Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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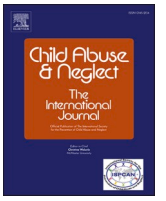

Invited review

The prevalences, changes, and related factors of child maltreatment during the COVID-19 pandemic: A systematic review

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ABSTRACT

Background: The impact of the COVID-19 pandemic has been extensive and drastic during the twenty-first century. The increasing phenomenon of child maltreatment during the pandemic is a significant public health concern.
Objective: This study is the first systematic review to analyze and summarize the prevalence rates, risk factors, and protective factors related to child maltreatment during the COVID-19 pandemic.
Methods: Four electronic databases (PubMed, Web of Science, Scopus, Embase) were systematically searched. Some potential studies were also identified from the reference lists of previously included articles. The quality of the included studies was assessed by the National Institutes of Health (NIH) Quality Assessment Tool and Critical Appraisal Skills Program (CASP) Quality Assessment Tool.
Results: A total of 35 articles were included in the analysis, with 16 having prevalence information and 22 having factor information. Sixteen studies were conducted in the US, the other 17 studies were from 12 countries, and only two studies contained mixed countries. The prevalences of child maltreatment during the pandemic varied widely in different types and measurements. The pandemic rates of physical abuse, psychological abuse, neglect, and sexual abuse were 0.1 %–71.2 %, and 4.9 %–61.8 %, 7.3 %–40 % and 1.4 %–19.5 %, respectively. There was a decline in allegations of child maltreatment and an increase in severe cases of child maltreatment during the COVID-19 pandemic. Lockdown measures and their side effects were the main risk factors contributing to child maltreatment.
Conclusions: This review calls for targeted measures to prevent child maltreatment during the COVID-19 pandemic and current and future lockdowns and more future replication studies conducted in countries other than the US.

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1. Background

Child maltreatment (CM) is a widespread public health problem with adverse short-term or long-term physical and psychological health outcomes for children (Mehta et al., 2021). Child maltreatment is the abuse and neglect that occurs to children below 18 years old (World Health Organization, 2019). It includes multiple forms, such as physical abuse, emotional abuse, sexual abuse, and neglect (Wu et al., 2018), which results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power (World Health Organization, 2019). All types of child maltreatment were associated with higher levels of depression and anxiety (Gardner & Moallef, 2015; Humphreys et al., 2020) and even caused a greater risk of premature mortality among children who are maltreated compared to those who are not (Rogers et al., 2019). Although limited research has investigated child abuse during previous pandemics of infectious diseases, an increasing number of studies have begun to focus on child maltreatment during COVID-19. Given these considerations, systematically collating these relevant findings could be beneficial to provide an overall picture of CM during the COVID-19 pandemic.

Before the COVID-19 pandemic, some studies examined the prevalence of child maltreatment: 12 %–12.7 % for sexual abuse, 20 %–22.6 % for physical abuse, 30 %–36.3 % for psychological abuse, and 18.4 %–47 % for neglect (Wang et al., 2020; van IJzendoorn et al., 2020). In addition, the prevalences of each type of CM vary across studies, and the majority of these children may experience more than one type of child maltreatment (Walker & Wamser-Nanney, 2022). More importantly, the prevalences of CM may be affected by specific contexts, such as the COVID-19 crisis (Agrawal & Kelley, 2020; Coulton et al., 2018). Growing studies have started to examine the pandemic rates of child maltreatment reports, and these rates vary across countries. For instance, recent research showed that American children who experienced sexual abuse, physical abuse, psychological abuse, and neglect accounted for 19.5 %, 28.4 %, 6.97 % and 40 % (Sharma et al., 2021). The pandemic rates of sexual abuse, physical abuse, psychological abuse, and nonmedical neglect among Chinese children were 2.9 % (Long et al., 2022), 13.7 %, 20.2 % and 7.3 %, respectively (Zhang et al., 2022). Despite this evident discrepancy in the rates of child maltreatment reports, it is clear that child maltreatment is a major global public health problem before and after the COVID-19 outbreak. To our knowledge, few reviews have systematically examined the prevalences of child maltreatment during pandemic. The changes in the prevalences or severity of child maltreatment before and during COVID-19 remain controversial. For instance, one study showed that the prevalence of child maltreatment increased by 5.2 % in the US after the COVID-19 outbreak compared to before (Theodorou et al., 2022), whereas another study showed that the number of child maltreatment incidents in the U.S. decreased by 7.95 % during the COVID-19 pandemic (Barboza et al., 2021). Thus, it is necessary to systematically review the prevalences and changes of child abuse during the COVID-19 pandemic, which could help understand the impact of the COVID-19 pandemic on child maltreatment and develop targeted prevention strategies.

According to ecological systems theory and etiological models (Belsky, 1980; Bronfenbrenner, 1977), the interactions of the various levels of interrelated systems could shape the environmental context that influences child maltreatment, including the microsystem, mesosystem, exosystem and macrosystem. In detail, macrosystems and exosystems are systems at the societal level, including cultural factors and social structures; mesosystems and microsystems include factors at the family level and individual level, respectively (Belsky, 1980; Bronfenbrenner, 1977). Additionally, risk or protective factors related to child maltreatment in different systems could be further divided into transient factors and enduring factors based on the ecological-transactional model (Cicchetti & Lynch, 1993; Cicchetti & Toth, 2005). Enduring factors are usually relatively long-lasting conditions or attributes, including demographic factors, socioeconomic status, historical and cultural factors and family structure, while transient factors are short-term stresses or stressors that fluctuate over time (Cicchetti & Lynch, 1993; Cicchetti & Toth, 2005).

Factors related to the COVID-19 pandemic may be transient factors related to child maltreatment, since the COVID-19 pandemic could be a stressor affecting the system at the societal, family and individual levels over time. Specifically, the COVID-19 pandemic significantly affects most social determinants of health (SDH) (Abrams et al., 2022), referring to the conditions in which people are born, grow, work, live, and age and the wider set of forces and systems shaping the conditions of daily life (.). Furthermore, social isolation in COVID-19 pandemic could affect parents' SDH, including insecurity of housing and food, financial loss, and unemployment risks (Hiilamo et al., 2021; Rodriguez et al., 2021; Boyraz & Legros, 2020). These SDHs have been demonstrated to be risk factors associated with child maltreatment (Hunter & Flores, 2021), because they increase parents' economic pressure and provoke negative changes to the family dynamic, thus increasing the risk of child abuse (Boyraz & Legros, 2020; Hiilamo et al., 2021).

In addition, the closures of schools and child care centers during the lockdown elevated the burden of child-care and work-life conflict of parents (Griffith, 2022; Sserwanja et al., 2021; Wu & Xu, 2020). It could lead to more parenting stress and less access to external social support (Griffith, 2022; Sserwanja et al., 2021). Both of them could increase parents' vulnerabilities and then exacerbate the risk of child maltreatment, according to family stress theory (Griffith, 2022; Sserwanja et al., 2021; Wu & Xu, 2020). Moreover, greater risk perception, accompanying the fear and uncertainty related to COVID-19, could worsen parents' mental health (Brown et al., 2020; Calvano et al., 2022). While parents' mental health problem could impair their ability to meet children's immediate needs, triggering maltreatment against children (Roscoe et al., 2018). Based on the above literatures, we expected that the COVID-19 pandemic might elevate the risk of child maltreatment by these transient factors, including risk perception (Brown et al., 2020), mental health (Calvano et al., 2022), social isolation (Lee et al., 2021), economic loss (Barboza et al., 2021), social support (Rodriguez et al., 2021), and family dynamics (Wong et al., 2021). To date, few reviews have systematically explored factors contributing to child maltreatment during COVID-19, especially pandemic factors, based on ecological and etiological theory. Therefore, it is important to understand these factors to help identify at-risk children and guide preventive interventions.

Currently, numerous studies have investigated the prevalences of child maltreatment during the COVID-19 pandemic and its changes compared to the time before COVID-19. However, controversy exists due to the particular data source, target population, and different types and measurements of child maltreatment. To the best of our knowledge, few studies have systematically reviewed the

prevalences of and changes relevant to child maltreatment during the pandemic. In addition, most relevant reviews summarized the potential risk factors for child maltreatment during the COVID-19 outbreak by the analysis of similar previous crises, although COVID-19 is an unprecedented pandemic and may be different compared to previous crises. In addition, most studies only reviewed the impact of parental burnout and stress on child maltreatment during the COVID-19 pandemic. However, no review systematically evaluates and synthesizes the recent research that has been conducted on the risk and protective factors of child maltreatment during the COVID-19 pandemic. More importantly, only one conceptual article used the family stress model to explore factors associated with child maltreatment during the pandemic (Wu & Xu, 2020), but it did not synthesize the newest empirical evidence.

