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## Letter to the Editor

## Prevalence of posttraumatic and general psychological stress during COVID-19: A rapid review and meta-analysis



## ARTICLE INFO

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## ABSTRACT

Emerging evidence suggests rates of posttraumatic stress and psychological stress in the general population are elevated due to COVID-19. However, a meta-analysis is needed to attain more precise prevalence estimates due to between-study variability. Thus, we performed a rapid review and meta-analysis of posttraumatic stress and general psychological stress symptoms during COVID-19. Electronic searches were conducted up to May 26th, 2020 using key terms: mental illness and COVID-19. A total of  $k = 14$  non-overlapping studies were identified for inclusion. Random effects meta-analyses indicated that the pooled prevalence of posttraumatic stress symptoms and psychological stress in the general population was 23.88% and 24.84%, respectively. In both meta-analyses, the prevalence of stress symptoms was higher in unpublished compared to peer-reviewed studies. Overall, nearly one-in-four adults experienced significant stress due to the COVID-19 pandemic. Psychological resources and services must be allocated to help address the mental health burden of COVID-19. High quality, longitudinal research on the long-term mental health effects of the pandemic is greatly needed.

## 1. Introduction

On March 11th, 2020, the novel coronavirus disease (COVID-19) was declared a global pandemic, instantiating physical distancing and quarantine orders to mitigate its rapid transmission. Past studies have documented the effects of infectious outbreaks and subsequent quarantine orders, on both posttraumatic stress disturbance (Hawryluck et al., 2004) and psychological stress (Brooks et al., 2020; Lau et al., 2005) experienced in the general population. In addition to psychosocial stressors, such as financial strain and isolation (Tan et al., 2020), COVID-19 may also increase stress due to fear of infection to oneself or loved ones (Khan et al., 2020). Altogether, the uncontrollable and unpredictable nature of COVID-19 has likely led to extraordinary stress in the general population.

Emerging literature indicates stress reactions are occurring in response to COVID-19 (e.g., Wang et al., 2020), however, prevalence estimates vary widely. The prevalence of posttraumatic and general stress disturbance may be attenuated or amplified by demographic (e.g., age, sex) or methodological variables (e.g., publication status). In order to guide policy-decisions regarding where to allocate psychological resource and to determine who may be in most need of services, meta-analytic estimates of posttraumatic and psychological stress due to COVID-19 are needed. The purpose of this rapid review and meta-analysis was to attain more precise estimates of general and posttraumatic stress symptoms experienced in population-based samples during COVID-19. We examine posttraumatic and general stress symptoms separately to distinguish symptoms specific to traumatic events (e.g., intrusion, avoidance) and experiences of stress (e.g., difficulty relaxing, nervous arousal) non-specific to events. We also examine factors that may explain between-study variation in prevalence estimates.

## 2. Method

PRISMA guidelines were followed. Electronic searches developed by

a health sciences librarian were conducted in PsycINFO, Cochrane Central Register of Controlled Trials, Embase, and MEDLINE up to May 26th, 2020 (see PROSPERO [CRD42020184903]). Unpublished pre-prints were searched for in PsycArXiv. Key search terms included *COVID-19* and *mental health*. Inclusion criteria were: (1) empirical study; (2) written in English; (3) collected during COVID-19; (4) sample  $\geq 18$  years; and (5) drawn from general population.

This information was extracted from included studies: (1) brief 6-point study quality assessment (available from authors upon request); (2) participant age; (3) % female in sample; (4) geographical region; (5) type of stress measure (posttraumatic or psychological); and (6) prevalence data. Random agreement probabilities of extracted articles (20%) ranged from 0.73–1.00. Discrepancies were resolved among coders.

Random effects meta-analyses were performed in Comprehensive Meta-Analysis Software (CMA, 3.0; Borenstein et al., 2009) to obtain pooled prevalence estimates, which give greater weight to studies with larger sample sizes, with associated 95% confidence intervals (CIs). Extreme cases were identified via box plot inspections in SPSS. Between-study heterogeneity was examined with  $Q$ - and  $I^2$ -statistics (Higgins et al., 2003). Categorical and continuous moderators were explored using group and meta-regression analysis, respectively. Publication bias was examined via inspection of funnel plots. Statistical significance was set at  $p < .05$ .

## 3. Results

In total, 3,405 non-duplicated abstracts were identified, 175 full-text articles were reviewed, and  $k = 14$  non-overlapping studies ( $N = 21,744$  participants) were identified for inclusion. No extreme cases were found. On average, participants were 29.47 years of age and 54.39% were female. All studies were cross-sectional and used self-reports of stress symptoms. The mean study quality was 3.07/6.0

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**Table 1**  
Characteristics of included studies.

