TECHNICAL COMMENTARY

Epidemics and pandemics

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POST-TRAUMATIC STRESS DISORDER LIBRARY

Introduction

For a person to be diagnosed with PTSD, at least one stressor is required. Stressors as determined by the latest version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) include being exposed to threatened death, actual or threatened serious injury, or actual or threatened sexual violence. Examples are direct exposure, witnessing the trauma, or learning that a relative or close friend was exposed to a trauma. Stressors can also be encountered in the course of professional duties.

This summary table presents the evidence for risk of PTSD in people exposed to epidemics or pandemics.

Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2010 that report results separately for people with PTSD. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. When multiple copies of reviews were found, only the most recent version was included. We prioritised reviews with pooled data for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis[1]. Reviews with less than 50% of items checked have been excluded from the library. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large or if there is a dose dependent response. We have also taken into account sample size and whether results are consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found four systematic reviews that met our inclusion criteria[3-6].

- Moderate to high quality evidence finds the overall mean prevalence of PTSD symptoms during coronavirus outbreaks is around 18% (severe acute respiratory syndrome [SARS], Middle East respiratory syndrome [MERS], or Coronavirus disease 2019 [COVID-19]).
- Rates were higher in patients (29%) than in healthcare workers (18%) or in the general population (12%). Rates were generally higher in longitudinal cohort studies than in cross-sectional studies, and during MERS or SARS than COVID-19, however long-term measures of the effects of COVID-19 have not been completed. Rates were higher after the outbreaks, apart from in healthcare workers who showed higher rates of PTSD during outbreaks.
- Moderate quality finds the mean prevalence of PTSD following a coronavirus infection is around 32%. Rates of PTSD were higher in females than males, higher in infected healthcare workers than other infected people, higher in people with a previous

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physical illness, in people with avascular necrosis, functional impairment, pain, and a lack of control. Rates of depression and anxiety disorders were lower at around 15%.

- Moderate quality evidence finds small effects of increased rates of PTSD in COVID-19 patients compared to non-patients, and in people exposed to longer versus shorter COVID-19 media reporting.
- Moderate quality evidence finds the mean prevalence of PTSD during and following quarantine is 21.65%. There were similar levels of overall distress (20.84%), depression (22.69%), and anxiety (16.16%).

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Cavicchioli M, Ferrucci R, Guidetti M, Canevini MP, Pravettoni G, Galli F

What Will Be the Impact of the COVID-19 Quarantine on Psychological Distress? Considerations Based on a Systematic Review of Pandemic Outbreaks

Healthcare 2021; 9(1): 101

View review abstract online

Comparison	**Prevalence of PTSD during and after pandemic infections that required quarantine measures for their management.**
Summary of evidence	**Moderate quality evidence (large sample size, appears inconsistent and imprecise, direct) finds the mean prevalence of PTSD following quarantine is 21.65%.**
Quarantine	
10 studies, N = 7,725, prevalence of PTSD = 21.65%, 95%CI 10.95% to 32.36% Overall distress (20.84%), depression (22.69%) and anxiety (16.16%) symptoms were also prevalent.	
Consistency in results‡	Appears inconsistent
Precision in results§	Appears imprecise
Directness of results‖	Direct

Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, Zandi MS, Lewis G, David AS

Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic

The Lancet Psychiatry 2020; 7: 611-27

View review abstract online

Comparison	**Prevalence of PTSD in people post-coronavirus illness (severe acute respiratory syndrome [SARS], Middle East respiratory syndrome [MERS], or coronavirus disease 2019 [COVID-19]).**

	Follow-up time varied between 60 days and 12 years.
Summary of evidence	**Moderate quality evidence (large sample, appears inconsistent and imprecise, direct) finds the mean prevalence of PTSD following a coronavirus infection is around 32%. Rates of PTSD were higher in females than makes, and high in healthcare workers, in people with a previous physical illness, in people with avascular necrosis, functional impairment, pain, and a lack of control.**
Coronavirus infections	
4 studies, N = 402, point prevalence of PTSD = 32.2%, 95%CI 23.7% to 42.0% *Rates of PTSD were higher in;* Females than males: OR = 3.85, 95%CI 1.18 to 12.54 Infected healthcare workers than other infected people: OR = 2.92, 95%CI 1.08 to 7.88 People with a previous physical illness than no previous illness: OR = 4.38, 95%CI 1.06 to 18.02 People with avascular necrosis than no avascular necrosis: OR = 2.91, 95%CI 1.06 to 8.02 People with functional impairment than no functional impairment: OR = 2.44, 95%CI 1.66 to 3.56 People with average pain than no/low pain: OR = 1.69, 95%CI 1.31 to 2.19 People with severe pain than no/low pain: OR = 36.01, 95%CI 2.10 to 617.59 People with a lack of control than those having a sense of control: OR = 1.22, 95%CI 1.09 to 1.37 Rate of depression was 14.9%, and anxiety disorders was 14.8%	
Consistency in results	Appears inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Salehi M, Amanat M, Mohammadi M, Salmanian M, Rezaei N, Saghazadeh A, Garakani A