Taken together, the objectives of this systematic review are (a) to critically examine the pandemic rates of child maltreatment reports across diverse population groups, types, and measurements, (b) to explore the changes in the rates and severity of child maltreatment reports before and after the COVID-19 pandemic, and (c) to summarize the factors contributing to child maltreatment during the COVID-19 crisis and build the corresponding conceptual framework. Developing the conceptual framework could contribute to identifying children with a high risk of CM at the early stage of the pandemic and developing early targeted prevention and interventions. On the basis of the above literature review, we proposed the hypothesis that the COVID-19 pandemic could elevate the rates and severity of child maltreatment through a series of transient factors affecting the system at the societal, family and individual levels. Overall, this systematic review aims to answer questions about the rates of CM reports, the extent to which the COVID-19 pandemic has affected CM and its mechanisms. This could shed light on the development and implementation of preventive interventions for CM in the current and future pandemic crisis. Specifically, it could help us to evaluate the potential impact of the pandemic on CM, guide the reasonable allocation of prevention resources, and improve early detection. Apart from providing practical knowledge, a systematic review could also identify, select, appraise, and synthesize studies to generate various types of knowledge for researchers (e.g., conceptual framework, limitations of current research and future research priorities) (Page et al., 2021).

2. Method

2.1. Search strategy

Between 1st January 2020 and 10th August 2022, we carried out a systematic literature search using four electronic databases, including PubMed, Web of Science, Scopus, and Embase. Search strings related to COVID-19, children and child maltreatment were utilized, that is, "2019-nCoV" or "2019 novel coronavirus" or "COVID-19" or "SARS-CoV-2" or severe acute respiratory syndrome coronavirus 2″ or "COVID-19 virus" AND "Child" or "Adolescent" or "Teen" or "Youth" or "school-aged" or "young people" or "Children" or "preschool" AND "maltreatment" or "physical abuse" or "psychological abuse" or "emotional abuse" or "child maltreatment" or "child neglect". These terms were selected based on relevant systematic reviews (Kirabira et al., 2019; Pascarella et al., 2020) and searched within the title, keywords, and abstract for each article in each database. In addition to electronic databases, we identified potential studies from the reference lists of previously identified articles.

2.2. Inclusion/exclusion criteria

We screened the articles based on the following standardized inclusion and exclusion criteria. Articles were included if a) they were published in peer-reviewed journals, b) they described a quantitative or qualitative content analysis of child maltreatment, which refers to "the abuse and neglect that occurs to children below 18 years old " (World Health Organization, 2019), c) they reported the prevalences or factors related to child maltreatment during the COVID-19 pandemic, d) they reported the changes in the cases or scores or rates of child maltreatment reports during the COVID-19 pandemic, e) participants were children aged <18 years old or parents with underaged children, f) full-text papers were available in English. The reason for including qualitative studies is because it could provide detailed evidence of pandemic-related factors associated with child abuse and neglect, which is another focus of this review.

The exclusion criteria included a) duplicates b) articles irrelevant to child maltreatment during the COVID-19 pandemic, c) articles that did not differentiate child maltreatment from family violence, d) policy suggestions or data predictions, e) narrative reviews or overviews, f) commentaries or other types of documents, g) articles that reported neither rates nor changes nor factors related to child maltreatment during the COVID-19 pandemic, h) non-English articles or unavailable full-text papers, i) articles that only measured childhood maltreatment of adults over 18 years old.

2.3. Screening of studies, data extraction, and quality assessment

In the process of study selection, we initially screened the titles using the reference management software EndNote to remove duplicate articles. Second, each reviewer reviewed the title and abstracts of each article to exclude irrelevant studies and then screened the abstracts and full text of the remaining studies against inclusion and exclusion criteria. Data extraction was performed using a standardized template, which collected the country of research, participants, types, and measurement of child maltreatment, prevalence/mean, contributing factors (risk and protective factor), date of data collection, and study design.

A standardized quality assessment was conducted on the nineteen included studies using the NIH Quality Assessment Tool for observational cohort or cross-sectional studies (*Study Quality Assessment Tools*, 2021) and the Critical Appraisal Skills Program (CASP) Quality-Assessment Tool for qualitative studies (Critical Appraisal Skills Programme, 2018). (More details, see Appendix A.) Screening of studies, data extraction, and quality assessment were independently conducted by two reviewers, and a third reviewer was consulted to resolve any disagreements by reaching a consensus. For example, for disagreements on the screening of studies, a third

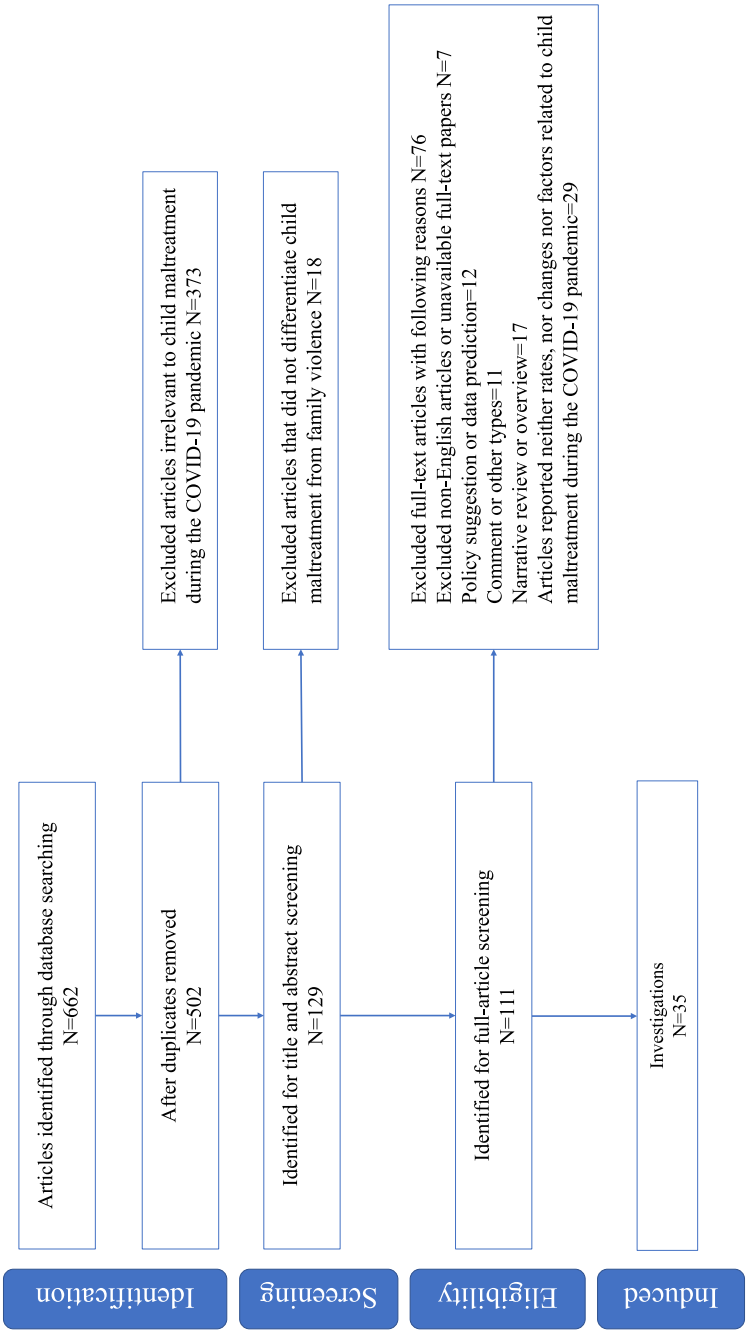

Fig. 1. Flow diagram of the study selection process.

Table 1
Summary of studies related to child maltreatment during the COVID-19 pandemic.

