

# Impact of COVID-19 on the mental health of children and young people: an umbrella review

Leonardo Bevilacqua <sup>1</sup>, Lana Fox-Smith,<sup>2</sup> Amy Lewins,<sup>3</sup> Poonam Jetha,<sup>2</sup> Athena Sideri,<sup>1</sup> Gil Barton,<sup>2</sup> Richard Meiser-Stedman <sup>1</sup>, Peter Beazley <sup>1</sup>

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/jech-2022-220259>).

<sup>1</sup>Faculty of Medicine and Health Sciences, University of East Anglia, Norwich, UK

<sup>2</sup>Great Ormond Street Institute of Child Health, UCL, London, UK

<sup>3</sup>Oxford Institute of Clinical Psychology Training and Research, University of Oxford, Oxford, UK

## Correspondence to

Dr Leonardo Bevilacqua, Faculty of Medicine and Health Sciences, University of East Anglia, Norwich, UK; [l.bevilacqua@uea.ac.uk](mailto:l.bevilacqua@uea.ac.uk)

Received 27 December 2022

Accepted 25 July 2023

Published Online First

24 August 2023

## ABSTRACT

**Background** Over the past 3 years, a multitude of studies have highlighted the impact of the COVID-19 pandemic on the mental health of children and young people (CYP). In this umbrella review, we synthesise global evidence on the impact of COVID-19 on the mental health of CYP from existing systematic reviews with and/or without meta-analysis.

**Methods** Adopting the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, we evaluated 349 citations and identified 24 eligible reviews with medium to high methodological quality to be reviewed narratively.

**Results** Most of the reviews reported a high prevalence of anxiety disorders, depression, suicidal behaviour, eating disorders and other mental health problems. Most studies that used data at multiple time points indicate a significant increase in mental health problems in CYP, particularly in females and older adolescents.

**Conclusions** Multipronged psychosocial care services, policies and programmes are needed to alleviate the burden of mental health problems in CYP as a consequence of the COVID-19 pandemic and associated global health measures.

**PROSPERO registration number** CRD42021276312.

## WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Children and young people seem particularly vulnerable to developing mental health problems due to the COVID-19 pandemic. Systematic reviews on the topic have been published, but there are not many umbrella reviews that provide a more comprehensive and up-to-date synthesis of the data.

## WHAT THIS STUDY ADDS

⇒ This umbrella review highlights that the prevalence of mental health problems in children and young people over the past 3 years has been very high across the world, with females and older adolescents being at particularly high risk.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The present findings are concerning. Collaboration between researchers, clinicians and policymakers should aim at the development of psychosocial interventions that target mental health difficulties in high-risk populations.

## INTRODUCTION

Since March 2020, the world has been learning to cope with COVID-19. This global pandemic has caused a wide range of consequences, including biological, socioeconomic and psychological.<sup>1</sup> There have been several primary studies and systematic reviews that have highlighted the impact of global health measures (such as social restrictions, school closures, etc) on the mental health (MH) of the population.<sup>2-3</sup> The MH problems that the COVID-19 pandemic caused and/or exacerbated include anxiety disorders and depression,<sup>4-5</sup> post-traumatic stress disorders (PTSD),<sup>6</sup> sleep disorders<sup>7-8</sup> and eating disorders.<sup>9</sup>

Researchers have investigated the MH impact that COVID-19 pandemic had on vulnerable populations. These include health professionals,<sup>10</sup> the elderly<sup>11</sup> and children and young people (CYP).<sup>12-13</sup> This last category seems to have suffered significant MH difficulties as a result of the pandemic, and there is a plethora of studies that support this, including several types of reviews.<sup>14</sup>

