TECHNICAL NOTE

The Prevalence of Online Victimisation

Introduction

Indicator 1 shows the global prevalence of victimisation of online child sexual exploitation and abuse (OCSEA). More specifically, it provides estimates for the number of victims under the age of 18 on the global scale who have experienced different forms of OCSEA.

Although a growing body of evidence on both offline and online child abuse and exploitation is published and widely disseminated, estimating the full extent of these crimes remains extremely challenging due to their 'hidden' nature and the fragmentation of the associated data. Therefore, to better understand the risks that children are facing in the online environment; the magnitude of victimisation; and what data is available and known, and what is unavailable and unknown, it is crucial to estimate the scale of the victimisation and establish more precise and uniform typology and estimates on the prevalence and nature of OCSEA.

Indicator 1 is based on a comprehensive systematic review conducted in six official UN languages and a meta-analysis of the findings. This review aimed to contribute to filling the gap in our understanding of the prevalence and nature of OCSEA on a global scale. By analysing and synthesising the existing literature on technology-facilitated and online child sexual abuse and exploitation, this comprehensive systematic review provides crucial evidence that can complement the current knowledge of OCSEA by highlighting what is, and what is not known currently; and inform policymaking and practice regarding the prevention and intervention of OCSEA. The findings of this review, as presented in an accompanying PDF narrative and data website, will be of great significance to policymakers, practitioners, advocates, and researchers as they can use the evidence to make informed decisions about allocating resources and designing effective prevention and response programmes. Moreover, the review will contribute to the more general advancement of knowledge on OCSEA prevalence and its measurement, and thus, assist in the development of future research in this field. Ultimately, the findings from this indicator have the potential to make a significant impact in reducing the incidence of OCSEA and promoting the health and wellbeing of children globally.

This technical note explains in more detail how the data for the indicator was collected and analysed, as well as reflections on data quality and limitations of the methods applied.

Data Collection

A comprehensive systematic review was conducted in six official UN languages and was focused on online child sexual exploitation and abuse. This review scanned the academic and grey literature in six UN languages to identify studies that had published prevalence estimates on any type of online CSEA. This review also checked previous scoping and systematic reviews, including those conducted by the team, such as a review on prevalence estimation methods for CSEA and a scoping review (published in Childlight's 2024 Searchlight publication) on quantitative studies focused on the prevalence and nature of OCSEA in different online environments, including social media, peer-to-peer file sharing networks and the dark web (see for example: https://childlight.org/nature-online-child-sexual-exploitation-and-abuse-csea).

Search strategy

The research team searched the following electronic databases for journal articles/reports that met the inclusion criteria:

1. PubMed/Medline (ovid),
2. Global Health (ovid),
3. PsycINFO (ovid),
4. EMBASE (ovid),
5. Social science citation index (Web of Science),
6. Sociological abstracts (Proquest),
7. CINAHL (EBSCOhost),
8. ERIC(EBSCOhost)
9. Criminal Justice Abstract (EBSCOhost)
10. Google Scholar

In addition, using the same search terms, relevant articles were selected from the following journals that are key in the field of child protection: 'Child Abuse and Neglect', 'Child Maltreatment', 'Child Abuse Review', and 'Journal of Interpersonal Violence'. Relevant systematic review bibliographies were also searched.

Again, the search terms were used in Google Scholar and Google Search to identify previous reviews. Within these reviews, relevant references from their bibliographies were chosen and added to Covidence for review.

Grey literature was searched through the university library databases, specifically designed to identify unpublished or non-standard academic literature. Key grey literature sources included research by international non-governmental organisations (INGOs), UN agencies and community-based organizations (CBOs), as well as research reports from national government sources. A thorough scan of key websites that publish OCSEA

studies was completed. This scan helped identify both grey literature and organisations/individuals that might have links to grey literature. These websites included but were not limited to:

- www.crin.org (and www.crin.org/bcn)
- Child Rescue Coalition (CRC)
- Canadian Centre for Child Protection (C3P)
- Thorn v. International Development Research Centre (IDRC)
- Save the Children-Resource Center
- International Society for the Prevention of Child Abuse and Neglect (ISPCAN)
- National Center of Missing and Exploited Children (NCMEC)
- International Center of Missing and Exploited Children (ICMEC)
- WeProtect Global Alliance
- Child Protection Monitoring and Evaluation
- Child Exploitation and Online Protection
- Terre des Hommes
- Internet Watch Foundation (IWF)
- INHOPE
- End Child Prostitution and Trafficking (ECPAT)
- National Society for the Prevention of Cruelty to Children (NSPCC)
- Technology Coalition
- Seksuelle Overgrep mot Barn over Internett (SOBI)
- Missing Children Europe (MCE)
- eSafety Commission
- NetSafe
- Get Safe Online
- Lucy Faithfull
- Oak foundation
- www.endcorporalpunishment.org
- www.unicef-irc.org and other UNICEF websites
- Sexual Violence Research Initiative (SVRI) search by region: https://www.svri.org/
- World Health Organization (WHO), WHO's own violence prevention publications: https://www.who.int/violence_injury_prevention/publications/violence/en/; and the WHO's V-Info website search under countries: https://apps.who.int/violence-info/countries.
- Together for Girls
- The Global Partnership to End Violence Against Children's Knowledge Platform: https://www.end-violence.org/knowledge

