



# Compulsive Sexual Behavior and Changes in Solitary Sexual Behaviors During the COVID-19 Pandemic

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## Abstract

The aim of with this brief report is to examine how the COVID-19 pandemic differentially impacted solitary sexual behaviors in those with and without clinically significant compulsive sexual behavior (CSB). A total of 944 individuals in the United States completed an online cross-sectional survey in October 2020. Participants were asked to retrospectively report their frequency of masturbation and pornography use during the pandemic and prior to the pandemic. Participants also completed assessments of CSB, depression symptoms, and experiences of financial stress caused by the pandemic. Individuals who screened positive for clinically significant CSB reported statistically significant increases in masturbation and pornography use during the pandemic. Those who screened negative for CSB reported no significant increase in masturbation and a very small, statistically significant increase in pornography use. Those screening positive for CSB also reported significantly higher levels of depression symptoms but did not report increased likelihood of experiencing financial distress due to the pandemic. This suggests that increases in masturbation and pornography use reported by some, but not all, recent studies on sexual behaviors during the COVID-19 pandemic may be driven by individuals with CSB. Future research on sexual behaviors during the pandemic should assess CSB to further clarify its relationship with sexual behavior changes.

**Keywords** COVID-19 · Pornography · Masturbation · Compulsive sexual behavior

## Introduction

The COVID-19 pandemic has had a significant and complex impact on human sexual behavior, including solitary sexual activities like masturbation and pornography use. Initial public and scientific discourses suggested that increased social isolation, limited social contact, and restrictions on mobility would cause a sharp increase in solitary sexual behaviors (Döring, 2020). This idea was reinforced by the dramatic and highly publicized increase in traffic on pornography websites like Pornhub.com in the early months of the pandemic (PornHub, 2020). However, the research to date suggests that the

relationship between the COVID-19 pandemic and solitary sexual behaviors is more complex.

Studies from the United States, Canada, and Germany examining changes in masturbation reported both increases (Gleason et al., 2021; McKay et al., 2021; Mumm et al., 2021) and decreases (Brotto et al., 2022; Gauvin et al., 2022; Lehmillier et al., 2020) in frequency, and others found that masturbation frequency stayed the same for those who were single or in a long-distance relationship, while it decreased for those with a close-proximity or live-in partner (Herbenick et al., 2022; Hille et al., 2021). Studies examining pornography use have also reported mixed findings. Some retrospective studies in the United States and Israel found that men, but not women, self-reported increases in pornography use (Craig-Kuhn et al., 2021; Gleason et al., 2021; Shilo & Mor, 2020), while large longitudinal studies in Canada and the United States collecting data before and after the start of the pandemic found that both adult and adolescent men and women demonstrated no changes in pornography consumption frequency in response to the pandemic (Bóthe et al., 2022; Grubbs et al., 2022). A qualitative study from the United States found a variety of self-reported factors that caused changes in solitary sexual behaviors during

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the pandemic, including reasons for both increases (boredom, increased private time at home, lack of access to partners) and decreases (mental health struggles, stress, lack of privacy at home; Gleason et al., 2022).

One factor that has received little attention in research on sexual behavior during the COVID-19 pandemic is compulsive sexual behavior (CSB). Compulsive sexual behavior disorder was recently added to the International Classification of Diseases-11 (ICD-11), which describes CSB as an impulse control disorder involving difficulty controlling sexual urges, thoughts, and behaviors (Kraus et al., 2018)., one recent study utilizing a large probability sample in the US suggested that as many as 8.6% of adults may have clinically significant CSB-related distress (Dickenson et al., 2018). Though it is not included in the ICD-11 diagnostic requirements, some suggest CSB may be characterized by an overreliance on sexual behavior as a means of emotion regulation (Coleman et al., 2018; Kafka, 2010), which has led some experts to express concern the social isolation and stress caused by the pandemic could exacerbate compulsive sexual behaviors, especially compulsive masturbation and pornography use (Mestre-Bach et al., 2020). However, longitudinal studies from Canada and Hungary have found that CSB symptoms did not change (Bóthe et al., 2022) or increased very slightly (Koós et al., 2022) during COVID. Another longitudinal study of Chinese college students found that COVID-related stress in February 2020 predicted CSB symptoms in June 2020, and that this effect was mediated by increases in anxiety (Deng et al., 2021). While these studies provide limited evidence for an increase in CSB during COVID, they did not investigate how COVID impacted individuals with CSB. It may be that COVID did not increase CSB symptoms in the general population, but it did lead individuals with CSB to use sexual behavior to cope with pandemic-related stress. In other words, CSB may be a moderating factor that explains the mixed evidence for changes in solitary sexual behavior frequency during COVID.