No.	Countries	Author, year	Study design	Participants	Measurement	Date of data collection
1.	Korea	Kim, 2022	Retrospective data review	None	Number of hotline calls related to child maltreatment from formal organizations	COVID: January 2020 to March 2021 Pre-COVID: February 2016 to January 2020
2.	Netherlands	Vermeulen et al., 2022	Cross-sectional design	444 childcare professionals and primary and secondary school teachers	Reports of childcare professionals	COVID: March 16, 2020–June 16, 2020
3.	Indonesia	Suyadi & Selvi, 2022	Qualitative study	317 parents of children aged 3–12 years	Open-ended questionnaire	COVID
4.	Germany	Calvano et al., 2022	Cross-sectional design	1024 parents of underage children	pediMACE	COVID: August 3rd to 11th 2020
5.	Saudi Arabia	Alenezi et al., 2022	Retrospective data review	1304 children aged 0–13+ years	Register cases of abuse from the National Guard Health Affairs (NGHA)	COVID: 23 March to September 2020 Pre-COVID: September 2019 to 23 March 2020
6.	France	Loiseau et al., 2021	Retrospective observational study	844,227 children aged 0–5 years hospitalized	ICD-10-CM	COVID: March and April 2020 Pre-COVID: March and April 2017–2019
7.	Norway	Augusti et al., 2021	Longitudinal design	1944 adolescents aged 13–16 years	CTSPC	COVID: January 2019 Pre-COVID: January 2020
8.	Brazil, Canada, Colombia	Katz et al., 2022	Retrospective data review	None	Reports from The New South Wales Department of Communities and Justice	COVID: March–June 2019 Pre-COVID: March–June 2020
9.	Brazil	Martins-Filho et al., 2020	Retrospective population-based study	123 children and adolescents aged 0–17 years suffering physical abuse (Pre-COVID: n = 70; COVID: n = 53)	Registries of child physical injury from the official child maltreatment database	COVID: The first half of 2020 Pre COVID: The same period in 2019
10.	Canada	Craig et al., 2022	Cross-sectional design	809 adolescents aged 0–18 years 578 caregivers of adolescents	CTS	COVID: June 17 to July 31, 2020
11.	Canada	Stewart et al., 2021	Longitudinal design	adolescents aged 0–17 years (COVID: n = 3712 Pre-COVID:n = 3197)	interRAI CYMHA	COVID: Mar 17 2020 to May 16, 2021 Pre-COVID: Mar 12 2019 to Mar 16 2020
12.	Canada	Bérubé et al., 2020	Cross-sectional design	414 parents of children aged 0–17 years	MNBS combined RPQ	COVID: April 29 to May 10, 2020
13.	China	Zhang et al., 2022	Cross-sectional design	1062 school-aged children	Items from the Violence against Children Survey	COVID: July 2020
14.	China	Long et al., 2022	Longitudinal design	2821 children and adolescents from 12 to 18	CTQ-SF	COVID: 29 December 2020 to 16 January 2021 Pre-COVID: 22 September to 25 October 2020
15.	China	Tso et al., 2022	Cross-sectional design	417 parents of children with SEN studying at special schools and 25,427 parents of children with typical development (TD) studying at mainstream schools	CTSPC	COVID: April 2020
16.	China	Wong et al., 2021	Cross-sectional design	600 parents aged 18 years or older with a child under 10 years old	CTSPC	COVID: 29 May to 16 June 2020
17.	Mexico	Cabrera-Hernández & Padilla-Romo, 2020	Longitudinal design	None: incident-level crime reports and victim characteristics	Reports from the Mexico City Attorney General's Office	COVID: March 23 to June 2020 Pre-COVID: January 2019 to March 22, 2020
18.	US, Australia and Canada	Bullinger et al., 2022	Cross-sectional design	258 SafeCare provider participants.	Items from the SafeCare Provider survey	COVID: June 3rd and 16th of 2020.
19.	US and Israel	Tener et al., 2020	Qualitative cross-cultural comparative study	60 participants that were therapeutic, child welfare and legal professionals	Open-ended questionnaire	COVID: May 2020
20.	US	Salt et al., 2021	Retrospective data review	579 encounters for patients <18 years of age	ICD-10-CM	COVID: After March 20, 2020 Pre-COVID: Before March 20, 2020
21.	US	Rodriguez & Lee, 2022	Cross-sectional design	193 mothers of a child age 8 or younger	CTSPC; AAPI-2	COVID: September-early October 2020

(*continued on next page*)

Table 1 (*continued*)

No.	Countries	Author, year	Study design	Participants	Measurement	Date of data collection
22.	US	Chaiyachati et al., 2022	Retrospective study	emergency department (ED) encounters (COVID: $n = 297,603$ Pre-COVID: n = 1,271,141)	ICD-10-CM and skeletal survey cohort	COVID: April 2020–March 2021 Pre-COVID: January 2018–March 2020
23.	US	Ma et al., 2022	Cross-sectional design	7955 students aged 10–16+ years	Self-administered questionaire	COVID: October to December in 2020
24.	US	Theodorou et al., 2022	Longitudinal design	Patients ≤5 years old admitted to a level one pediatric trauma center	Determined by Social Work and/or Child Protection Teams (CPT).	COVID-19: March 19 to September 19, 2020 Pre-COVID: The same period in 2019
25.	US	Babvey et al., 2021	Qualitative study: social media data	17,413 posts from users of all ages in Reddit	A testimonial-based approach measured changes in violence-related conversations	COVID: between March and July 2020 Pre-COVID: From January 2019 to March 2020
26.	US	Brown et al., 2020	Cross-sectional design	183 parents with a child below 18 years old	BCAPI	COVID: April 21, 2020 to May 9, 2020
27.	US	Sharma et al., 2021	Retrospective medical record audits	776 (Pre-COVID: $n = 561$; COVID: $n = 215$) children 0–18 years of age who were admitted to the ED at our facility	ICD-10-CM	COVID: From March 15 to July 31 of 2020 Pre-COVID: the same period in 2017, 2018, 2019
28.	US	Whelan et al., 2021	Time-series data	None	Criminal charges from the state of Oklahoma	COVID: February through June of 2020
29.	US	Rodriguez et al., 2021	Longitudinal design	Pre-COVID: 119 mothers whose focal child was between 4 and 4½ years old; COVID: 106 mothers of children would have been between 5 and 6½ years old	CTSPC; AAPI-2; BCAPI	COVID: April 20 to May 31, 2020
30.	US	Kaiser et al., 2021	Retrospective cohort study	5815 children ≤5 years (COVID: $n = 1237$; Pre-COVID: $n = 4578$) in the Pediatric Health Information System (PHIS)	ICD-10-CM	COVID: March 16 to August 31, 2020
31.	US	Lee et al., 2021	Cross-sectional design	283 parents of at least one child 0–12 years of age	CTSPC	COVID: March 24, 2020
32.	US	Kovler et al., 2021	Retrospective chart review	257 patients <15 years of age who were entered into the trauma registry at the pediatric trauma center (COVID: $n = 60$; Pre-COVID: $n = 197$)	Evaluated by a multidisciplinary child protection team	COVID: From March 28, 2020 to April 27, 2020
33.	US	Lawson et al., 2020	Cross-sectional design	342 parents with a child aged 4 to 10 years	CTSPC	COVID: Mid-April to mid-May 2020
34.	US	Musser et al., 2021	Time series data	294,462 youth ages 0–17 years 11.99 months from the State Automated Child Welfare Information System (SACWIS)	Reports at time of removal from SACWIS database	COVID: April 2020 Pre-COVID: From January 1, 2001 to 2019
35.	US	Barboza et al., 2021	Spatiotemporal incident data	1305 children under 18 years old reported to the Los Angeles Police Department for (CAN) (COVID-19: $n = 641$; Pre-COVID-19: $n = 661$)	Crime reports from the City of Los AngelesOpen Data portal	COVID

Note: MNBS: Multidimensional Neglectful Behavior Scale Parent-Report (Kantor et al., 2004); RPQ: Room for Parents Questionnaire (Bérubé et al., 2017); pediMACE: Maltreatment and Abuse Chronology of Exposure—Pediatric Interview (Teicher & Parigger, 2015); CTSPC: the Parent–Child Conflict Tactics Scale (Straus et al., 1998); CTS: The Conflicts Tactics Scale (Straus, 1979); AAPI-2: The Adult-Adolescent Parenting Inventory-2 (Bavolek & Keene, 2010); BCAPI: The Brief Child Abuse Potential Inventory (Ondersma et al., 2005); ICD-10-CM: International Classification of Diseases, 10th Revision, Clinical Modification (Puls et al., 2020); CTQ-SF: The Childhood Trauma Questionnaire-Short Form (He et al., 2019); interRAI CYMHA: interRAI Child and Youth Mental Health Assessment (ChYMH) (Stewart et al., 2015).

reviewer synthesized the opinions of both reviewers and made a decision based on the relevance to the topic of this article. For the discrepancies in quality assessment, Author 3 adopted the lowest score rated by Author 1 or Author 2 to avoid overestimating the quality of research.

3. Results

3.1. Description of search results

A total of 662 articles were identified across all databases. After the removal of duplicates, 502 articles were screened by title and

abstract to exclude 373 irrelevant articles. 129 articles were then reviewed by abstract to delete 18 articles that did not distinguish child maltreatment from family violence. The 111 remaining studies were screened by full text. Last, we included 35 investigation studies after excluding non-English articles, unavailable full-text papers, narrative reviews or overviews, policy suggestions, comments, other types of documents and articles that reported neither rates nor changes nor factors related to child maltreatment during the COVID-19 pandemic. More descriptions of the search results can be found in Fig. 1.

Table 2
The prevalence rates of child maltreatment during the COVID-19 crisis.