- UNICEF Regional Offices: search bars on the following websites
  - Middle East and North Africa (MENA): https://www.unicef.org/mena/
  - Latin America and the Caribbean Regional Office (LACRO): https://www.unicef.org/lac/en
  - West and Central Africa Regional Office (WCARO): https://www.unicef.org/topics/wcaro
  - East and Southern Africa Regional Office (ESARO): https://www.unicef.org/topics/esaro,
  - East Asia and Pacific Regional Office (EAPRO): https://www.unicef.org/eap/
  - Regional Office of South Asia (ROSA): https://www.unicef.org/rosa/
  - Europe and Central Asia (ECA): https://www.unicef.org/eca/

In addition, the research team searched for comparable data on the prevalence of OCSEA published in:

1. Demographic Health Surveys (DHS)
2. Multiple Indicator Cluster Surveys (MICS)
3. Global School-Based Health Surveys (GSHS)
4. Health Behaviour in School-aged Children Study (HBSC)
5. Disrupting Harm (DH)
6. Global Kids Online (GKO)
7. Violence Against Children Survey (VACS)

Language specific databases:

Spanish specific databases:

- Scielo (Scientific Electronic Library Online) which has collections of academic journals from 15 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Spain, Mexico, Paraguay, Peru, Portugal, South Africa, Uruguay, and Venezuela: https://scielo.org/es
- Dialnet. Has articles published in Spain or in Spanish covering a wide range of subject areas: https://dialnet.unirioja.es/
- Redalyc: https://www.redalyc.org/
- CLACSO: https://biblioteca-repositorio.clacso.edu.ar/

French specific databases:

- CAIRN. Covers Articles from France and Belgium across the humanities and social sciences. Access through the CAIRN link on the University of Edinburgh's Library Databases A-Z page
- PASCAL & FRANCIS. Closed in 2015 but has articles in humanities and social sciences dating from 1984. Access through the 'PASCAL and FRANCIS Bibliographic Databases' link on the University of Edinburgh's Library Databases A-Z page
- OpenEdition open access journals in the French Language

Chinese specific databases:

- China National Knowledge Infrastructure (CNKI): https://oversea.cnki.net/index/. It is the largest and continuously updated Chinese journals database in the world
- Wanfang Database: http://www.wanfangdata.com/. It provides access to a wide range of database resources including journals and dissertations published in Chinese
- Chinese Electronic Periodical Services: https://www.airitilibrary.com/. It includes full-text periodicals published in both the Mainland China and Taiwan
- China Science and Technology Journal Database (http://qikan.cqvip.com/)

Arabic specific databases:

- Arabic Collections Online (http://dlib.nyu.edu/aco/)
- SCOPUS (with a language filter) access through University of Edinburgh database
- Gale OneFile News (https://go-gale-com.ezproxy.is.ed.ac.uk/ps/start.do?p=STND&u=ed_itw)
- AMEEL (https://hdl.handle.net/10079/bibid/11689753)
- Humanindex hosted by DARALMANDUMAH http://search.mandumah.com/MyResearch/Home
- EduSearch hosted by DARALMANDUMAH http://search.mandumah.com/MyResearch/Home
- Mandumah Dissertations hosted by DARALMANDUMAH http://search.mandumah.com/MyResearch/Home
- Egyptian Journals Database (allows advanced search) https://journals.ekb.eg/
- Iraqi Academic Scientific Journals https://www.iasj.net/iasj

Russian specific databases:

- Elibrary: https://www.elibrary.ru/defaultx.asp?
- East View: http://dlib.eastview.com/
- Russian State Library: https://www.rsl.ru

Search terms

In the main systematic review, the specific search strategy included the intersection of terms indicating both offline and online sexual victimisation in order to capture studies that were wider than just OCSEA but that may have asked questions and produced a prevalence estimate for some type of OCSEA. This approach was applied in order to maximise efficiency and minimise error when conducting this large review. Search terms specifically focused on OCSEA were also included based on the team's experience of conducting previous systematic and scoping reviews in this area. Table 1 presents all the search terms used.

Table 1 The list of a full list of search terms used in the review.