Given the number of systematic reviews published on the impact of COVID-19 on the MH of CYP, we deemed helpful to conduct an

umbrella review of systematic reviews on the topic to synthesise the data in a useful way for both researchers, clinicians and public health professionals. Umbrella reviews are helpful in synthesising and understanding the information available in a given research domain and provide a ‘snapshot’ of the evidence available in a given area that may help the development and implementation of prevention and intervention programmes.<sup>15</sup> A recent umbrella review on this topic has been recently published.<sup>14</sup> However, this work included non-systematic reviews<sup>16</sup> and was not registered on PROSPERO. In addition, we have included more systematic reviews that took into account longitudinal studies.<sup>17</sup> The lack of longitudinal studies in this work is one of the limitations that the authors highlighted. Finally, our work has the advantage of including more recent reviews.<sup>18</sup> Including the most recent data on this topic is particularly relevant considering the fast pace at which the pandemic is evolving.

The aim of the present work is to systematically review the literature on the impact of COVID-19 on the MH of CYP and gather evidence from



© Author(s) (or their employer(s)) 2023. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Bevilacqua L, Fox-Smith L, Lewins A, et al. *J Epidemiol Community Health* 2023;**77**:704–709.

systematic reviews that have been conducted in this area. Depending on the data available, we will try to identify whether there are characteristics that are associated with heightened risk for MH in CYP.

## METHODS

The present umbrella review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines<sup>19</sup> and was registered on PROSPERO (CRD42021276312). We ran a search through multiple scientific databases using Medical Subject Headings (MeSH) terms including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, Cochrane Database of Systematic Reviews, PROSPERO, PubMed/MEDLINE, Web of Science and Scopus. The complete search strategy is shown below:

(MH 'COVID-19') OR AB (COVID-19 or coronavirus or 2019-ncov or sars-cov-2 or cov-19) AND ((MH 'Child, Preschool') OR (MH 'Adolescent') OR (MH 'Infant') OR (MH 'Child')) OR (children or adolescents or youth or child or teenager) AND (MH 'Mental Health') OR (mental health or mental illness or mental disorder or psychiatric illness) AND TI systematic review.

Due to concerns about missing understudied conditions in CYP (such as bipolar disorder and substance use), two additional searches were run through PubMed and PsycINFO which included: (*bipolar disorder or manic depression or bipolar affective disorder or bipolar depression*) and (*substance use or drug use or drug addiction or alcohol use or alcoholism or alcohol dependence or alcohol abuse or alcoholic or alcohol addiction*).

Initial searches were conducted on 1 May 2022 with a follow-up search conducted on 10 December 2022. EPPI-Reviewer was used to screen all the studies identified by the searches.<sup>20</sup> Figure 1 shows the PRISMA flow chart, with details of included and excluded papers with reason.

Studies were included if they were:

- ▶ Systematic reviews that looked at prevalence of MH problems (using either non-diagnostic or diagnostic information) during the COVID-19 pandemic in CYP (aged 0–18).
- ▶ Systematic reviews that compared rates of MH problems in CYP before versus during the COVID-19 pandemic.
- ▶ Systematic reviews with mixed participants (eg, including adolescents and young adults) were still included if it was possible to extract data specific to CYP.

Studies were excluded if they were:

- ▶ Primary studies/analysis that included adult population only, where it was not possible to extract CYP-specific data, or where age of included participants was not specified.
- ▶ Non-systematic narrative reviews (rapid non-systematic or scoping reviews, or reviews where PRISMA statement was not available).

Six reviewers (LB/LFS/AL/PJ/AS/GB) independently screened all titles and abstracts identified from the literature search (n=349). Full paper manuscripts of any titles and abstracts that were considered relevant by any of the three reviewers were obtained (n=55) and independently assessed for inclusion. Any discrepancies were resolved by consensus. Only studies meeting the inclusion criteria underwent data extraction (n=24).

A standardised data extraction table was used which included the following variables: study authors, sample size by geographical area, sample characteristics, number of studies included in the systematic review, pandemic exposure and MH outcomes (see online supplemental table 1).