The prevalence of post-traumatic stress disorder related symptoms in Coronavirus outbreaks: A systematic-review and meta-analysis

Journal of Affective Disorders 2021; 282: 527-38

View review abstract online

Comparison	**Prevalence of PTSD symptoms during coronavirus outbreaks (severe acute respiratory syndrome [SARS], Middle East**

	respiratory syndrome [MERS], and Coronavirus disease 2019 [COVID-19]).
Summary of evidence	**Moderate to high quality evidence (large samples, inconsistent, mostly precise, direct) finds the overall mean prevalence of PTSD symptoms during coronavirus outbreaks is around 18%. Rates were higher in patients (29%) than in healthcare workers (18%) or in the general population (12%). Rates were generally higher in longitudinal cohort studies than in cross-sectional studies, and during MERS or SARS than COVID-19, however long-term measures of the effects of COVID-19 have not been completed. Rates were higher after the outbreaks, apart from in healthcare workers who showed higher rates of PTSD during outbreaks.**
Coronavirus outbreaks	
Overall 35 studies, N = not reported, prevalence rate = 18%, 95%CI 15% to 20%, I^2 = 98% Prevalence rates were more frequent in cohort studies (29%) than in cross-sectional (15%) and case-control (11%) studies. Prevalence rates of PTSD in MERS (36%, 2017-2020) outbreaks were higher than SARS (18%, 2004-2009) and COVID-19 (9%, 2020) outbreaks. Prevalence rates were higher after outbreaks (23%) than during outbreaks (14%). General population samples 12 studies, N = 13,006, prevalence rate = 12%, 95%CI 8% to 16%, I^2 = 98% Prevalence rates were higher in SARS (18%) than in COVID-19 (8%), in studies using the Impact of Event scale (18%), and after outbreaks (18%) than during outbreaks (11%). Patients 10 studies, N = 794, prevalence rate = 29%, 95%CI 18% to 39%, I^2 = 96% Prevalence rates were more frequent in cohort studies (36%) than in cross-sectional studies (13%). Prevalence rates were higher in MERS (40%) than SARS (28%) patients, and in studies using the Impact of Event scale (40%). Prevalence rates were higher after outbreaks (37%) than during outbreaks (2%). Healthcare workers 15 studies, N = 5,628, prevalence rate = 18%, 95%CI 13% to 24%, I^2 = 97% Prevalence rates were higher in cross-sectional (18%) than in cohort studies (11%). Prevalence rates were higher during MERS (33%) than during SARS (14%) or COVID-19 (11%). Prevalence rates were higher during outbreaks (23%) than after outbreaks (13%).	
Consistency in results	Inconsistent
Precision in results	Appears mostly precise
Directness of results	Direct

Wang Y, Kala MP, Jafar TH

Factors associated with psychological distress during the coronavirus disease 2019 (COVID-19) pandemic on the predominantly general population: A systematic review and meta-analysis

PLOS ONE 2021; 15: e0244630

View review abstract online

Comparison	**Risk factors associated with PTSD during the COVID-19 pandemic.**
Summary of evidence	**Moderate quality evidence (large samples, consistent, some imprecision, direct) finds small effects of increased rates of PTSD in COVID-19 patients compared to non-patients, and in people exposed to longer vs. shorter COVID-19 media reporting.**
COVID-19	
Small effects showed higher risk of PTSD during the COVID-19 pandemic was associated with; Being a patient vs. non-patient: 3 studies, N = 7,023, OR = 1.27, 95%CI 1.10 to 1.47, I^2 = 0% Longer vs. shorter media exposure: 3 studies, N = 5,267, OR = 1.48, 95%CI 1.23 to 1.78, I^2 = 0% There were no significant associations with age or sex.	
Consistency in results	Consistent
Precision in results	Some imprecision
Directness of results	Direct

Explanation of acronyms

CI = confidence interval, COVID-19 = Coronavirus disease 2019, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), HIV = human immunodeficiency, MERS = Middle East respiratory syndrome, N = number of participants, OR = odds ratio, SARS = severe acute respiratory syndrome, vs. = versus

Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[7].

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. Less than 0.4 represents a small effect, around 0.5 a medium effect, and over 0.8 represents a large effect[7].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[8]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship

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between variables. They can provide an indirect indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula[7];

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed[9].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

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