Line		Search terms
1		child* OR adolescen* OR infant* OR young* OR youth* OR teen* OR juve-nile* OR minor* OR toddler* OR boy* OR girl* OR student* OR pre-pubert* OR pre-pubescen* OR prepubert* OR prepubescen* OR newborn* OR new-born OR baby* OR babies OR preschool* OR kid* OR puberty OR pubescen* OR minors* OR "under age" OR underag* OR preadolesc* OR preteen* OR "pre-teen*"
2	AND	molest* OR incest OR "unwanted touching" OR "unwanted sex" OR "coerc* sex*" OR "pressured sex" OR "sexual intimate partner violence" OR "sexual gender-based violence" OR "sexual harassment" OR "online child sex* abuse" OR "online solicitation" OR "sex* cyber-solicitation" OR "online child abuse image*" OR "online child abuse" OR "online sex* abuse" OR "online sex* violence" OR "technology-facilitated sex* abuse" OR "technology-enabled sex* abuse" OR "unwanted online sexual exposure" OR "harmful sexual behavior*" OR grooming OR "unwanted online sex*" OR "online grooming" OR "internet grooming" OR "revenge porn*" OR "child porn*" OR "nonconsensual porn*" OR "no- consensual porn*" OR "online sex* exploit*" OR "online sex* offen*" OR "online sex* violen*" OR " rape" OR "online sex* abus*" OR "online sex* aggression" OR "online sex* victim*" OR " online sex* survivor*" OR "online sex* crime" OR "forced sex" OR cybersex OR "attempted sex*" OR csam OR csai OR csea OR ocsea OR iioc OR osec OR sextort* OR paedophil* OR pedophil* OR "indecent image*" OR porn* OR "sex* extortion*" OR "online sex* blackmail*" OR "sex* video*" OR "sex* image*" OR "sex* material*" OR "online sex* harass*" OR "online sex* harm*" OR "cyberflash OR "sex* predator*" OR "sex* trafficking" OR "image-based sex* abuse" OR "technology-assisted sexual violence" OR tasv OR ta-sv OR livestream* OR OR "sexual molestation" OR "sexual assault" OR "sexual exploitation" OR "sexual offen*" OR "sexual violence" OR "rape" OR "sexual abuse" OR "sexual aggression" OR "sexual maltreatment" OR "sexual coerc*" OR "sexual victim*" OR "sexual survivor" OR "sexual trauma" OR "sexual crime"
3	AND	epidemiolog* OR prevalence OR proportion OR rate OR incidence OR occur* OR magnitude OR scale OR percent* OR count OR frequen* OR degree OR measure* OR "network scale-up" OR nsum OR "household survey*" OR "prevalence estimate*" OR "respondent-driven sampling*" OR rds OR "link tracing sampling" OR "time location sampling" OR tls OR "time space sampling" OR "venue based sampling" OR "multiple systems estimation" OR mse OR "capture recapture" OR "petersen-lincoln*" OR crt OR m-nsum OR g-nsum OR s-pps OR "sampling proportionate to size"
4		1 AND 2 AND 3

These search terms were decided upon after conducting a scoping review and pilot searches. Piloting of the search strategies allowed to modify and identify the terms which produced the most relevant results. Moreover, articles on OCSEA were read to determine which terms were being used by academics and researchers in the field. The search terms are extensive due to the myriad of terms and the lack of consensus on the OCSEA conceptualisation and typology.

Inclusion/Exclusion criteria

Several inclusion and exclusion criteria were used to select relevant evidence:

Inclusion criteria:

1. The study is published in one of the six official UN languages, i.e., English, Russian, Chinese, Spanish, Arabic, and French between January 1, 2010, and September 30, 2023.
2. The study reports the prevalence of OCSEA or is an article that includes prevalence data on OCSEA.
3. The data are based on general population samples, which means samples are representative at the national and sub-national level.
4. The review includes a measure of actual OCSEA.
5. The review includes prevalence estimates collected using traditional sampling and survey methods (e.g., random, stratified, cluster, convenience, snowball), or other methodological approaches of prevalence estimation (e.g., Multiple Systems Estimation, respondent-driven sampling, time and location sampling, network scale up method, and hybrid approaches)[1].
6. OCSEA needs to occur in childhood (under 18 years old); it could be self-reported either by a child or an adult; or could be violence reported by parents or others in a position of responsibility (e.g., teachers, medical doctors, social workers).
7. The sample size needs to be at least 100.

Exclusion criteria

1. Although the study may report abuse as OCSEA, if the offence did not occur in childhood, then it is not OCSEA, and these studies were excluded.
2. The study has non-disaggregated data for children or adult experiences as children (e.g., making it impossible to determine findings for children under 18 years of age).
3. Estimates from particular sub-populations that might not generalise to the population, e.g., patients with psychosis, psychiatric disorders, depression, autism spectrum disorder, or HIV/AIDS; samples consisting of individuals with disabilities; military or veterans; individuals with a history of criminal behaviour, offenders, or those currently incarcerated; samples consisting of lesbian, gay, bisexual, transgender individuals, or those within the LGBT community;

[1] The alternative methodological approaches to estimate prevalence were covered by the supplementary review only.

samples of children living in foster homes, group homes, or other forms of substitute care; samples exclusively comprised of victims/survivors of online CSEA (100% prevalence) as examples. Although these studies are excluded for this systematic review, they do hold value, and thus there is the possibility of including them in future research.

4. Research with limited sample size/selected samples, e.g., sample size <100, case study, control study/randomised control trial or qualitative studies.
5. Other types of violence: child-to-parent violence, intimate partner violence between adults, theft/robbery if no OCSEA estimate is present.

Data screening and selection

The screening management for grey literature, as well as online published reports and statistics were stored in SharePoint (Microsoft Corporation, Redmond, Washington, USA). The Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia) was used to compile relevant peer-reviewed sources. Duplicate entries were removed. Two team members screened databases, searched results, titles, and abstracts to identify existing sources regarding measuring the prevalence and nature OCSEA, collaborating with other team members for guidance and confirmation. Following the initial screening selection, two reviewers thoroughly assessed the full texts of peer-reviewed articles, grey literature, and online published OCSEA monitoring data to determine their alignment with the inclusion criteria for the review. Any sources that failed to meet the inclusion criteria were excluded, and the reasons for such exclusions were documented and recorded in Covidence. In the event of disagreements among team members, efforts were made to reach a resolution through discussion. However, if consensus could not be achieved, an additional team member was brought in for consultation. The search strategy along with the selection processes was documented and reported in the final systematic review.

Data extraction

The research teams extracted data based on key publication/research information into Excel. The preliminary data extraction tool was refined and updated as required during the data extraction process. The team improved the extraction tool by conducting a pilot test of the data extraction process, using previously identified sources (academic articles and grey literature, as well as reports by organisations that specialise in the detection and measurement of OCSEA). To ensure that the specificities of the data and methodologies used are effectively captured, the team defined variables in separate spreadsheet tabs. Two reviewers extracted the data from included sources. Any disagreements between the two reviewers – regarding magnitude and nature measurements, data interpretation, contextual considerations, study methods, key findings

relevant to the review questions, or variable definitions – was thoroughly discussed until a consensus was reached. If a consensus could not be achieved, the final decision was made by a third member of the team.