Countries	Author, year	Sample size	Sample feature	Children's age	Types of child abuse	Prevalence	Measurement
US	Theodorou et al., 2022	163	Patients	≤5	Child maltreatment	13.5 %	Social Work and/or Child Protection Teams
China	Tso et al., 2022	25,844	Parents	2–12	Psychological aggression	80.5 %	CTSPC
China	Wong et al., 2021	600	Parents	<10	Psychological aggression	42.3 %	CTSPC
China	Zhang et al., 2022	1062	Children	School-aged	Psychological abuse	20.2 %	Items from the Violence against Children Survey
Canada	Stewart et al., 2021	3712	Children	0–17	Psychological abuse	11.7 %	interRAI CYMHA
Germany	Calvano et al., 2022	1024	Parents	Underage	Psychological abuse	32.4 %	pediMACE
Norway	Augusti et al., 2021	1944	Children	13–16	Psychological abuse	8.2 %	CTSPC
US	Lee et al., 2021	283	Parents	0–12	Verbal aggression	61.8 %	CTSPC
US	Ma et al., 2022	7955	Children	10–16+	Psychological abuse	21.8 %	Self-administered questionnaire
US	Sharma et al., 2021	215	Patients	0–18	psychological abuse	7.0 %	Electronic medical records
China	Tso et al., 2022	25,844	Parents	2–12	Neglect	28.8 %	CTSPC
China	Zhang et al., 2022	1062	Children	School-aged	Neglect	7.3 %	Items from the Violence against Children Survey
US	Sharma et al., 2021	215	Patients	0–18	Neglect	40.0 %	Electronic medical records
US	Lee et al., 2021	283	Parents	0–12	Emotional neglect	23.0 %,	CTSPC
US	Lee et al., 2021	283	Parents	0–12	Physical neglect	12.4 %	CTSPC
US	Musser et al., 2021	294,462	Children	0–17	Emotional neglect	23.7 %	Reports from SACWIS database
China	Tso et al., 2022	25,844	Parents	2–12	Physical assault	71.2 %	CTSPC
China	Wong et al., 2021	600	Parents	<10	Corporal punishment	14.8 %	CTSPC
China	Zhang et al., 2022	1,062	Children	School-aged	Physical abuse	13.7 %	Items from the Violence against Children Survey
Canada	Stewart et al., 2021	3,712	Children	0–17	Physical abuse	4.9 %	interRAI CYMHA
France	Loiseau et al., 2021	844,227	Patients	0–5	Physical abuse	0.1 %	ICD-10-CM
Norway	Augusti et al., 2021	1,944	Children	13–16	Physical abuse	2.8 %	CTSPC
US	Kovler et al., 2021	60	Patients	<15	Physical abuse	13.0 %	Evaluated by a multidisciplinary child protection team
US	Lawson et al., 2020	300	Parents	4–10	Physical abuse	15.0 %	CTSPC
US	Ma et al., 2022	7,955	Children	10–16+	Physical abuse	3.1 %	Self-administered questionnaire
US	Sharma et al., 2021	215	Patients	0–18	Physical abuse	28.4 %	Electronic medical records
US	Lee et al., 2021	283	Parents	0–12	Physical punishment	19.9 %;	CTSPC
Norway	Augusti et al., 2021	1,944	Children	13–16	Sexual abuse	1.4 %	CTSPC
China	Long et al., 2022	2,821	Children	12–18	Sexual abuse	2.9 %	CTQ-SF
Canada	Stewart et al., 2021	3,712	Children	0–17	Sexual abuse	3.9 %	interRAI CYMHA
US	Sharma et al., 2021	215	Patients	0–18	sexual abuse	19.5 %	Electronic medical records

Note: pediMACE: Maltreatment and Abuse Chronology of Exposure—Pediatric Interview (Teicher & Parigger, 2015); CTSPC: the Parent–Child Conflict Tactics Scale (Straus et al., 1998); ICD-10-CM: International Classification of Diseases, 10th Revision, Clinical Modification (Puls et al., 2020); CTQ-SF: The Childhood Trauma Questionnaire-Short Form (He et al., 2019); interRAI CYMHA: interRAI Child and Youth Mental Health Assessment (ChYMH) (Stewart et al., 2015).

Table 3
Changes in child maltreatment from before to during the COVID-19 crisis.

No.	Countries	Author, year	Sample size	Sample feature	Children's age	Measurement	Changes
1.	Germany	Calvano et al., 2022	1,024	Parents	Underage	pediMACE	Pandemic rates of increased verbal emotional abuse = 42.2 %
2.	France	Loiseau et al., 2021	844,227	Patients	0–5	ICD-10-CM	Increase in the number of children physically abused = 40 %
3.	Canada	Stewart et al., 2021	COVID: n = 3,712; Pre-COVID: n = 3,197	Children	0–17	interRAI CYMHA	Increase in rates of physical abuse = 1.6 % (COVID = 4.9 %; Pre COVID = 6.5 %) Increase in rates of Emotional abuse = 2.4 % (COVID = 11.7 %; Pre COVID = 13.1 %)
4.	China	Wong et al., 2021	600	Parents	<10	CTSPC	Corporal punishment = 14.8 % (increased = 2.3 %, decreased = 0.2 %); Severe physical assault = 4.3 % (increased = 1.2 %, decreased = 0.2 %); Very severe physical assault = 3.5 % (increased = 1.0 %, decreased = 0.0 %); Psychological aggression = 42.3 % (increased = 3.7 %, decreased = 1.0 %);
5.	China	Long et al., 2022	2,821	Children	12–18	CTQ-SF	Increase in rates of sexual abuse = 1.3 % (COVID: 2.9 %; Pre-COVID: 1.6 %)
6.	China	Tso et al., 2022	25,844	Parents	2–12	CTSPC	Increase in rates of physical assault = 11.4 % (COVID = 71.2 %; Pre-COVID = 59.8 %) Increase in rates of psychological aggression = 26.8 % (COVID = 80.5 %; Pre-COVID = 53.7 %)
7.	US, Australia and Canada	Bullinger et al., 2022	258	Safecare provider participants.	None	Items from the SafeCare Provider survey	Believed maltreatment increased during the pandemic = 87 %
8.	US	Salt et al., 2021	579	Patient	<18	ICD-10-CM	Increase in the rates of sexual abuse = 85 %
9.	US	Rodriguez & Lee, 2022	193	Mothers	≤8	CTSPC; AAPI-2	Hitting more often since the pandemic began = 10.5 % Yelling more often = 21 % Using harsh words more often = 12 % Decreased child supervision = 12 % Leaving their child alone more often = 5.2 %
10.	US	Theodorou et al., 2022	163	Patients	≤5	Determined by Social Work and/or Child Protection Teams	Increase in rates of child maltreatment reports = 5.2 %
11.	US	Babvey et al., 2021	17,413	Posts	None	Violence-related conversations	Increase in average monthly number of posts for child abuse = 94 %
12.	US	Lee et al., 2021	283	Parents	0–12	CTSPC	Increased use of discipline = 15.1 %, Yelled/screamed more = 19.3 % More conflict = 24.4 % Spanked or hit more = 5.4 %
13.	US	Kovler et al., 2021	COVID: n = 60; Pre-COVID: n = 197	Patients	<15	Evaluated by a multidisciplinary child protection team	Increase in rates of physical abuse = 9.4 % (COVID = 13.0 %; Pre-COVID = 3.6 %)
14.	Brazil, Canada, Colombia	Katz et al., 2022	None	None	None	CM reports	Decrease in child abuse reports: Brazil = 17.1 % Canada = 30 %–40 % Colombia = 21 %
15.	Brazil	Martins-Filho et al., 2020	Pre-COVID: n = 70; COVID: n = 53	Children	<18	Registries of child physical injury	Decrease in physical abuse = 24.3 %

(*continued on next page*)

Table 3 (*continued*)

No.	Countries	Author, year	Sample size	Sample feature	Children's age	Measurement	Changes
16.	Mexico	Cabrera-Hernández & Padilla-Romo, 2020	None	None	None	Other reports	An average reduction in child maltreatment reports = 21 % (synthetic control) or = 30 % (difference-in-differences method)
17.	US	Chaiyachati et al., 2022	COVID: n = 297,603 Pre-COVID: n = 1,271,141	Patients	<18	ICD-10-CM	Decrease in pediatric ED encounters concerning child physical abuse = 19 %
18.	US	Whelan et al., 2021	None	None	None	Criminal charges	Reduction in criminal charges pertaining to neglect or abuse of a child = 25.70 %
19.	US	Kaiser et al., 2021	COVID: n = 1,237; Pre-COVID: n = 4,578	Children	≤5	ICD-10-CM	Decline in volume of CPA encounters at week 10 of 2020 = 63.4 cases
20.	US	Musser et al., 2021	294,462	Children	<18	Other reports	Reduction in the total number of youths placed in FL foster care system = 24.08 % Reduction in rates of emotional neglect: COVID = 23.67 % vs Pre-COVID = 27.60 %
21.	US	Barboza et al., 2021	COVID-19: n = 641; Pre-COVID-19: n = 661	Children	<18	Crime reports	Decrease in the number of CAN reports = 7.95 %
22.	Saudi Arabia	Alenezi et al., 2022	1,304	Children	0–13+	Register cases	Decrease in the odds of physical abuse = 47.7 % Increase in the odds of emotional abuse = 33.5 % Increase in the odds of neglect = 45.7 %
23.	US	Sharma et al., 2021	Pre-COVID: n = 561; COVID: n = 215	Patients	<18	Child Abuse Reports	Increase in emotional/ psychological abuse = 4.45 % Increase in nonmedical neglect = 8.50 % Decrease in physical abuse = 2.4 % Decrease in sexual abuse = 1.5 %
24.	US	Rodriguez et al., 2021	Pre-COVID: *n* = 119 COVID: *n* = 106	Mothers	≤6	CTSPC; AAPI-2; BCAPI	Increase in Mean of CTSPC-Phych = 5.03 Decrease in Mean of AAPI-2 = 5.42 Decrease in Mean of CTSPC-Physical = 3.17

Note: pediMACE: Maltreatment and Abuse Chronology of Exposure—Pediatric Interview (Teicher & Parigger, 2015); CTSPC: the Parent–Child Conflict Tactics Scale (Straus et al., 1998); AAPI-2: The Adult-Adolescent Parenting Inventory-2 (Bavolek & Keene, 2010); BCAPI: The Brief Child Abuse Potential Inventory (Ondersma et al., 2005); ICD-10-CM: International Classification of Diseases, 10th Revision, Clinical Modification (Puls et al., 2020); CTQ-SF: The Childhood Trauma Questionnaire-Short Form (He et al., 2019); interRAI CYMHA: interRAI Child and Youth Mental Health Assessment (ChYMH) (Stewart et al., 2015).