Quality assessment including risk of bias of the systematic reviews included was conducted using the AMSTAR tool.<sup>21</sup> AMSTAR is a measurement tool created to assess the methodological quality of systematic reviews. AMSTAR comprises 11 criterion items (see online supplemental table 2) and each item is given a score of 1 if the specific criterion is met, or a score of 0 if the criterion is not met, is unclear or is not applicable. The scores are summed to give an overall quality score of the review: 8–11 is considered high quality, 4–7 is medium quality and 0–3 is low quality. Despite an ongoing and complex debate about the use of scoring systems, the items of the AMSTAR can be used to highlight methodological aspects of a systematic review that impact its overall quality.<sup>22</sup>

The studies included in this umbrella review presented with a degree of heterogeneity in terms of methods and outcomes included. Also, not all of them included a quantitative synthesis (ie, meta-analysis). For these reasons, it was decided to conduct a narrative synthesis in the present work.

## RESULTS

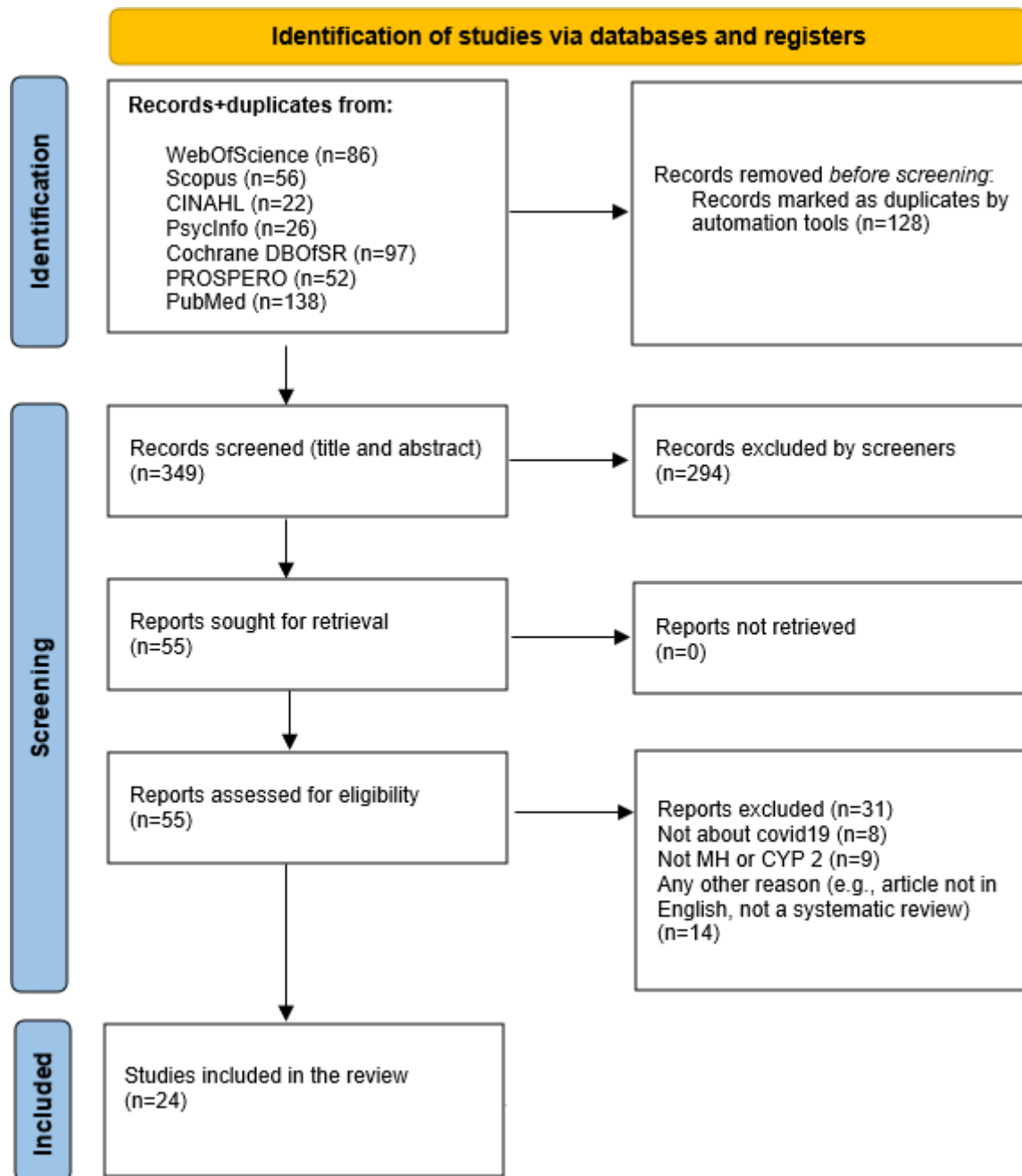
We included 24 studies for a narrative review. The sample size ranged from 939 to ±3 895 508, with the majority of participants being from Asia, particularly China (about 13 reviews recruited predominantly or exclusively from China, with two studies including over 1 million CYP from this country). The age range across all reviews spanned from 0 to 24, but we extracted data relative to CYP (ie, 0–18) only, when possible. It is possible, however, that a very small minority of the participants considered for the narrative review presented may be >18. The studies included for each review ranged from 3 to 116. In terms of pandemic exposure, most studies did not consider specific aspects of the pandemic, but eight studies mentioned lockdown and school closures as the main exposures of interest. In terms of MH outcomes, most studies considered looked at anxiety and depression, followed by stress, PTSD symptoms, eating difficulties, sleeping difficulties, emotion regulation, quality of life, well-being, obsessive-compulsive disorder symptoms, self-harm, and suicide rates and addictive/substance use behaviours. To note, the number of overlapping primary studies was quite high based on the fact that the two largest systematic reviews we included,<sup>23 24</sup> which considered 116 and 102 studies, respectively, had 40 studies in common. Thirteen of these also appeared in the third largest systematic review, which considered 61 studies in total.<sup>25</sup>