A master excel file was created of all the studies and extracting key information:

- Authors & Year & Title
- Sample Population (e.g., general or special)
- National Representative or Not (e.g., national representative, subnational representative, non-representative)
- Country(ies)
- Study Type (e.g., cohort, longitudinal, cross-sectional, case-control)
- Urbanicity Type (e.g., urban, rural, suburban, peri-urban, mixed)
- Sampling Method
- Survey Site (e.g., community-based, school-based, university-based, hospital or clinic-based, web-based)
- Sample Details & Data Collection Year
- Perpetrator Type & Perpetrator Age & Perpetrator Sex
- Types of OCSEA (e.g., contact OCSEA, non-contact OCSEA, online sexual exploitation)
- Frequency of the OCSEA & Level of OCSEA
- Sex of Sample & Sample Size & Response Rate
- Prevalence (%) for each type and subtype of OCSEA & Number of Cases for each type and subtype of OCSEA
- Weighted or Unweighted Prevalence
- Variance & Standard Error & Confidence Interval (CI) of Prevalence
- Location of OCSEA event (e.g., home, community, hospital, online, other)
- Respondent Type (e.g., children, parents report, adults recall) & Respondent Age
- Time Period for Violence Measurement (e.g., past year, lifetime)
- Age of OCSEA Experiences & Age of Onset for CSEA (Child Sexual Exploitation and Abuse)
- Self-administered or Not (e.g., self-administered online, self-facilitated ACASI, interview-facilitated ACASI, interview-administered questionnaire)
- Measurement Instrument & Number of Questions Asked
- Type of Publication

We will report study methods and findings from the systematic review in line with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Systematic Reviews (PRISMA; Page et al., 2021; see Appendix 1).

For the development of the indicator, this information was used and extracted further into a dataframe to inform design of the global map and graphics used as part of the visual index. This dataframe has been made publicly available on the website in tabular format and the dataset for Indicator 1 is also available here as part of our transparency, quality and reproducibility approach to data at Childlight.

Risk of bias assessment

We used the checklist of Hoy et al. (2012) for assessing risk of bias in prevalence studies, a framework we have used in other global systematic reviews. This checklist has nine questions with two standard answer options (high/low risk of bias):

1. External validity:
    a. Was the study's target population a close representation of the national population in relation to relevant variables?
    b. Was the sampling frame a true or close representation of the target population?
    c. Was some form of random selection used to select the sample, OR was a census undertaken?
    d. Was the likelihood of nonresponse bias minimal?
2. Internal validity:
    a. Were data collected directly from the subjects (as opposed to a proxy)?
    b. Was an acceptable case definition used in the study?
    c. Was the study instrument that measured the parameter of interest shown to have validity, reliability, and cultural sensitivity?
    d. Was the same mode of data collection used for all subjects?
    e. Were the numerator(s) and denominator(s) for the parameter of interest appropriate?

The final overall appraisal takes into account the answers to the above checklist questions and the summary can have two answer options (low/high risk of bias), based on the rater's judgment. Response options for the summary assessment were low, moderate, or high risk of bias.

Data preparation and conceptual framework

This section explains how the systematic review data was organised and categorised for Indicator 1.

Data cleaning

When conducting large systematic reviews and meta-analyses, it is crucial to perform data cleaning to ensure that the dataset is accurate and consistent and can be converted into a uniform format. This process also allows to conduct final checks of identified sources and exclude duplicates and studies that do not meet the inclusion criteria.

A total of 226 studies (204 in English, seven in Chinese, 14 in Spanish, and one in Russian) were included and extracted by the English, Spanish, Chinese and Russian language reviewers. All these records were combined in one file for further checks and data cleaning process.

Several steps were undertaken in this research to prepare the data for meta-analysis and included:

1. Filtering the extracted records by outcomes reported. At this stage, only data for subtypes of technology-facilitated victimisation was included in the dataset.
2. Removing studies and research reports that used non-representative samples or representativeness could not be verified.
3. Selecting overall or OCSEA subtype prevalence (where no overall OCSEA estimate reported) scores for the full sample rather than breakdowns by different age-ranges or by perpetrator characteristics.
4. Identifying research that did not meet the inclusion criteria (e.g., control study/randomised control trials; non-disaggregated data for mixed samples of respondents; perpetrator-centric; data disaggregated by gender identity or sexual orientation and no overall prevalence for the full sample provided; no country-level breakdown; samples exclusively comprised of victims/survivors of OCSEA).
5. Removing studies/reports that used the same sample/data published in other sources included in the review.
6. Excluding studies that did not provide prevalence estimates.
7. Excluding studies that reported data for one gender only, either females or males.
8. Overall OCSEA scores were calculated by the analyst where data was provided by gender breakdown only.
9. Studies were grouped by two recall periods: a) past year experience (30 days, three months, six months, 12 months, and Covid period categories combined); and b) lifetime experience (ever, before, pre-18, pre-16 categories combined).