3.2. Study characteristics

Table 1 shows a summary of the studies included in this review. Among 35 survey-based studies, most were conducted in the United States ($n = 16$), followed by China ($n = 4$). The other 13 studies were from Canada, Brazil, Mexico, Korea, Netherlands, Indonesia, Germany, Saudi Arabia, France, Norway, and Colombia. Only two studies contained mixed countries (note: one was from Canada, Brazil and Australia; another was from Israel and the US). Regarding the study design, over one-third of the papers were cross-sectional ($n = 13$), ten articles were retrospective, and six studies were longitudinal. Only three studies used qualitative methods. Two other studies used time-series data, and the remaining one study adopted spatiotemporal incident data. These studies' sample sizes ranged from 53 to 844,227, and data during the COVID-19 pandemic were collected from 21 January 2020 to 16 January 2021. Pre-pandemic data were collected from 1 January 2001 to December 31, 2019. Twenty-two studies included risk or protective factors. Sixteen articles reported the prevalences of child maltreatment during COVID-19, and the majority of articles reported a reduction or increase in child maltreatment during the pandemic ($n = 24$) (see Table 1).

3.3. Prevalences and changes in child maltreatment during the COVID-19 pandemic

Table 2 shows the pandemic rates of different types of child maltreatment reports during the COVID-19 pandemic. In the US, the pandemic rates of physical abuse ranged from 3.1 % (children aged over 10 years) to 28.4 % (0–18 years old patients) (Ma et al., 2022; Sharma et al., 2021), and 7.0 % (patients below 18 years) to 61.8 % (children below 12 years old) of parents engaged in psychological abuse (Lee et al., 2021; Sharma et al., 2021). The prevalence of neglect ranged from 12.4 % (children below 12 years) to 40 % (patients below 18 years) (Lee et al., 2021; Sharma et al., 2021). In addition, 19.5 % of patients below 18 years old experienced sexual abuse (Sharma et al., 2021).

In China, the pandemic rates of psychological abuse ranged from 20.2 % (13- to 16-year-old children) to 80.5 % (2–12 years old children) (Zhang et al., 2022; Tso et al., 2022). The pandemic rates of neglect ranged from 7.3 % (school-aged children) to 28.8 % (2–12 years old children) (Tso et al., 2022; Zhang et al., 2022). Approximately 13.7 % (school-aged children) -71.2 % (2–12 years old children) experienced physical abuse or assault during the COVID-19 crisis (Tso et al., 2022; Zhang et al., 2022). Only 2.9 % of children

Table 4
Factors contributing to child maltreatment during the COVID-19 crisis.

Enduring factors		
Demographic factors	Children's age	Sharma et al., 2021; Long et al., 2022; Bérubé et al., 2020; Calvano et al., 2022
	Parents' age	Calvano et al., 2022
	Children's gender	Lawson et al., 2020; Sharma et al., 2021
	Ethnicity	Sharma et al., 2021; Musser et al., 2021
Socioeconomic status	Parental education	Vermeulen et al., 2022
	The assets children have at birth	Barboza et al., 2021
	The socioeconomic development of municipalities	Cabrera-Hernández & Padilla-Romo, 2020
History of violence, drug abuse and mental illness	A history of physically or psychologically abusing children	Lawson et al., 2020; Augusti et al., 2021
	The experience of physical or sexual violence in adulthood	Calvano et al., 2022
	The experience of physical or sexual violence in childhood	Calvano et al., 2022
	family members with history of drug abuse and mental illness	Zhang et al., 2022
Cultural factors	Wrong social parenting-specific beliefs	Alenezi et al., 2022
Family structure	Family size	Vermeulen et al., 2022
	Separated/divorced families	Zhang et al., 2022

Transient factors (pandemic related factors)		
Mental or physical health	Anxiety	Brown et al., 2020; Bullinger et al., 2022; Calvano et al., 2022
	Depressive symptoms	Brown et al., 2020; Calvano et al., 2022; Long et al., 2022
	Worries and loneliness	Rodriguez et al., 2021; Rodriguez & Lee, 2022
	Subjective health	Calvano et al., 2022
	General stress	Calvano et al., 2022
	Pandemic-related stress	Calvano et al., 2022
	Economic pressures	Suyadi & Selvi, 2022
	Parental stress	Calvano et al., 2022 Bérubé et al., 2020
	Family stress	Craig et al., 2022
	Family dysfunction (parents' mental health problems and substance abuse)	Augusti et al., 2021
Family dynamics	Exposure to intimate partner violence	Wong et al., 2021;
	Parental confidence in managing preventive COVID-19 behaviors	Wong et al., 2021
	Parental difficulty in discussing COVID-19	Wong et al., 2021
Risk perception	Perceived control over COVID-19 situation	Brown et al., 2020;
Social isolation	Parental perceived social isolation	Lee et al., 2021; Tener et al., 2020
	Lockdown measures/social distancing measures	Wong et al., 2021
	School absenteeism	Barboza et al., 2021
Social support	Receipt of financial assistance during the pandemic	Brown et al., 2020
	Food insecurity: children had received meals at school pre-pandemic	Rodriguez et al., 2021
	Emotional and social support	Brown et al., 2020
Economic loss	Labor force participation	Barboza et al., 2021
	Poverty	Barboza et al., 2021
	Housing burden	Barboza et al., 2021
	Job losses	Calvano et al., 2022; Rodriguez et al., 2021; Lee et al., 2021; Lawson et al., 2020; Vermeulen et al., 2022; Kim, 2022
	Household Unemployment	Ma et al., 2022; Rodriguez et al., 2021
	Financial losses/income reduction	Calvano et al., 2022; Wong et al., 2021

aged 12–18 years experienced sexual abuse during the COVID-19 crisis (Long et al., 2022).

In Canada, the pandemic rates of psychological, physical and sexual abuse among children aged below 17 years were 11.7 %, 4.9 %, and 3.9 %, respectively (Stewart et al., 2021). In Norway, the pandemic rates of psychological, physical and sexual abuse among children aged below 13–16 years were 8.2 %, 2.8 %, and 1.4 %, respectively (Augusti et al., 2021). In France, only 0.1 % of patients aged below 5 years old experienced physical abuse (Loiseau et al., 2021). In Germany, approximately 32.4 % of parents with underaged children reported psychological abuse (Calvano et al., 2022).

Table 3 presents the changes in child maltreatment from before to during the COVID-19 pandemic. Eight studies reported that the prevalence, score, or the number of different types of child maltreatment decreased during the COVID-19 pandemic compared to periods without outbreaks, while increases in child maltreatment were found in thirteen studies (see Table 3). Regarding deceased child maltreatment during COVID-19 compared with the pre-COVID-19 phase, in the US, we found that the prevalence of child abuse and neglect (CAN) reports was decreased by 7.95 % (Barboza et al., 2021), and the actual number of criminal charges about neglect or abuse of a child from February to June 2020 was on average reduced by 25.70 % compared with the forecasted number (Whelan et al., 2021). The youths placed in the foster care system due to emotional neglect reduce from 27.60 % to 23.67 % (Musser et al., 2021). Two studies showed that there was a significant decline in the rate and volume of physical abuse encounters in the US (Chaiyachati et al., 2022; Kaiser et al., 2021). Additionally, two studies showed that the number of CAN reports in Brazil had decreased substantially since the COVID-19 outbreak (Katz et al., 2022; Martins-Filho et al., 2020). Besides, there was a 30 %–40 % reduction in CAN reports in Canada during the pandemic compared to before, and the cases reported in Colombia decreased by 21 % (Katz et al., 2022). In Mexico, the average reductions in crime reports related to child maltreatment calculated by synthetic control and the difference-in-differences method were 21 % and 30 %, respectively (Cabrera-Hernández & Padilla-Romo, 2020).

Regarding increased child maltreatment during the pandemic, in the US, the prevalence of child maltreatment among patients aged below <5 years in a trauma center increased by 5.2 % (Theodorou et al., 2022), and among trauma patients aged below 15 years, the prevalence of physical child abuse injuries increased from 3.6 % to 13.0 % from 2019 to 2020 (Kovler et al., 2021). The rates of sexual abuse among American underaged inpatients could be elevated by the pandemic (Salt et al., 2021). Among convenience sampled parents in the US, 15.1 % reported increased use of the discipline (Lee et al., 2021). In addition, >10 % of American mothers indicated that they were hitting, yelling or using harsh words more often, and over 5 % of them reported that they had provided less supervision to their children since the pandemic began (Rodriguez & Lee, 2022). The average monthly number of posts for child maltreatment increased to 94 % in Reddit during the outbreak (Babvey et al., 2021). Furthermore, among American, Australian and Canadian participants, 87 % believed that child maltreatment increased during the pandemic (Bullinger et al., 2022). In Germany, 42.2 % of parents reported an increase in verbal emotional abuse (Calvano et al., 2022). In Canada, the rates of adolescents who experienced physical and emotional abuse increased by 1.6 % and 2.4 %, respectively (Stewart et al., 2021). Among French children aged 0–5 years hospitalized, the number of children physically abused increased by 40 % (Loiseau et al., 2021). Two cross-sectional studies in China showed that the rates of physical assault, psychological aggression and sexual abuse increased by 11.4 %, 26.8 % and 1.3 %, respectively (Long et al., 2022; Tso et al., 2022). Another cross-sectional survey in China suggested that the prevalence of corporal punishment, psychological aggression, severe and very severe physical assault that parents used more frequently in the pandemic was 2.3 %, 3.7 %, 1.2 %, and 1.0 %, respectively (Wong et al., 2021).