The majority of the studies (17) included were of 'medium' quality, the remaining were of 'high' quality and no study scored in the 'low' range of the AMSTAR. No systematic review reported a list of excluded studies (see online supplemental table 2).

The vast majority of the studies considered indicated that the COVID-19 pandemic caused a deterioration of MH in CYP. Online supplemental table 1 provides a detailed account of the main characteristics and outcomes of each study. It follows a summary of the main findings from the studies, grouped by MH outcome.

### Anxiety

Anxiety seems to be one of the most investigated MH outcomes across all the reviews included in our work (only four did not look at anxiety). Studies which reported data prior to 2020 suggest that anxiety levels during the pandemic were higher compared with prepandemic levels in CYP. Chai *et al* reported through a meta-analysis that the prevalence of anxiety during the pandemic among Chinese CYP was about 25%, compared with the 17% before pandemic.<sup>26</sup> Others show that 17 of the studies they included in their review reported an increase in anxiety among CYP.<sup>23</sup> Studies with



**Figure 1** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart. CYP, children and young people; MH, mental health

lower estimates of anxiety (eg, 8–25%) included more children while those with higher estimates (eg, 34–74%) included more adolescents, suggesting that this specific population is at particularly high risk of developing anxiety symptomatology. Panchal *et al* state that anxiety was the most common MH outcome reported in the primary studies they reviewed, with 57.4% of the studies included in their review showing worsening of anxiety symptoms during the lockdown.<sup>25</sup> 59.6% of CYP reported excessive ruminative thinking and 13.4% reported severe anxiety. Like Windarwati *et al* and Chawla *et al*, it was observed that being an adolescent and being female increased the risk of developing anxiety symptomatology significantly.<sup>24 27</sup>

It is important to note that anxiety was considered in a broad sense by most studies, in that most data available come from questionnaires such as the 7-item Generalized Anxiety Disorder, the State-Trait Anxiety Inventory and the Screen for Child

Anxiety Related Disorders. Data regarding more specific forms of anxiety disorders such as social anxiety, specific phobias or separation anxiety are less known.