The purpose of the current study was to examine whether changes in solitary sexual behavior differed between individuals with and without CSB during the COVID-19 pandemic. We hypothesized that individuals screening positive for clinically significant CSB would show stronger self-reported increases in masturbation and pornography used compared to individuals without CSB. This was hypothesized because those with CSB are, in theory, more likely engage in frequent sexual behavior in response to the negative emotions and stress caused by the pandemic.

## Method

### Participants and Procedure

This study was conducted as part of a larger cross-sectional survey assessing sexual behavior and drug use during the COVID-19 pandemic; in-depth description of participant recruitment and study procedures are described in previously published studies (Gleason et al., 2021). A total of 1051 participants were recruited in October 2020 from the Amazon Mechanical Turk (Mturk) platform. Participants completed an online survey assessing sexual behavior during the COVID-19 pandemic and were compensated \$5 of Mturk credit for their participation. Of these participants, 107 were excluded from analyses because they did not masturbate or view pornography in the past year, resulting in a sample size of 944. Demographic characteristics of the sample are reported in Table 1.

### Measures

#### Frequency of Masturbation and Pornography Use

Participants were first asked to indicate their frequency of masturbation and pornography use before and during the pandemic. The questions read: “In the months since the start of the COVID-19 pandemic, how often have you [masturbated/ viewed pornography or any sexually explicit media]?” and “In the year before the start of the COVID-19 pandemic, how often did you [masturbate/ view pornography or any sexually explicit media]?” Participants responded to these two questions using a 7 item Likert scale (1 = not at all to 7 = multiple times each day).

#### Compulsive Sexual Behavior Inventory-13

The Compulsive Sexual Behavior Inventory (CSBI-13; Miner et al., 2017) is a 13-item assessment for CSB. Participants respond to items on a 5-point Likert scale ranging from 1 (never) to 5 (very frequently). Questions include “how often have you had trouble controlling your sexual urges?” and “how often have you used sex to deal with worries or problems in your life?” Scores are calculated by summing across items. The scale has demonstrated good internal consistency and construct validity (Coleman et al., 2019), and Cronbach’s alpha for this sample was  $\alpha = 0.91$ . Scores at or above 35 indicate a positive screen for clinically significant CSB, as validated in previous studies (Miner et al., 2017). Participant scores for this study were dichotomized as screening negative or positive for clinically significant CSB based on this cut point.

**Table 1** Participant demographics

Participant characteristics	All participants		CSB		Non-CSB	
	N	%	N	%	N	%
Total	944	100%	72	57.3%	872	42.1%
Age	$M = 38.15$ ( $SD = 10.35$ )		$M = 35.40$ ( $SD = 9.93$ )		$M = 38.38$ ( $SD = 10.35$ )	
Gender						
Woman	369	39.1%	18	25.0%	351	40.3%
Man	568	60.2%	54	75.0%	514	58.9%
Other	7	0.7%	0	0%	7	.8%
Sexual orientation						
Straight	826	87.5%	67	93.1%	759	87.0%
Gay/Lesbian	34	3.6%	1	1.4%	33	3.8%
Bisexual	64	6.8%	4	5.6%	60	6.9%
Pansexual	12	1.3%	0	0%	12	1.4%
Asexual	5	0.5%	0	0%	5	0.6%
Other	3	0.3%	0	0%	3	0.3%
Relationship status						
Single	346	36.7%	23	31.9%	323	37.0%
In a relationship, living separately	125	13.2%	11	15.3%	114	13.1%
Live-in partnership	141	14.9%	9	12.5%	132	15.1%
Married	331	35.1%	29	40.3%	302	34.6%
Multi-person partnership	1	0.1%	0	0%	1	0.1%
Race						
White (non-Hispanic)	733	77.6%	50	69.4%	683	78.3%
Hispanic	39	4.1%	3	4.2%	36	4.1%
Black (non-Hispanic)	62	6.6%	7	9.7%	55	6.3%
American Indian/Alaska Native	1	0.1%	0	0%	1	0.1%
Asian	68	7.2%	8	11.1%	60	6.9%
2 + races (non-Hispanic)	41	4.3%	4	5.6%	37	4.2%
Education						
Less than high school	5	0.5%	0	0%	5	0.6%
High school/GED	124	13.1%	9	12.5%	115	13.2%
Some college	197	20.9%	17	23.6%	180	20.6%
Professional degree	33	3.5%	6	8.3%	27	3.1%
Associate's degree	117	12.4%	1	1.4%	116	13.3%
Bachelor's degree	402	42.6%	33	45.8%	369	42.3%
Graduate degree	66	7.0%	6	8.3%	60	6.9%
Employment						
Employed	683	72.4%	57	79.2%	626	71.8%
Unemployed	42	4.4%	4	5.6%	38	4.4%
Self-employed	170	18.0%	9	12.5%	161	18.5%
Student	12	1.3%	1	1.4%	11	1.3%
Retired	13	1.4%	0	0%	13	1.5%
Unable to work	7	0.7%	1	1.4%	6	0.7%
Laid off or furloughed	17	1.8%	0	0%	17	1.9%
Depression (PHQ-2) <sup>a</sup>	$M = 3.37$	$SD = 1.71$	$M = 4.76$	$SD = 1.68$	$M = 3.26$	$SD = 1.67$
Experienced financial difficulty due to COVID-19	225	23.8%	22	30.6%	203	23.3%