Three studies found that the changes in child maltreatment might differ across types (Alenezi et al., 2022; Rodriguez et al., 2021; Sharma et al., 2021). In Saudi Arabia, a study also found that the COVID-19 pandemic was significantly associated with lower odds of physical abuse and higher odds of emotional abuse and neglect (Alenezi et al., 2022). In the US, the analysis of electronic medical records indicated that the growth of psychological abuse and neglect was 4.45 % and 8.50 %, respectively, while the decline in physical abuse and sexual abuse was 2.4 % and 1.5 %, respectively (Sharma et al., 2021). The psychological aggression score increased from 15.38 to 20.41 between pre-COVID-19 and COVID-19, whereas child abuse risk and physical assault decreased from 97.20 to 91.78 and from 10.26 to 7.09, respectively (Rodriguez et al., 2021).

3.4. Risk and protective factors of child maltreatment

Table 4 shows the risk or protective factors related to child maltreatment. Among them, enduring factors include demographic factors, socioeconomic status, and the history and attitude of violence. Transient factors (pandemic-related factors) include mental or physical health, family dynamics, risk perception, parenting about COVID-19, social isolation, social support, and economic loss (see Table 2).

The demographic factors, age, and gender of children could be significantly associated with child maltreatment (Bérubé et al., 2020; Calvano et al., 2022; Lawson et al., 2020; Long et al., 2022; Sharma et al., 2021). Minorities are associated with a larger reduction in child maltreatment during the pandemic (Musser et al., 2021; Sharma et al., 2021).

Socioeconomic factors, parents with a lower level of education may be more difficult to meet children's basic care needs (Vermeulen et al., 2022). Children with assets at birth may experience more child abuse and neglect (Barboza et al., 2021). At the societal level, the estimated decline in maltreatment reports in poorer municipalities is larger (Cabrera-Hernández & Padilla-Romo, 2020).

Historical factors, including a history of violence and history of drug abuse and mental illness of family members, were positively associated with child maltreatment during the COVID-19 pandemic (Lawson et al., 2020; Calvano et al., 2022; Augusti et al., 2021; Zhang et al., 2022). In addition, cultural factors such as wrong social parenting-specific beliefs might increase use of physical punishment (Alenezi et al., 2022). Family structures such as larger family size and separated/divorced families also affect the risk for maltreatment (Vermeulen et al., 2022; Zhang et al., 2022).

With regard to mental or physical health during the COVID-19 pandemic, family stress from confinement was associated with more

frequent physical and psychological maltreatment (Craig et al., 2022). Family dysfunction, including parents' mental health problems and substance abuse, could increase the risk of abuse experience (Augusti et al., 2021). Loneliness and worries of parents may increase the prevalence of neglect, conflict, and hitting their children (Rodriguez et al., 2021; Rodriguez & Lee, 2022). Anxiety, depressive symptoms and economic pressure of parents were positively associated with child abuse potential (Brown et al., 2020; Bullinger et al., 2022; Calvano et al., 2022; Long et al., 2022; Suyadi & Selvi, 2022). Parental stress may also elevate the risk of WDV and VEA, whereas the subjective good health of parents may lower the risk (Calvano et al., 2022).

Concerning risk perception, perceived control over the COVID-19 situation was negatively correlated with child abuse potential (Brown et al., 2020). With regard to social isolation, more time in social distancing is associated with more physical abuse, more sexual abuse, and less psychological aggression during the pandemic (Lee et al., 2021; Tener et al., 2020; Wong et al., 2021). Even after controlling for times of social distancing, perceived social isolation at the parent's level is positively associated with child neglect (Lee et al., 2021). Additionally, school absenteeism due to health reasons and transportation issues was related to increases in CAN during the pandemic (Barboza et al., 2021).

For social support, high emotional and social parental support was negatively associated with child abuse potential (Brown et al., 2020). However, another study showed that mothers whose children received free meals at school before the pandemic might be more likely to abuse children (Rodriguez et al., 2021). Children in families receiving financial assistance might be at greater risk of maltreatment during the pandemic (Brown et al., 2020).

Economic losses, such as job losses and financial losses, are positively associated with child maltreatment (Vermeulen et al., 2022; Kim, 2022; Barboza et al., 2021; Calvano et al., 2022). These factors could increase the risk of WDV and VEA (Calvano et al., 2022), but decrease the risk of psychological aggression (Wong et al., 2021). However, other studies have shown that employment change can increase emotional neglect, physical punishment (Lee et al., 2021), and psychological maltreatment (Lawson et al., 2020). In addition, at the family level, the experience of household employment loss is related to a higher child abuse risk score (Ma et al., 2022; Rodriguez et al., 2021). At the societal level, a more severe housing burden, poverty, and labor force participation correlated with new and intensifying hotspots compared to consecutive cold spots of CAN during the pandemic (Barboza et al., 2021).

3.5. Measurement

The studies in this review measured child maltreatment in a wide variety of ways. As shown in Appendix B, seven scales that were specifically developed to assess child maltreatment were used in 12 studies. Several studies provided the measure's psychometric properties and therefore confirmed good validity and reliability. Specifically, the values of internal consistency reliability were 0.71–0.78 for the Parent–Child Conflict Tactics Scale (Augusti et al., 2021; Lawson et al., 2020), 0.85–0.90 for the Conflicts Tactics Scale (Craig et al., 2022), 0.66–0.94 for Multidimensional Neglectful Behavior Scale Parent-Report (Kantor et al., 2004), 0.86–0.96 for the Adult-Adolescent Parenting Inventory-2 (Bavolek & Keene, 2010; Rodriguez et al., 2021; Rodriguez & Lee, 2022), 0.80–0.89 for the Brief Child Abuse Potential Inventory (Ondersma et al., 2005; Rodriguez et al., 2021; Brown et al., 2020), and 0.72 for the Childhood Trauma Questionnaire-Short Form (Long et al., 2022). The value of Test-Retest Reliability of Maltreatment and Abuse Chronology of Exposure—Pediatric Interview is 0.91 (Teicher & Parigger, 2015). One study reported the ICR of their scale was 0.82–0.90 (Zhang et al., 2022). The remaining 23 studies didn't report psychometric properties (more details see in the Appendix B).

4. Discussion

The objective of this review was to gather and synthesize the available evidence related to the prevalence of and changes in child maltreatment during the COVID-19 epidemic as well as the factors contributing to more or less child maltreatment. Knowledge of the prevalence of maltreatment during COVID-19 and associated factors will help in developing effective interventions for child maltreatment during similar public health emergencies and inform directions for future research. The current review used a comprehensive search without limitation of sample size and participant groups, thus including broad and diverse studies related to child maltreatment during the pandemic. The variety of its assessment and definition used in different studies also resulted in the diversity of the results and findings of this review.

During the COVID-19 outbreak, the prevalence rates of physical abuse, psychological abuse, neglect, and sexual abuse in the US were 3.1 %–28.4 %, 7.0 %–61.8 %, 12.4 %–40 % and 19.5 %, respectively. In China, the pandemic rates of physical abuse, psychological abuse, neglect, and sexual abuse were 13.7 %–71.2 %, 20.2 %–80.5 %, 7.3 %–28.8 % and 2.9 %, respectively. In Canada, the pandemic rates of psychological, physical and sexual abuse were 11.7 %, 4.9 %, and 3.9 %, respectively. In Norway, the pandemic rates of psychological, physical and sexual abuse were 8.2 %, 2.8 %, and 1.4 %, respectively. In France, only 0.1 % of patients aged below 5 years experienced physical abuse, while 32.4 % of German parents reported psychological abuse (Calvano et al., 2022). Moreover, only the lowest pandemic rate of sexual abuse in the US is higher than the highest pre-pandemic rate of sexual abuse, and the highest pandemic rates of physical and emotional abuse in the US and China are higher than their highest pre-pandemic rates. This partially supports our hypothesis that the COVID-19 pandemic could increase the risk of child maltreatment. In addition, we found that in the US, the pandemic rates of physical abuse and neglect among underaged patients are greater than those among general children. It is obvious that the prevalence of child maltreatment was diverse across different types of child maltreatment and population groups. The definition, diagnosis, and types of child maltreatment were also very different across all studies, which made the comparison across studies difficult.