### Depression

Like anxiety, depression was extensively studied in the papers we included in this umbrella review (only four studies did not look at depression). Samji *et al* report that 25 of the 116 studies included in their review show that prevalence of depression in CYP was higher during the pandemic compared with prepandemic times.<sup>23</sup> Panchal *et al* included 24 studies in their review which looked at depression in CYP during the pandemic.<sup>25</sup> They reported that the rate of positive screen for depression (9-item Patient Health Questionnaire (PHQ-9) score  $\geq 11$ ) significantly increased from 48.5% (before pandemic)

to 63.8% (during lockdown) and the rate of those scoring within severe depression ranges (PHQ-9  $\geq 20$ ) from 10% to 27%.<sup>25</sup> Others estimated pooled prevalence of depression in adolescence to range from 18.2% to 50.7%, with a median of 34.4%, and from 1.3% to 22.3% with a median of 11.8% in children, during the first half of 2020 in China.<sup>28</sup> Females and older adolescents seem to be particularly vulnerable to depression compared with males and younger children.<sup>27 29 30</sup>

### Other MH outcomes

Beyond anxiety and depression, symptoms considered by the different reviews included inattention and hyperactivity, poor sleep, self-harm and suicide, eating problems and PTSD symptoms. Overall, the number of reviews focusing on these symptoms was smaller than those looking at anxiety and depression. All studies reviewed report an overall worsening at the level of other MH outcomes as a consequence of the COVID-19 pandemic.

Panchal *et al* report that attention-deficit/hyperactivity disorder (ADHD) symptoms exacerbated during the pandemic, particularly in males and younger children, and to a lesser degree in females and adolescents.<sup>25</sup> Panda *et al* reported that during the COVID-19 pandemic CYP exacerbated the clinical symptoms of those with a previous diagnosis of ADHD.<sup>31</sup>

Sleep quality has significantly worsened in CYP during the pandemic, with high school teenagers being at particularly high risk of experiencing insomnia.<sup>27</sup> Viner *et al* report that 25% of 895 UK participants complained the onset of new sleep problems because of worrying in the UK.<sup>32</sup> In their meta-analysis, Sharma *et al* report that the prevalence of sleep problems during the pandemic seems to be doubled compared with prepandemic times in CYP. School-age children, and those with previously diagnosed ADHD or autism spectrum disorder, suffered sleep problems the most.<sup>33</sup>

Panchal *et al* reported that the prevalence of non-suicidal self-injury in Chinese CYP increased by 10% during the pandemic.<sup>25</sup> The authors also reported a threefold increase in suicide ideation among Canadian youth in 2020 compared with 2017, and a 49% increase in suicide rates in Japan between July and October 2020. In another systematic review the authors highlighted that suicidal ideation and attempts were more common in female adolescents.<sup>27</sup>

Panchal *et al* reported that individuals with eating disorders struggled to maintain feeding routines, and a large proportion (approximately 41%) of CYP who were suffering with eating disorder and disordered eating experienced a reactivation of their symptoms after lockdown.<sup>25</sup> Jones *et al* report that adolescents with a previous diagnosis of anorexia nervosa complained an increase in poor eating habits and increased thoughts associated with eating disorders during the pandemic.<sup>34</sup>

In the first half of 2020, Oliveira *et al* report that 85.5% of Chinese under 16 years old displayed symptoms of PTSD that would place them in the 'moderate' or 'severe' range, according to the Impact of Events Scale-Revised (IES-R), a self-report measure that assesses subjective distress caused by traumatic events.<sup>35</sup> Panchal *et al* report that 3.2% of Chinese children during the COVID-19 pandemic met diagnostic criteria for PTSD around that same period.<sup>25</sup> This discrepancy may be attributed to differences in measurement. The authors argue that an increase in PTSD symptoms may be observed some time after and not during the outbreak. Being female (vs male) and adolescent (vs child) seemed to increase the risk of PTSD.<sup>18</sup>