<sup>a</sup> Study	<sup>b</sup> N	Age (years)	% Female	Country	Type of Stress	Measure of Stress	Date of Data Collection	Published? (yes/no)	Mean Study Quality Score
Agberotimi et al. (2020)	502	28.75	55.20	Nigeria	PTS	IES	Mar 20 – Apr 19	N	4
Al Banna et al. (2020)	1427	25.75	28.50	Bangladesh	GS	DASS-21	Apr 29 – May 7	N	2
González-Sanguino et al. (2020)	3480	37.92	75.00	Spain	PTS	PCL	Mar 21 – Mar 28	Y	3
Islam et al. (2020)	3122	21.40	40.50	Bangladesh	GS	DASS-21	Apr 11 – Apr 24	N	3
Khan et al. (2020)	505	–	37.23	Bangladesh	PTS, GS	IES, DASS-21	Apr 9 – Apr 23	N	2
Liu et al. (2020)	285	–	54.40	China	PTS	PCL	Jan 20 – Feb 8	Y	4
Mazza et al. (2020)	2766	32.94	71.60	Italy	GS	DASS-21	Mar 18 – Mar 22	Y	3
Odrizola-González et al. (2020)	3550	32.10	35.10	Spain	GS	DASS-21	Mar 28 – Apr 4	N	2
Ozamiz-Extebarria et al. (2020)	976	32.98	81.10	Spain	GS	DASS-21	Mar 11 – Mar 15	Y	3
Park et al. (2020)	408	–	43.00	United States	PTS	PCL	May 6 – May 9	N	2
Tan et al. (2020)	673	30.8	25.60	China	GS	DASS-21	Feb 24	Y	4
Tang et al. (2020)	2485	19.81	61.37	China	PTS	PCL	Feb 20 – Feb 27	Y	4
Wang et al. (2020)	1304	–	67.30	China	PTS, GS	IES, DASS-21	Jan 31 – Feb 2	Y	3
Zhang & Ma (2020)	263	37.7	59.70	China	PTS	IES	Feb 15 – Feb 29	Y	4

Note. PTS = posttraumatic stress symptoms. GS = general stress symptoms. DASS-21 = Depression, Anxiety, and Stress Scale - 21; IES = Impact of Event Scale; PCL = Posttraumatic Stress Disorder Checklist.

<sup>a</sup> All studies were conducted in 2020.

<sup>b</sup> Sample size used to calculate prevalence rate.

(range = 2.00 to 4.00; see Table 1 for full description of study characteristics).

The pooled prevalence of posttraumatic stress symptoms ( $k = 8$ ) was 23.88% (95% CI: 14.01, 33.76). Significant heterogeneity was identified ( $Q = 118,330.05$ ;  $I^2 = 99.99$ ). Moderators were explored (see Supplementary Table 1) and unpublished studies had significantly higher prevalence estimates ( $k = 3$ ; prevalence = 34.71%; CI: 23.25, 46.19) compared to published studies ( $k = 5$ ; prevalence = 17.38; CI: 6.02, 28.75). Age and sex were not significant moderators.

The pooled prevalence of psychological stress ( $k = 8$ ) was 24.84% (95% CI: 11.75, 37.92). Heterogeneity was significant ( $Q = 265,346.12$ ;  $I^2 = 99.997$ ). Moderators were explored (see Supplementary Table 1) and unpublished studies had significantly higher prevalence estimates ( $k = 4$ ; prevalence = 37.07%; CI: 23.02, 51.11) compared to published studies ( $k = 4$ ; prevalence = 12.61; CI: 1.72, 23.49). Age and sex were not significant moderators. No publication bias or additional moderators were detected in the meta-analyses.

#### 4. Discussion

Results from the current meta-analysis document high levels of both posttraumatic (26.2%) and psychological (23.1%) stress associated with COVID-19. Although prevalence estimates were lower in peer-reviewed compared to unpublished studies, findings suggested approximately one-in-four adults require mental health services during the ongoing pandemic. While elevations in stress during a global pandemic are to be expected, the long-term implications of these elevations are cause for concern. Specifically, decades of research suggest elevations in overall stress are risk factors or precipitants for the onset of comorbid mental health difficulties such as anxiety, depression, or substance use (Conde et al., 2019). Exposure to stress over time can also lead to accelerated disease processes and the exacerbation of chronic health conditions, further inflating healthcare costs (McEwen, 2000). All told, the broader implications of large increases in stress during COVID-19 at a population level are significant and will require government and policy changes to help reduce stress, such as income supplements, childcare, and development of broadly available prevention and intervention programs that promote stress-reduction strategies such as healthy eating, physical activity, and good sleep habits.

Due to the rapidly evolving nature of COVID-19, the research presented in this rapid review is preliminary in nature and represents a snapshot of stress levels in the months immediately following the

pandemic. Most studies to date have reported on cross-sectional data and without representative samples. Publication status moderated effect sizes. Methodological rigor is critical to adequately inform policy, practice, and public dialog. Longitudinal studies are necessary to determine whether these elevations in stress are sustained, reduced, or exacerbated over time (Pierce et al., 2020). Furthermore, studies from different geographic areas with varying severity of exposure to the disease, as well as differences in mitigative strategies (e.g., lockdown, school closures), are needed.

#### Author contributions

NR and SM designed the search strategy with input from JC and RE. SM, NR, JC, and RE completed the literature search and screening. JC, RE, and NR performed data extraction. SM conducted the analyses. JC, RE, NR, and SM contributed to writing the manuscript, reviewing the manuscript with content expertise, and providing critical feedback.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2020.113347](https://doi.org/10.1016/j.psychres.2020.113347).

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