Conceptual framework

For the analysis, results were grouped according to the measured outcome. Primarily, overall prevalence estimates of OCSEA were identified, where possible. Overall prevalence estimates were defined as those studies that included prevalence for at least three of the sub-types from the conceptual framework. Table 2 presents four main subtypes of OCSEA that were used in this review. This framework was developed both by examining all the classifications of types of OCSEA as identified in the studies and drawing from the existing literature on the topic and existing conceptual models (E-Safety Commissioner, 2021; Finkelhor et al., 2022; Laird et al., 2022). Several iterations of the conceptual framework were developed, and the final broad sub-types listed below were included as all the studies could fit into one or more of these sub-types and they aligned with the existing evidence-base. It is important to note that while sexual extortion is listed as a sub-type, it is most appropriately a sub-type of sexual exploitation. We listed it on its own, however, given that there has been significant discussion about the rise in the scale of this type of OCSEA by practitioners, which is thus a strategic priority area for our index prevalence tracking over time.

Table 2 Four broad subgroups of OCSEA.

Aggregated subgroup	Examples of composite OCSEA subtypes	Description
Online solicitation	Online grooming, online solicitation, online sexual harassment, pressure to obtain images, voluntarily provided images in a statutorily impermissible relationship, unwanted/non-consensual/ pressured sexting, unwanted sexual talk (Sub-type informed by Finkelhor et al., 2022)	This subtype covers a range of unwanted/pressured sexual interactions and activities. Those may include casual sexual inquiries via mobile phone or Internet, as well as long-lasting sexual conversations that can lead to exchange of sexual pictures or videos. It is important to note, that all different types of online solicitation often come from peers as well as adult perpetrators.

Aggregated subgroup	Examples of composite OCSEA subtypes	Description
Non-consensual taking, sharing and exposure to sexual images and videos	Non-consensual images or videos taking and distributing by an adult or another young child or young person; Forced/unwanted exposure to pornographic content (adult content or CSAM (Child Sexual Abuse Material)) (Sub-type informed by Finkelhor et al., 2022 and E-Safety Commissioner, 2021),	Non-consensual image or video taking refers to having sexual images taken when a child was unconscious, intoxicated, distracted, or unable to consent. It could also include so-called deepfake images in which a child's head or likeness was imposed on a sexual image of someone else. This subgroup also includes an unwanted exposure of a child to pornographic materials (e.g., forcing a child to watch nude videos or pictures or sending a child a link to pornographic websites). Please note that unwanted exposure to sexual content occurs frequently while surfing or scrolling through social media. This type of exposure may not be precursors to a request for reciprocity.
Online sexual exploitation	Commercial sexual talk, commercial sexual images, or other commercial sexual activity, sexual coercion (Sub-type informed by Laird et al., 2022 and Finkelhor et al., 2022)	Sex acts are exchanged for the child or young person's unmet needs, via the provision of monetary or non-monetary resources (e.g., food, clothes, shelter, affection, protection, belonging, gifts and/or anything else of perceived value to the young person or child) on or offline.
Sexual extortion	Sextortion, Sexual Extortion, Sexual blackmail (Sub-type informed by E-Safety Commissioner, 2021)	Sexual extortion is a form of blackmail that involves threatening to share an individual's intimate image or video online unless they comply with certain demands such as to obtain money or gift cards/other items of monetary worth, additional pictures, or other sexual activities.

For studies that did not measure an overall estimate of OCSEA prevalence, only specific subtypes were reported. This approach was necessary as only a limited number of included records (n=6; covering 17 individual studies) reported an overall prevalence of OCSEA meaning they presented an overall prevalence measure that included at least three different sub-types of OCSEA. Most of the existing research on online child sexual victimisation is primarily focused on measuring individual sub-types of OCSEA, using available measures for the construct of interest. Authors are more likely to rely on a single item/screening question to assess the overall exposure to online sexual violence, and the existing adequate psychometric support for measures of OCSEA remains limited, an area of future development in which Childlight is interested in supporting.

In total, 88 sources in this review from 58 countries measured at least one subtype of OCSEA. Of the 84 publications that reported individual subtypes, a total of 20 studies from 18 countries and four regions (East Asia and Pacific, Eastern and Southern Africa, North America, Western Europe; UNICEF Regional Classification, 2023) asked multiple items/questions around three (n=7) or four main subtypes/domains (n=13) of OCSEA (see Table 2) and were representative at a national or sub-national level. The remaining studies (n=65) examined one (n=54) or two (n=9) subtypes only. Ultimately, all four broader OCSEA subtypes were covered by the included studies: non-consensual taking, sharing and exposure to sexual images and videos (n=52), online solicitation (n=58), sexual extortion (n=18), and online sexual exploitation (n=19). In this review, 56 sources from 47 countries reported prevalence data by gender.

In the meta-analysis, all 88 sources from 57 countries (one of the countries did not report the sample size) were included. Further, 50 sources from 30 countries provided data for the gender breakdown analysis. Sample sizes for males and females have not been provided in six sources initially included in the review, and therefore they were not considered in the analysis.

Data analysis

Strategy for data synthesis and production of regional estimates

Previous studies have observed variations in the prevalence of violence against children, influenced by several methodological factors. These factors include the method of data collection, sample type (household versus school), sample site, national or subnational survey, respondent type (parent, adult recall, young adult recall, child), sample size, response rate, self-administered surveys, use of standard definitions for violent behaviours, and the definition of childhood (Andrews et al., 2004; Barth et al., 2012; Bolen & Scannapieco, 1999; Fang et al., 2015; Haugaard & Emery, 1989; Wynkoop, Capps, & Priest, 1995).