Findings in relation to substance use are mixed, but there seems to be a general trend towards a reduction of substance

use in adolescents during the pandemic. This includes alcohol, cannabis, tobacco and e-cigarette/vaping.<sup>36</sup> A significant increase in internet and smartphone addiction was observed during the pandemic, and this was strongly associated with MH difficulties such as low self-esteem, depression, anxiety, alexithymia and stress.<sup>37</sup>

### DISCUSSION

The aim of the present work was to review the literature on the impact of COVID-19 on the MH of CYP. The prevalence of MH difficulties in CYP at the time of the pandemic was high, and where prepandemic data were available, a significant increase was observed. The most studied MH outcomes were anxiety and depression, where a consistent increase in prevalence and symptom severity was observed in CYP across the globe. There was less evidence of consideration around other MH outcomes, though some evidence that outcomes including inattention and hyperactivity, sleep problems, self-harm and suicide, eating disorder and disordered eating, and PTSD symptoms also worsened. MH intervention programmes should consider the most vulnerable populations of CYP, which seem to be females and older adolescents according to the present work and others.<sup>14</sup>

There appear to be no major differences in CYP's MH difficulties associated with the COVID-19 pandemic across the world. We need to acknowledge, however, that most of the data come from Asia (particularly China), and we did not conduct an in-depth analysis across countries. This study did not look at the causal mechanisms underlying this dramatic change in MH in CYP during the pandemic. However, it is plausible that a combination of factors, including limitations to socialising opportunities, had a major role in this. We have provided evidence that indeed lockdowns and school closures had a major impact on the MH of CYP.<sup>31 32 38</sup> This can provide an insight into one of the factors that underlie MH problems in CYP more broadly, and potentially guide prevention and intervention programmes.

### Limitations

The findings of this umbrella review should be considered in the light of a number of limitations. First, the present work included mostly cross-sectional studies. Future research should focus on longitudinal studies, and ideally studies where data before, during and after pandemic are available to assess the extent to which CYP are still suffering from the effect of the pandemic.

Second, the majority of the systematic reviews included here had large samples of CYP from China and not many from the Mediterranean countries and South America. Africa was significantly under-represented while Europe and USA were moderately represented.

Third, it is worth mentioning that during 2020–2022 different countries put in place different public health measures at different times. These variations may have affected the MH of CYP in multiple ways and our work does not account for these variations but may partially explain the large MH prevalence gaps observed. Despite being unable to conduct an in-depth and systematic cross-country comparison, the present data do not suggest major differences in terms of the general impact of the pandemic on the MH of CYP (ie, virtually no study reported an improvement in MH in CYP during the pandemic).

Fourth, most of the data were from cross-sectional studies and came from 2020 and 2021 which leaves us without a clear picture of how CYP are coping now that the worst phases of the COVID-19 pandemic are over in most countries. Future research should compare prepandemic and postpandemic data on a large scale to clarify this aspect.

Fifth, this umbrella review did not include articles that were not in English.

## CONCLUSIONS

To the best of our knowledge, the present umbrella review represents the most up-to-date and comprehensive work on the impact of the COVID-19 pandemic on the MH of CYP. There seems to be a general and worrying trend towards deterioration in general MH in CYP across the globe due to the pandemic. Females and older adolescents seem to be particularly vulnerable.

Future research should consider synthesising data from longitudinal studies where prevalence of MH difficulties in CYP is available ideally before, during and after pandemic. This will shed light on the long-term consequences of the COVID-19 pandemic on the MH of CYP and will guide the next steps in public health prevention and intervention policies.