Participants in the CSB group scored 35 or greater on the CSBI-13, while participants in the non-CSB group scored lower than 35

<sup>a</sup>Scores on the PHQ-2 range from 2 (no depression) to 8 (severe depression)

## Mental Health Factors

Participants completed the Patient Health Questionnaire-2 (PHQ-2; Löwe et al., 2005), a brief 2-item measure of depression. Scores range from 2 to 8, with higher scores indicating greater endorsement of depression symptoms (i.e., depressed mood and lack of interest or pleasure). Cronbach's alpha for this sample was  $\alpha=0.90$ . Participants also responded to a single yes/no question asking whether they experienced financial difficulties due to the COVID-19 pandemic.

## Statistical Analyses

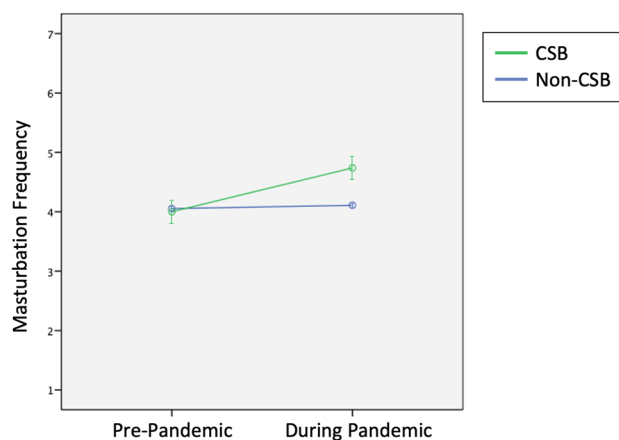
Descriptive statistics were calculated for all study variables. To determine differences in mental health factors between those who screened positive and negative for CSB, we conducted an independent samples *t*-test and chi-square test. To test our hypotheses, we conducted two two-way mixed ANOVAs. CSB status (score above or below the CSBI-13 cut point) served as the between-subjects independent variable, time (pre-pandemic vs. during the pandemic) served as the within-subjects independent variable, and frequency of masturbation or pornography use served as the dependent variable. A series of within-subjects *t*-tests were conducted as post-hoc analyses. Finally, to determine whether mental health factor and gender differences between those screening negative and positive for CSB were responsible for observed differences, two follow-up ANCOVAs were conducted including these variables as covariates. All analyses were run using SPSS version 27.