Similar variability in prevalence was also observed in this research. Despite significant efforts to use standardised definitions (ECPAT, 2016; Finkelhor et al., 2022; Livingstone & Stoilova, 2021; Stoilova et al., 2021)and instruments (Finkelhor et al., 2005; Gámez-Guadix et al., 2018; Zolotor et al., 2009) to capture the broad spectrum of OCSEA, the evolving nature

of online victimisation led many researchers in the field to develop their own outcome measures and use 'umbrella' terms from previous research or even create their own categorisations. Those efforts demonstrate that existing OCSEA typology and methodologies do not adequately reflect the complexity of emergent abusive behaviours and/or that researchers are not using previously developed questions in their research. The conceptual and typological inconsistencies and ambiguities constitute a challenge in terms of comparability and prevalence estimation across the existing literature.

Furthermore, the geographical coverage of research on online child sexual victimisation was relatively inconsistent across the regions, specifically considering certain types of OCSEA. The majority of studies included in this analysis were focused on investigating one specific type of harm, whereas a limited number of records covered a wide range of OCSEA types. This variability in terms of selected outcomes and their observed prevalence estimates carried through a huge variation of the number of studies conducted across the regions.

To ensure some degree of consistency and uniformity, this research proposed four broader terms that clustered a range of OCSEA types. Composites of these new groupings are often presented as individual outcomes in previous research, therefore results for these subgroups of OCSEA should be interpreted with caution. To ensure the findings are not overinterpreted, the number of sources for each outcome and country was provided to reflect the amount of contribution of the research towards the prevalence estimates within each region. Additionally, confidence intervals are presented for all estimates.

Another challenge that was identified during conducting the initial analyses was related to the number of questions used to investigate conceptually similar forms of harms that were coded as separate items. In the absence of additional information about the research, it was not possible to establish how many individual children reported one or more types of abuse included in the measure. To address this issue, the maximum of the various individual prevalences was used for each subtype of OCSEA in each study. Thus, a single maximum prevalence was applied to stand in for an estimate of the number of unique children involved in reporting events of a specific type.

To account for potential impact of recall period, separate analyses were conducted for past year and lifetime experiences. This recall-based breakdown was used to produce prevalence estimate for the total sample, as well as for males and females. Finally, for regional prevalence estimates, UNICEF classifications (2023) by nine regions was used. UNICEF regions were used instead of WHO or World Bank regions to highlight the significant amount of child protection programming done by UNICEF and thus potential pathways to impact in these regional groupings. It is our hope that in future iterations of the index to provide multiple regional breakdowns for our indicators. To combine prevalence estimates between countries within a region defined by each of the nine region classifications, each country estimate in that region was synthesised into an average. Those were further synthesised into an average for a region.

Meta-analysis and statistical issues

Analyses were carried out using the R package (R Core Team, 2018; for R code see Appendix 2). Separate analyses were run for each of the subtypes and an overall OCSEA, disaggregated by the recall period and UNICEF world regions. Additionally, for studies that reported gender breakdown and sufficient data for conducting the analysis (n=50), results for each outcome, recall period and regions were also provided (see Appendix 3)

The level of heterogeneity (i.e., observed variability between individual study estimates for a single analysis) identified in this analysis was extremely high. Therefore, the random effects model was used to function to some extent as a summary measure of the average prevalence. However, caution is required in interpretation of the results, given the wide variation in individual study estimates. These should not be interpreted as estimates of the overall prevalence of a specific OCSEA type either worldwide or within defined geographical regions.

In many analyses (see Appendix 3), the breakdown by UNICEF regions showed that there were no studies investigating specific types of OCSEA in particular parts of the world, and no estimates were possible. For several regions that did have data, the number of studies present were extremely low (N=1 in one or two cases, N< 5 in many others). Thus, the accuracy of region-specific estimates was likely to be low, and these estimates should also be interpreted as summaries rather than in any sense being predictive. It advised to treat any region-specific analysis with less than 5 studies with extreme caution.

Data quality and limitations

The systematic review used to collect the data for Indicator 1 drew predominantly on data from a variety of surveys, which report estimates at the regional, national or sub-national level. Although the traditional survey methods appear to be the most common methods of prevalence estimation in online children sexual victimisation, they also have limitations when attempting to measure the prevalence of 'hidden' victims.

Child sexual exploitation and abuse is often reported retrospectively, months or years after it occurred, therefore most survey research relies on recollection and is prone to recall bias. This and respondents' non-disclosure may lead to underestimating the prevalence rates. Prevalence estimation techniques, such as the scale-up network method (NSUM) or multiple systems estimation (MSE), may also include hidden victims. However, these non-traditional methods are not at present widely applied in the research on child sexual victimisation but they may hold promise.

A wide range of emerging technological modalities of abuse have been captured by the literature included in this comprehensive review and meta-analysis. However, this diversity of offences that have been labelled with various terms and often assembled into distinct conceptual categories, also revealed the need to refine and standardise the classification and typology of OCSEA. Inconsistencies in definitions and measures used, constituted a challenge in terms of comparability and estimating the overall OCSEA prevalence.

As part of our commitment to transparency, reproducibility and quality, we have made the dataset for Indicator 1 open access so that researchers can review, test, challenge and further build upon our work.