These findings should encourage collaboration between researchers, clinicians and policymakers in order to minimise societal and financial costs associated with the MH of CYP locally and globally. This effort should aim at the development of psychosocial intervention programmes with special focus on targeted MH difficulties (such as anxiety and depression) in high-risk populations. Novel intervention programmes should be implemented within the context of a strengthened set of safety nets for CYP locally and globally. This can only be done by improving access and utilisation of MH services to CYP and their families.<sup>1</sup>

**Twitter** Leonardo Bevilacqua @Leonardo Bevilacqua

**Contributors** LB, PB and RM-S participated in the design of the study. LB collected, analysed and synthesised the data and led the writing of the article. LF-S, AL, PJ, AS and GB contributed to screening and quality assessment. All the named authors approved the final version of the manuscript. LB is the author acting as guarantor.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Not applicable.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data sharing not applicable as no data sets generated and/or analysed for this study. As an umbrella review, this work makes use of information provided by the published articles included.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

This article is made freely available for personal use in accordance with BMJ's website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.

## ORCID iDs

Leonardo Bevilacqua <http://orcid.org/0000-0002-2397-8189>

Richard Meiser-Stedman <http://orcid.org/0000-0002-0262-623X>

Peter Beazley <http://orcid.org/0000-0001-8821-1213>

## REFERENCES

- Holmes EA, O'Connor RC, Perry VH, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 2020;7:547–60.
- Hossain MM, Sultana A, Purohit N. Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. *Epidemiol Health* 2020;42:e2020038.
- Hessami K, Romanelli C, Chiurazzi M, et al. COVID-19 pandemic and maternal mental health: a systematic review and meta-analysis. *J Matern Fetal Neonatal Med* 2022;35:4014–21.
- Usher K, Durkin J, Bhullar N. The COVID-19 pandemic and mental health impacts. *Int J Mental Health Nurs* 2020;29:315–8. 10.1111/inm.12726 Available: <https://onlinelibrary.wiley.com/toc/14470349/29/3>
- Robinson E, Sutin AR, Daly M, et al. A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. *J Affect Disord* 2022;296:567–76.
- Johnson SU, Ebrahimi OV, Hoffart A. PTSD symptoms among health workers and public service providers during the COVID-19 outbreak. *PLoS One* 2020;15:e0241032.
- Tang W, Hu T, Hu B, et al. Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-Quarantined Chinese university students. *J Affect Disord* 2020;274:1–7.
- Bothe K, Schabus M, Eigl E-S, et al. Self-reported changes in sleep patterns and behavior in children and adolescents during COVID-19. *Sci Rep* 2022;12:20412.
- Taquet M, Geddes JR, Luciano S, et al. Incidence and outcomes of eating disorders during the COVID-19 pandemic. *Br J Psychiatry* 2022;220:262–4.
- Greenberg N, Docherty M, Gnanapragasam S, et al. Managing mental health challenges faced by Healthcare workers during COVID-19 pandemic. *BMJ* 2020;368:m1211.
- Phillip J, Cherian V. Impact of COVID-19 on mental health of the elderly. *Int J Community Med Public Health* 2020;7:2435.
- Newlove-Delgado T, McManus S, Sadler K, et al. Child mental health in England before and during the COVID-19 Lockdown. *Lancet Psychiatry* 2021;8:353–4.
- Golberstein E, Wen H, Miller BF. Coronavirus disease 2019 (COVID-19) and mental health for children and adolescents. *JAMA Pediatr* 2020;174:819–20.
- Hossain MM, Nesa F, Das J, et al. Global burden of mental health problems among children and adolescents during COVID-19 pandemic: an umbrella review. *Psychiatry Res* 2022;317:114814.
- Aromataris E, Fernandez R, Godfrey CM, et al. Summarizing systematic reviews: methodological development, conduct and reporting of an umbrella review approach. *Int J Evid Based Healthc* 2015;13:132–40.
- Marchi J, Johansson N, Sarkadi A, et al. The impact of the COVID-19 pandemic and societal infection control measures on children and adolescents' mental health: A Scoping review. *Front Psychiatry* 2021;12:711791.
- Meherali S, Punjani N, Louie-Poon S, et al. Mental health of children and adolescents amidst COVID-19 and past Pandemics: a rapid systematic review. *Int J Environ Res Public Health* 2021;18:3432.
- Gabriel IW de M, Lima DGS, Pires JP, et al. Impacts of COVID-19 on children and adolescents: A systematic review analyzing its psychiatric effects. *World J Psychiatry* 2022;12:1313–22.
- Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev* 2021;10:89.
- Thomas Jet al. *EPPI-Reviewer: advanced software for systematic reviews, maps and evidence synthesis*. EPPI-Centre Software. London: UCL Social Research Institute, 2020.
- Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol* 2007;7:10:1–7..
- Pieper D, Buechter RB, Li L, et al. Systematic review found AMSTAR, but not R(Evised)-AMSTAR, to have good measurement properties. *J Clin Epidemiol* 2015;68:574–83.
- Samji H, Wu J, Ladak A, et al. Mental health impacts of the COVID-19 pandemic on children and youth—a systematic review. *Child Adolesc Ment Health* 2022;27:173–89.
- Chawla N, Tom A, Sen MS, et al. Psychological impact of COVID-19 on children and adolescents: a systematic review. *Indian J Psychol Med* 2021;43:294–9.
- Panchal U, Salazar de Pablo G, Franco M, et al. The impact of COVID-19 Lockdown on child and adolescent mental health: systematic review. *Eur Child Adolesc Psychiatry* 2023;32:1151–77.
- Chai J, Xu H, An N, et al. The prevalence of mental problems for Chinese children and adolescents during COVID-19 in China: A systematic review and meta-analysis. *Front Pediatr* 2021;9:661796.
- Windarwati HD, Lestari R, Supianto AA, et al. A narrative review into the impact of COVID-19 pandemic on senior high school adolescent mental health. *J Child Adolesc Psychiatr Nurs* 2022;35:206–17.
- Ma L, Mazidi M, Li K, et al. Prevalence of mental health problems among children and adolescents during the COVID-19 pandemic: A systematic review and meta-analysis. *J Affect Disord* 2021;293:78–89.
- Racine N, Cooke JE, Eirich R, et al. Child and adolescent mental illness during COVID-19: A rapid review. *Psychiatry Res* 2020;292:113307.
- Djordjevic S, Conde G Ileana, Dukanac V, et al. Anxiety and depressive Symptomatology among children and adolescents exposed to the COVID-19 pandemic: A systematic review. *VSP* 2022;79:389–99.
- Panda PK, Gupta J, Chowdhury SR, et al. Psychological and behavioral impact of Lockdown and quarantine measures for COVID-19 pandemic on children, adolescents and Caregivers: a systematic review and meta-analysis. *J Trop Pediatr* 2021;67:fmaa122.