## Results

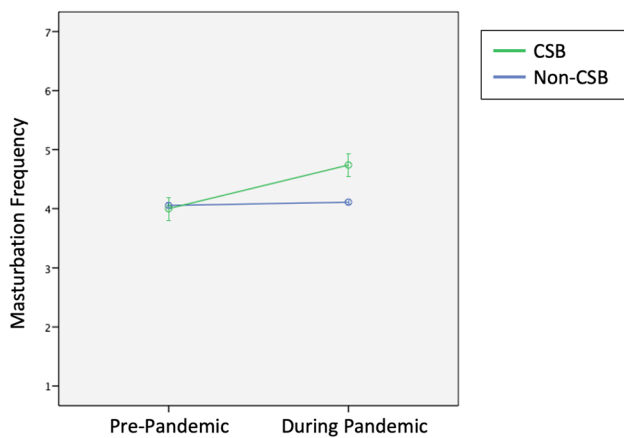
Out of the 944 participants included in analyses, 907 (96.1%) reported masturbating in the past year, 817 (86.5%) reported watching pornography in the past year, and 72 (7.6%) screened positive for CSB. A chi-square test indicated that men were significantly more likely to screen positive for CSB than women,  $\chi^2(1)=6.76, p=.01, \phi=-.09$ . An independent samples *t*-test indicated that participants who screened positive for CSB reported significantly greater depression symptoms ( $M=4.76$ ) compared to those who screened negative ( $M=3.26$ ),  $t(942)=7.36, p<.001, d=.90$ . A total of 225 (23.8%) participants reported experiencing financial hardship due to COVID, and a chi-square test indicated that participants screening positive for CSB were not significantly more likely to report financial hardship ( $N=22$ ; 30.6%) than those screening negative ( $N=203$ ; 23.3%),  $\chi^2(1)=1.94, p=.19, \phi=-.05$ .

Results of the first two-way mixed ANOVA indicated there was a significant increase in masturbation frequency during the pandemic ( $F(1, 905)=49.15, p<.001, \eta^2_p=.05$ ), while CSB status did not have a main effect on masturbation frequency ( $F(1, 905)=2.85, p=.09, \eta^2_p=.003$ ). There was a significant interaction between CSB status and time ( $F(1, 905)=36.31, p<.001, \eta^2_p=.04$ ), such that those screening positive for CSB reported a larger increase in masturbation frequency compared to those screening negative (see Fig. 1). Results of two within subjects *t*-tests indicated that for those who screened positive for CSB, the increase in masturbation from pre-COVID ( $M=4.0$ ;  $SD=1.52$ ) to during COVID ( $M=4.74$ ;  $SD=1.41$ ) was significant ( $t(64)=4.66, p<.001, d=.58$ ), but for those who screened negative for CSB, the change from pre-COVID ( $M=4.05$ ;  $SD=1.38$ ) to during COVID ( $M=4.11$ ;  $SD=1.41$ ) was not significant ( $t(841)=1.92, p=.06, d=.07$ ). To examine whether the observed differences were due to gender and mental health differences between the CSB and non-CSB groups, a two-way mixed ANCOVA was conducted including male gender (dichotomized) and depression score as covariates. Results indicated that the interaction effect between CSB status and time remained significant ( $F(1, 896)=31.61, p<.001, \eta^2_p=.03$ ).

Results of the second two-way mixed ANOVA indicated there was also a significant increase in pornography use frequency during the pandemic ( $F(1, 815)=19.03, p<.001, \eta^2_p=.02$ ), while CSB status did not have a main effect on pornography use frequency ( $F(1, 815)=3.15, p=.08, \eta^2_p=.004$ ). There was a significant interaction between CSB status and time ( $F(1, 815)=10.57, p<.01, \eta^2_p=.01$ ), such that those screening positive for CSB showed a greater increase in pornography use frequency compared to those screening negative (see Fig. 2). Results of two within subjects



**Fig. 1** Mean masturbation frequency between CSB and Non-CSB groups. *Note.* Masturbation frequency is reported on a 1–7 scale from 1 = not at all to 7 = multiple times each day. Error bars represent standard error of the mean



**Fig. 2** Mean pornography use frequency between CSB and Non-CSB groups. *Note.* Pornography use frequency is reported on a 1–7 scale from 1 = not at all to 7 = multiple times each day. Error bars represent standard error of the mean

*t*-tests indicated that for those who screened positive for CSB, the increase in pornography use from pre-COVID ( $M = 4.09$ ;  $SD = 1.58$ ) to during COVID ( $M = 4.54$ ;  $SD = 1.55$ ) was significant and had a small effect size ( $t(64) = 2.91$ ,  $p = .01$ ,  $d = .36$ ); Individuals who screened negative for CSB also demonstrated a significant increase in pornography use from pre-COVID ( $M = 3.96$ ;  $SD = 1.43$ ) to during COVID ( $M = 4.03$ ;  $SD = 1.47$ ), though the effect size was very small ( $t(751) = 2.05$ ,  $p = .04$ ,  $d = .07$ ). To examine whether the observed differences were due to gender and mental health differences between the CSB and non-CSB groups, a two-way mixed ANCOVA was conducted including male gender and depression score as covariates. Results indicated that the interaction effect between CSB status and time remained significant ( $F(1, 807) = 9.90$ ,  $p < .01$ ,  $\eta^2_p = .01$ ).