Summary

Despite those limitations, the Victim Indicator provides global prevalence estimates for child sexual victimisation based on a comprehensive synthesis of a variety of available representative quantitative data sources. Several academic search platforms and databases were used to identify those sources, as well as searches of references of prior reviews and eligible studies; and expert recommendations; to ensure (as far as possible) that all relevant data have been included. Moreover, the scope of this research was not restricted by the type of study context or specific OCSEA characteristics. This allowed the appraisal of a diverse range of OCSEA typologies and summaries of evidence from a range of victim-centric investigations. In addition, the searches were not restricted to the English language, which mitigated language bias and allowed the identification of additional records to extend the analysis on the global prevalence of OCSEA. Those comprehensive searches also improve the validity of the meta-analysis conducted in this research; and enhance the precision of the evidence provided by this analytical method.

Finally, combining a systematic review with a meta-analysis offers a more objective appraisal of the available data compared to the traditional narrative reviews. Although potential bias cannot be completely prevented as such, it can be minimised by using meta-analytic methods for examining independent studies for the purpose of integrating their findings. However, prevalence data on CSEA victimisation presented in this research should be considered with extreme caution. The random effects should be interpreted as summary estimates of average prevalence in the presence of very high variability distributions of individual published prevalences, and therefore they are not necessarily an accurate guide to some notional overall prevalence of a specific event type either worldwide or within defined geographical regions.

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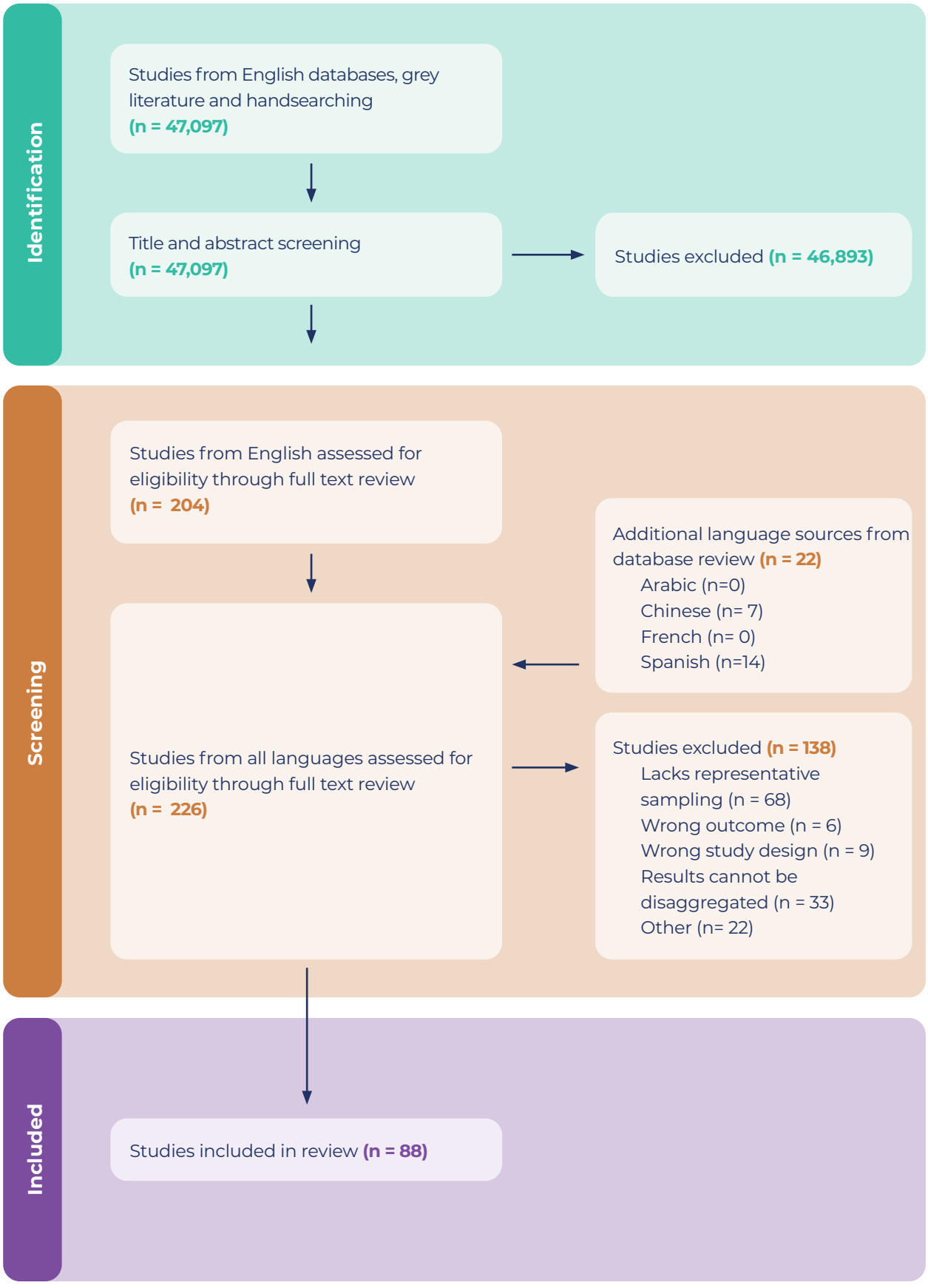
Appendix 1

