis and OCD symptoms, indicating that personal illness may contribute to the exacerbation of OCD. Indeed, studies have shown that personal illness, such as self-reported cases of COVID-19, may significantly contribute to the onset or exacerbate OCD symptoms, supporting a potential link between health-related stressors and OCD pathology [15]. Moreover, extreme stress about COVID-19 and experiences of COVID-related life stressors were also strongly associated with higher odds of clinical or subclinical OCD, suggesting that heightened stress may play a role in OCD symptoms. Results from subsequent waves suggest that having friends or family impacted by COVID, or experiencing greater levels of stress related to COVID, also increased the likelihood of OCD symptoms.

Our findings align with previous extensive research that has shown stress, particularly chronic or perceived as uncontrollable, can exacerbate OCD symptoms [27–30]. Stress is believed to affect cognitive control processes, increasing intrusive thoughts and the use of compulsive rituals to manage distress [27, 31, 32]. In adolescents, this may be compounded by developmental vulnerabilities in regulating emotion. The response to stress, especially the hypothalamic-pituitary-adrenal axis dysregulation, has also been linked to OCD severity [33]. During the pandemic, disruptions to social support networks, schooling, and daily routines may have further reduced access to coping resources, creating an environment for OCD symptoms to worsen. Given these mechanisms, targeted interventions such as cognitive-behavioral therapy, exposure and response prevention, and mindfulness-based stress reduction may help reduce both distress and compulsions in youth with OCD [34, 35]. Schools and families may also consider accessible and low-burden strategies such as developing alternative daily routines, online peer support, and psychotherapy to ameliorate the effects of stress and maintain functioning during public health emergencies.

The chronic and often debilitating effects of OCD affect a significant portion of adolescents worldwide, contributing to substantial impairment in social, academic, and emotional functioning [36–38]. The COVID-19 pandemic introduced novel stressors that may have exacerbated this burden, particularly through perceived health threats and disruptions to daily routines. Findings from this study suggest that pandemic-related stress was strongly associated with increased odds of OCD symptoms not only during lockdown in the first year of the pandemic, but in the following two years as well, although the large odds ratios for certain stressors, such as mental health and schoolwork should be interpreted cautiously given the wide confidence intervals. These results align with emerging literature suggesting that chronic or acute stress, especially surrounding health threats, can trigger or intensify compulsive behaviors and intrusive thoughts that are common in OCD. The experience of loss or serious illness among close contacts may further contribute to this observation.

These data may further serve to implicate the effects of public health measures on exacerbating OCD symptoms, particularly among the adolescent population. These findings underscore the importance of addressing stress as a significant factor in the exacerbation of OCD symptoms. As a result, continuous support and interventions to manage stress related to either personal circumstances or to larger events impacting the population might be crucial in mitigating OCD severity. This also emphasizes the need for ongoing monitoring and adaptive mental health strategies throughout a prolonged crisis.

Limitations

This study has several limitations that warrant consideration. First, the cross-sectional analyses limit the ability to establish directionality of associations between COVID-19-related stressors and OCD symptoms. Furthermore, because this cohort was initiated during the pandemic, pre-pandemic data were not collected to provide baseline measures of OCD symptoms, therefore, quantifying change from pre-pandemic levels or ascribing causality to COVID-19-related stressors cannot be established. There may also be unmeasured confounding factors. Second, all data were self-reported by adolescents, COVID-19 exposures and OCD symptoms, which introduces the potential for

misclassification bias. Moreover, the use of a self-reported OCD measure (RCADS) to assess symptoms may not capture the entire clinical spectrum of the disorder. Third, early data collection occurred during the height of the COVID-19 pandemic and stay-at-home orders in California, which may have amplified perceived stress and restricted access to coping resources, thus potentially influencing both symptom reporting and lived experiences. In addition, the analytic samples at each wave included only participants with complete data on OCD symptoms, COVID-19 exposures, and covariates. Missing data and attrition across waves may therefore have introduced selection bias if adolescents with greater pandemic-related stress or OCD symptoms were less likely to participate. Finally, the study sample included adolescents from public high schools in Southern California. It may therefore not be generalizable to adolescents in other regions or educational settings, such as rural or underserved areas, where pandemic-related stressors and support systems may differ from those in large metropolitan centers like Los Angeles.

Conclusions

The present study reports results from survey data collected at three time points spanning a three-year period (2021–2023). Findings indicate that stressors arising from the COVID-19 pandemic were associated with OCD symptoms in a sample of high school students in Southern California, even several years after the pandemic began. These results highlight the significant challenge of deploying population-level public health interventions without imposing unintended psychological burdens on vulnerable groups, particularly adolescents and those predisposed to OCD. Supportive services to help adolescents manage stress, particularly during periods of increased societal stress, may help reduce symptoms of OCD. Because participants were drawn from public high schools in Southern California, these findings may be most applicable to adolescents in similar urban school settings and may not generalize to youth in other regions or educational contexts.

Research ethics: Approval was obtained from the Institutional Review Board at the University of Southern California on 9/26/2019 (IRB ID: HS-19-00682). The procedures used in this study adhere to the tenants of the Declaration of Helsinki.

Informed consent: Informed consent was obtained from all individuals included in this study, or their legal guardians or wards.

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