## Discussion

The results of this study confirmed our hypotheses and suggest that CSB may be linked to increases in solitary sexual behaviors during the COVID-19 pandemic. Thus, population-level increases in solitary sexual behavior noted in the literature (Craig-Kuhn et al., 2021; Gleason et al., 2021; McKay et al., 2021; Mumm et al., 2021; Shilo & Mor, 2020) may be driven by individuals with CSB. It may be that CSB played a causal role in increasing solitary sexual behaviors during the COVID-19 pandemic: individuals with CSB may have used sexual behavior to cope with the negative emotional states caused by the pandemic. This finding is in line with the conceptualization of CSB as a maladaptive emotion regulation strategy (Coleman et al., 2018) and is supported by results indicating that those screening positive for CSB reported significantly higher levels of depression, but

the moderation remained significant even after controlling for depression scores. This indicates that differential experiences of depression do not fully explain the differences between the CSB and non-CSB group. Individuals with CSB may engage in sexual behavior to cope with depression symptoms while other individuals with similar levels of depression do not. However, there are aspects of CSB that may also explain how it moderates solitary sexual frequency. For instance, individuals with CSB tend to be higher in traits such as sexual excitation (Miner et al., 2016) and sensation seeking (Burri, 2017). It may be that individuals with CSB increased solitary sexual activity to offset reduced in-person sexual outlets (i.e., casual sexual partners) during the COVID lockdown, while those without CSB did not. The current study is not able to determine the mechanism by which individuals with CSB increased solitary sexual behavior.

In addition, because this study is cross sectional, a causal association between CSB and sexual behavior changes cannot be drawn. An alternate explanation for these results is that individuals who experienced increases in solitary sexual behaviors were more likely to perceive their sexual behavior as out-of-control. These individuals may have misperceived changes in their sexual behavior as the result of personal or moral failings rather than the result of environmental factors (i.e., more time at home alone, boredom, lack of in-person sexual outlets, etc.), causing them to perceive their behavior as out-of-control. Relatedly, participants with CSB may have been biased in reporting their sexual behavior, reporting frequencies that were in line with their perception of their sexual behavior as out-of-control.

Several other limitations must be considered when interpreting these results as well. First, sexual frequencies before the start of the pandemic were reported retrospectively, introducing the possibility of hindsight bias. Participants are unlikely to have perfect accuracy in remembering their sexual behavior from over 6 months ago. Second, while the CSBI-13 is a well-validated measure of CSB, a structured clinical interview would have provided a more accurate assessment. Third, assessment of factors that may help explain this relationship were limited to a brief depression screener and a question assessing financial hardship. Because this study was part of a larger study on sexual behavior and substance use during the COVID-19 pandemic, we were unable to administer more comprehensive measures of mental health symptoms and stressors. More thorough measures of these factors would help clarify the mechanism of association between CSB and sexual frequency changes. Finally, while pornography use was assumed to be a solitary sexual behavior in this study, it is likely that some individuals were viewing pornography together with a partner or partners (as has been noted in another qualitative study utilizing data from this same survey; Gleason et al., 2022). It is therefore possible



that the analyses involving the pornography use variable may reflect both partnered and solitary sexual behavior changes.

Future research should continue to evaluate CSB in the context of the COVID-19 pandemic. This research will not only help to explain heterogeneity in the impact of the pandemic on sexual behavior but will also help researchers to better understand CSB and how it interacts with other mental health factors and stressful environments. Future studies examining sexual behavior during pandemics or other stressful, large-scale events should consider including a brief measure of CSB, as it may help explain which individuals drive population-level changes.

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**Available of Data and Materials** Data and study material are available upon request from the corresponding author.

**Code Availability** Code is available upon request from the corresponding author.

## Declarations

**Conflict of Interest** The authors report no conflicts of interest.

**Ethical Approval** Approval for this study was obtained from University of Minnesota's IRB.

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