- 32 Viner R, Russell S, Saullé R, *et al.* Impacts of school closures on physical and mental health of children and young people: a systematic review. *Public and Global Health* [Preprint] 2021.
- 33 Sharma M, Aggarwal S, Madaan P, *et al.* Impact of COVID-19 pandemic on sleep in children and adolescents: a systematic review and meta-analysis. *Sleep Med* 2021;84:259–67.
- 34 Jones EAK, Mitra AK, Bhuiyan AR. Impact of COVID-19 on mental health in adolescents: A systematic review. *Int J Environ Res Public Health* 2021;18:2470.
- 35 Oliveira J de, Butini L, Pauletto P, *et al.* Mental health effects prevalence in children and adolescents during the COVID-19 pandemic: A systematic review. *Worldviews Evid Based Nurs* 2022;19:130–7. 10.1111/wvn.12566 Available: <https://doi.org/10.1111/wvn.12566>
- 36 Layman HM, Thorisdottir IE, Halldorsdottir T, *et al.* Substance use among youth during the COVID-19 pandemic: a systematic review. *Curr Psychiatry Rep* 2022;24:307–24.
- 37 Gul MK, Demirci E. Addiction in adolescents during COVID-19 pandemic: A systematic review. *EJMI* 2021.
- 38 Imran N, Aamer I, Sharif MI, *et al.* Psychological burden of quarantine in children and adolescents: A rapid systematic review and proposed solutions. *Pak J Med Sci* 2020;36:1106–16.