Regarding the changes in the score, number, or prevalence of child maltreatment during COVID-19 compared to the period before the pandemic, both increases and decreases have been reported. Most studies that reported a reduction in child maltreatment adopted data from governmental organizations, such as crime reports, criminal charges, and allegations, whereas studies that reported an

increase in child maltreatment mainly employed data from clinical settings and individual surveys. Reductions in child maltreatment may be explained by the significant obstacles that the COVID-19 pandemic and lockdown brought to surveillance of child maltreatment. The increase in child maltreatment reported by parents surveyed during the pandemic, this was because the COVID-19 crisis highly influenced the ecological systems contributing to child maltreatment, and thus exacerbating accumulated risk and cumulative harm to children abused (Bryce, 2020). Also, we further discussed this reason in the following section relevant to the risk factors associated with child maltreatment during the pandemic.

In addition, three studies showed that the rates or scores of physical abuse was reduced during the pandemic, while psychological abuse was more likely to increase (Alenezi et al., 2022; Rodriguez et al., 2021; Sharma et al., 2021). However, the observed decrease in physical abuse may not be real, since the cases of sentinel injuries increased, whereas the emergency department (ED) visits decreased at a pediatric ED trauma center in May and June 2020 (Sharma et al., 2021). Parents might tend to underreport physical aggression given concerns about social desirability concerns (Rodriguez et al., 2021). More importantly, physical abuse is more likely to co-occur with psychological maltreatment, but psychological abuse may not come with physical abuse (Cicchetti, 2016).

Consistent with previous research conducted before the COVID-19 pandemic, enduring factors such as age, gender, ethnicity, socioeconomic status of parents and children, family structure and history of violence, drug use and mental illness are associated with child maltreatment (Cicchetti & Toth, 2005; Stith et al., 2009). Of note, two studies indicated that older children are more likely to be neglected by their parents or caregivers (Bérubé et al., 2020; Long et al., 2022), which differed from previous research indicating that younger children are at increased risk for neglect (Mulder et al., 2018). Bérubé et al. (2020) suggested that the result may be specific to the context of the lockdown, which may make parents the sole providers of all needs of their children. More specifically, parents may have more work-family conflict and neglect the needs of school-aged children who were formerly met by teachers and classmates at school, due to the measures of closure of school and work-at-home.

Gender is also an important demographic factor associated with child maltreatment. Compared to male children, female children may be more likely to experience sexual abuse, but less likely to experience physical and psychological abuse during the pandemic (Lawson et al., 2020; Sharma et al., 2021). The higher underreporting of female children abused during the pandemic may be because violence toward women may have been normalized at home since early age (Cabrera-Hernández & Padilla-Romo, 2020). In addition, ethnicity is also related to child maltreatment, and more underreporting may occur in Asian and black ethnicities than in white ethnicities during the pandemic (Musser et al., 2021; Sharma et al., 2021).

The second enduring factor is socioeconomic status, such as parental education level and the assets of the child at birth. High socioeconomic status is a major protective factor associated with less child maltreatment during a crisis (Barboza et al., 2021; Vermeulen et al., 2022). Although socioeconomic development seems to be a protective factor, a larger decline in maltreatment reports was found in poorer municipalities, which may result from the lower detection power in poorer municipalities (Cabrera-Hernández & Padilla-Romo, 2020).

The third enduring factor related to child maltreatment is family structure, such as family size and separated/divorced status (Vermeulen et al., 2022; Zhang et al., 2022). Families with a larger number of children may have more family resource problems related to failure to provide children with physical needs and supervision (Cozza et al., 2019). Living in larger families could reduce personal space and private time, which might lead to more frustrations and irritabilities among family members and thus increase the aggressive behaviors of parents (Vermeulen et al., 2022). Moreover, children living in separated/divorced families could be more likely to be abused by their single parents, since single parents may have higher levels of parenting stress than non-single parents (Zhang et al., 2022).

A history of violence, drug use, and mental illness is the fourth enduring factor contributing to child maltreatment. Of note, no matter what kind of child maltreatment parents or their children experienced prior to the COVID-19 pandemic, all could make their children at a greater risk of child abuse (Calvano et al., 2022; Augusti et al., 2021; Lawson et al., 2020). In addition, parents with a drug abuse history and mental illness may be more likely to maltreat their children (Zhang et al., 2022) due to the lack of ability to care for children and the failure to meet children's immediate needs (Roscoe et al., 2018). Regarding cultural factors related to child maltreatment, parents with wrong beliefs about offense and use of punishment may tend to adopt punitive parental strategies, thus increasing the risk of physical abuse (Alenezi et al., 2022).

For the transient factors (pandemic specific factors), we found that risk perception, mental or physical factors, family dynamics, social isolation, economic loss, and social support were associated with the risk for abuse. First, parents with higher risk perception perceive lower controllability over the COVID-19 situation and may experience more stressors (Brown et al., 2020; Liu, Huang, Fu, et al., 2021). As a result, they tend to adopt inadequate parenting practices, such as abusing their children to vent their negative emotions (Brown et al., 2020).

Secondly, adverse mental health amplified by the COVID-19 pandemic, such as anxiety, depressive symptoms, worries, loneliness, parental stress, family stress, and family dysfunction, could also increase the risk for child maltreatment (Bullinger et al., 2022; Brown et al., 2020; Calvano et al., 2022; Long et al., 2022; Rodriguez et al., 2021; Rodriguez & Lee, 2022; Suyadi & Selvi, 2022; Bérubé et al., 2020; Craig et al., 2022; Augusti et al., 2021). In addition, the subjective good health of parents is a protective factor (Calvano et al., 2022), indicating that both mental and physical health at the individual and family levels could protect children from maltreatment. This could be explained by the following reasons: first, parents with worse mental and physical health may not be capable of caring for their children and thus fail to meet their children's immediate needs (Roscoe et al., 2018). Second, elevated family stress due to the COVID-19 pandemic means less external and internal support, which could affect parents' ability to cope and make them tend to use more punitive parenting strategies (Craig et al., 2022), according to the family stress model (Wu & Xu, 2020). Third, mental and physical status at different systems may interact with each other and then affect the risk of child maltreatment, based on ecological systems theory and etiological models (Belsky, 1980; Bronfenbrenner, 1977). However, physical factors were not fully examined, and

the effect of children's physical and mental health has rarely been explored in empirical research.

Thirdly, family dynamics have been influenced by the COVID-19 pandemic (Brooks et al., 2020; Park et al., 2020). Negative family dynamics means that there are more parenting issues about COVID-19 between parents and children and more violence between parents, which could be a risk factor for child maltreatment (Wong et al., 2021). This is because parents experienced adverse family dynamics may not have enough ability to utilize available sources to manage stressors and to build positive communication about COVID-19 with their children (Brown et al., 2020; Duchovic et al., 2009), and thus leading to punitive or abusive parenting behavior.

Fourthly, social isolation at the societal level, such as lockdown measures, may result in more physical abuse and less psychological abuse (Wong et al., 2021). Parents perceive more social isolation and may tend to execute more physical and psychological abuse (Lee et al., 2021), possibly because social isolation may induce more emotional and psychological strain on parenting, particularly in the lack of external support from childcare, teachers, and other child care providers (Lee et al., 2021). It should also be noted that due to lockdown measures, families could not leave their home and constantly shared the same space with family members, leaving few escape possibilities for victims. However, in other families, stay-at-home orders may also protect victims from neglect and psychological abuse by improving parent–child communication and relationships (Tener et al., 2020).

Fifthly, regarding economic loss due to the pandemic, both unemployment and financial losses at the individual, family and societal levels could lead to a higher risk of child maltreatment (Barboza et al., 2021; Calvano et al., 2022; Kim, 2022; Lawson et al., 2020; Lee et al., 2021; Ma et al., 2022; Rodriguez et al., 2021; Vermeulen et al., 2022; Wong et al., 2021). This supported the ecological theory about the effects of economic strain in different systems on the child maltreatment (Conrad-Hiebner & Byram, 2020). Besides, economic loss could not only reduce the family resource to meet children's physical need, but also bring financial stress disrupting parents' ability to manage their negative emotion and parenting effectiveness, and thus increasing the use of punitive parenting styles, based on the family stress model (Ma et al., 2022; Wu & Xu, 2020).

Finally, social support is a significant protective factor for child maltreatment (Brown et al., 2020). In general, families who received more social support, such as financial assistance, during the pandemic may have a lower risk of child maltreatment, although one study found a positive association between financial support and the risk of maltreatment. One explanation for this seemingly contradictory pattern of findings is that families that receive financial assistance may have lower income, which in turn may relate to more worries, anxiety, and depressive symptoms (Brown et al., 2020). In addition, the lockdown policies resulted in fewer social services at the societal level and limited practical support that individuals could receive from friends and relatives, which may increase the risk of child maltreatment. For instance, children could not receive meals at school during the pandemic. As a result, parents may experience worries related to food insecurity and other financial concerns, which in turn may increase the risk for maltreatment (Rodriguez et al., 2021). Parents who perceive less emotional or social support from friends and others could be more likely to abuse their children (Brown et al., 2020).

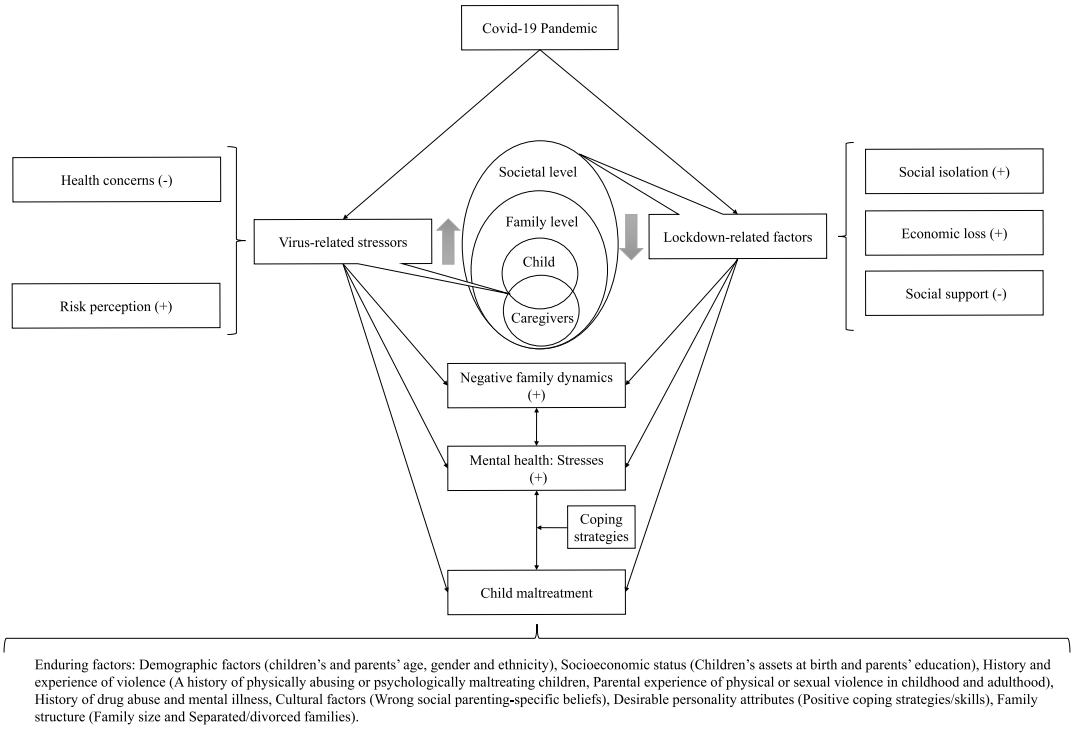

Fig. 2. Conceptual framework of factors associated with child maltreatment during the COVID-19 pandemic.
Note: "−" symbols in parentheses indicate a negative association between factors and child maltreatment, and "+" symbols in parentheses indicate a positive association between factors and child maltreatment.

4.1. Conceptual framework of factors associated with child maltreatment during COVID-19

Only three studies mentioned theories about risk and protective factors associated with child maltreatment (Lawson et al., 2020; Rodriguez et al., 2021; Whelan et al., 2021). However, few studies have constructed a conceptual framework of factors associated with child maltreatment during COVID-19 and have focused on COVID-19 pandemic-specific factors. To synthesize the mechanisms of how the COVID-19 pandemic affects child maltreatment, our review aims to establish a conceptual framework based on the identified factors and guided by the family stress model and ecological and etiological theory (Belsky, 1980; Cicchetti & Lynch, 1993; Cicchetti & Toth, 2005; Wu & Xu, 2020).

The factor model presented in Fig. 2 suggests that the COVID-19 pandemic broadly increases the rate of child maltreatment: virus-related stressors and side effects of lockdown policies affect mental health from the individual level to the societal level. These processes may generate a higher degree of distress for caregivers and reduce the quality of marital and parent–child relationships. The deteriorated family environment could in turn enhance caregivers' stresses, inducing child maltreatment. Therefore, the links between virus-related stressors, lockdown-related stressors, caregivers' mental health, family dynamics, and child maltreatment are not unidirectional and simple.

Child maltreatment risk is determined by transient factors containing short-term stressors and enduring factors, including relatively long-lasting conditions or attributes, according to etiological theory (Cicchetti & Lynch, 1993; Cicchetti & Toth, 2005). For the transient factors (pandemic-related factors), we could further divide these factors into four groups: virus-related stressors and lockdown-related stressors, mental health, and family dynamics, according to previous research about the COVID-19 pandemic (Wu & Xu, 2020). The first two factors are directly related to the virus itself and the lockdown, and the latter two factors are consequences of the first two factors. For parents, the impact side effect of the lockdown may be larger than the impact of the virus itself (Liu, Huang, Ahmed, et al., 2021). Thus, we should pay attention to virus-related stressors and focus in particular on lockdown-related stressors and their consequences for parents.

According to the family stress model, stressors are events or circumstances that generate pressure for a family system (Komarovsky et al., 1950). When families of caregivers do not have enough resources or appropriate coping strategies to cope with a stressor, psychological tension or distress could emerge (Folkman et al., 1986). Parents with more stressors are more likely to execute child abuse (Wu & Xu, 2020). Furthermore, coping strategies or resources, as protective factors for mental health, could buffer the relationship between stressors and child maltreatment.

4.2. Limitation

Our review is limited by the variability in types and measurements of child maltreatment, the calculation of prevalence and changes, and the assessment of risk and protective factors. Although extracting broad literature can help in obtaining comprehensive and rich information related to child maltreatment during the COVID-19 pandemic, it may limit the comparison of results across studies in this review and make the meaningful determination of prevalence and factors difficult. Second, most empirical studies we selected were conducted in the US, which may restrict the generalizability of our findings. More importantly, we only included publications in English language, so there may be language bias. Future reviews should add literatures published in the non-English and include the international data as much as possible.

4.3. Implications for future research, preventions, and interventions

As the first systematic review about child maltreatment during the COVID-19 pandemic, it has many implications for future research, prevention and intervention programs. For future research, we make some recommendations based on the limitations in the existing evidence base. First, it is necessary to investigate child maltreatment across countries with diverse cultures, since most existing research was conducted in the United States. Second, most studies used a cross-sectional design when analyzing associations with child maltreatment, thus limiting causal inference. Future studies should employ longitudinal designs. Third, rigorous replication studies are urged to further determine the prevalence of each type of child maltreatment during the pandemic and verify the risk and protective factors identified in this review, which could increase the reliability and consistency of conclusions. Fourth, limited studies have analyzed the role of mediation and moderation based on the corresponding theories. Thus, future studies could examine the role of mediators such as parental stress and the effect of moderators such as social support. Fifth, most studies focus on parent-level factors, and more focus should be given to child-level factors such as aggressive behaviors and disobedience and community-level factors such as the functioning of services for the defense of children's rights (Marques et al., 2020). Finally, the conceptual framework we established in the review illuminated the possible mechanisms how the COVID-19 pandemic affects child maltreatment. Future research could utilize the conceptual framework to systematically examine pandemic-specific factors.

Regarding prevention and interventions, the power of monitoring and detection needs to be enhanced during the pandemic, especially for minority ethnicity and girls living in poorer areas. Besides, due to the impact of lockdown measures on health and social services, more online resources should be developed for parents and children. Considering the buffering effect of positive coping strategies on the association between job loss and child maltreatment during the pandemic, online service and resources enhancing coping skills like positive cognitive reframing should be provided (Lawson et al., 2020). Given the effect of mental and physical factors on child maltreatment, health care professionals should pay attention to the mental and physical health of parents and children, particularly mental health problems like parental stress increased by the pandemic, and offer online therapeutic communication and treatment (Tener et al., 2020). When engaging online with children and their caregivers, mandated professionals such as teachers,

healthcare providers, and social service personnel should be vigilant about the signs of child maltreatment, which could further elevate surveillance capability. Policymakers should provide authentic information and disease knowledge in a timely manner to build correct risk perception of parents in risk communication about COVID-19 (Liu, Huang, Fu, et al., 2021; Lohiniva et al., 2020). Parents' financial loss and unemployment caused by the pandemic and lockdown must be given special attention, and corresponding social support should be provided (Brown et al., 2020; Calvano et al., 2022). In addition, the new framework we proposed in this study also calls for a specific focus from policymakers and practitioners on the effect of the pandemic on multiple levels of children's ecologies. Policymakers and practitioners could provide macrolevel and microlevel support to reduce child maltreatment, respectively. For example, policymakers could develop specific CM prevention strategies directed at improving family dynamics and mental health and reducing virus-related and lockdown-related stressors. Practitioners could use the conceptual framework to comprehensively identify vulnerable children and specifically implement prevention strategies during the pandemic.

5. Conclusion

This review was designed to summarize the available evidence on the prevalences, changes, and factors of child maltreatment during the COVID-19 pandemic. Empirical evidence has shown that the prevalences of and changes in child maltreatment vary widely depending on the data source and method. In addition, this review provided a conceptual framework to facilitate understanding of the risk for maltreatment during pandemics, proposed specific suggestions for future research, and recommended targeted measures to prevent child maltreatment during the COVID-19 pandemic and lockdown.

Declaration of competing interest

All authors declare that they have no conflicts of interest.

Data availability

No data was used for the research described in the article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chiabu.2022.105992.

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