Prisma flow diagram of systematic review



Appendix 2

R code used for the analyses in the current study.

```
```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = FALSE)
knitr::opts_chunk$set(dpi = 300)

library(tidyverse)
library(readxl)
library(meta)
library(Hmisc)
```
```{r datainput, include=FALSE}
```

 # Enter data, declare factors, summaries of 3 data sets to check

ind1dataPY<-read_excel(path =”data source”)

ind1dataL<-read_excel(path = “data source”)

ind1dataGender<-read_excel(path = “data source”)

ind1dataL<-ind1dataL %>%

select(`Study`,`Analytical sample size`,`Geographical location of the study_Country`,`Geographical location of the study_Region (UNICEF)`
Final categorisation,`Number of cases`,`Prevalence of OCSV (%)`) %>%

mutate(`Geographical location of the study_Region
(UNICEF)`=factor(`Geographical location of the study_Region (UNICEF)`),

Outcome=factor Final categorisation

NumCases=floor(Prevalence of OCSV (%)*`Analytical sample size`/100))

#Lifetime exposure data set
summary(ind1dataL)

---

ind1dataPY<-ind1dataPY %>%

select(`Study`,`Analytical sample size`,`Geographical location of the study_Country`,`Geographical location of the study_Region (UNICEF)`,
Final categorisation,`Number of cases`,`Prevalence of OCSV (%)`) %>%

mutate(`Geographical location of the study_Region
(UNICEF)`=factor(`Geographical location of the study_Region (UNICEF)`),

Outcome=factor Final categorisation,

NumCases=floor(Prevalence of OCSV (%)`Analytical sample size`/100))

#Previous year exposure data set
summary(ind1dataPY)
```

#Gender-stratified data set

ind1dataGender<-ind1dataGender %>%

select(`Study`,`Analytical sample size`, `Gender_victims`,`Geographical location of the study_Country`,`Geographical location of the study_Region (UNICEF)`,`Recall Period`,`Final categorisation`,`Number of cases`,`Prevalence of OCSV (%)`) %>%

mutate(Gender=factor(`Gender_victims`),

`Geographical location of the study_Region (UNICEF)`=factor(`Geographical location of the study_Region (UNICEF)`),
RecallP=factor(`Recall Period`),
Outcome=factor(`Final categorisation`),
NumCases=floor(Prevalence of OCSV (%)*`Analytical sample size`/100))

#Lifetime exposure data set
summary(ind1dataGender)```

Lifetime experience, both sexes

```{r osLife, fig.height=12, fig.width=10}

lifedata<- ind1dataL %>%
filter(Outcome==”outcome name”) %>%
drop_na(NumCases)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
data = lifedata,
method=”GLMM”,
sm=”PLOGIT”,
common = F,
random = T,
prediction=T,
title=”Lifetime experience, outcome name, both sexes”)

maLife
forest(maLife,sortvar = maLife$TE)

maLife<-metaprop(event=NumCases,
```

```
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = lifedata,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Lifetime experience, outcome name, both sexes, by UNICEF region")

maLife
forest(maLife,sortvar = maLife$TE)```
```

Lifetime exposure, male

```
```{r osemale, fig.height=10, fig.width=10}
lifedataM<- ind1dataGender %>%
filter(Outcome=="outcome name") %>%

filter(RecallP=='Lifetime_ever'|RecallP=='Lifetime_
before'|RecallP=='Lifetime_before 18') %>%
filter(Gender=='Male') %>%
drop_na(NumCases)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
data = lifedataM,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Lifetime experience, outcome name, Male")

maLife
forest(maLife,sortvar = maLife$TE)


maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = lifedataM,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Lifetime experience, outcome name, Male, by UNICEF region")

maLife
forest(maLife,sortvar = maLife$TE)
```
```

Lifetime exposure, female

{r osefemale, fig.height=10, fig.width=10}
lifedataF<- ind1dataGender %>%
filter(Outcome==”outcome name”) %>%

filter(RecallP==’Lifetime_ever’|RecallP==’Lifetime_
before’|RecallP==’Lifetime_before 18’) %>%
filter(Gender==’Female’) %>%
drop_na(NumCases)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
data = lifedataF,
method=”GLMM”,
sm=”PLOGIT”,
common = F,
random = T,
prediction=T,
title=”Lifetime experience, outcome name, Female”)

maLife
forest(maLife,sortvar = maLife$TE)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = lifedataF,
method=”GLMM”,
sm=”PLOGIT”,
common = F,
random = T,
prediction=T,
title=”Lifetime experience, outcome name, Female, by UNICEF region”)

maLife
forest(maLife,sortvar = maLife$TE)```

Past year, both sexes

```{r oseYear, fig.height=12, fig.width=10}

yeardata<- ind1dataPY %>%
filter(Outcome==”outcome name”) %>%
drop_na(NumCases)

maYear<-metaprop(event=NumCases,
```

```
n=`Analytical sample size`,
studlab=`Study`,
data = yeardata,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Experience within last year, outcome name, both sexes")

maYear
forest(maYear,sortvar = maYear$TE)

{r oseyear2, fig.height=12, fig.width=10}
# Geographical split
maYear<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = yeardata,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Experience within last year, outcome name, both sexes, by UNICEF region")

maYear
forest(maYear,sortvar = maYear$TE) ```
```

Past year, Male

```
```{r pymale, fig.height=10, fig.width=10}
PYdataM<- ind1dataGender %>%
filter(Outcome=="outcome name") %>%
filter(RecallP=='during the COVID-19 outbreak'|RecallP=='Past 3 months'|RecallP=='Past 30 days'|RecallP=='Past 6 months'|RecallP=='Past year (12 months)') %>%
filter(Gender=='Male') %>%
drop_na(NumCases)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
data = PYdataM,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Previous year experience, outcome name, Male")
```
```

```
maLife
forest(maLife,sortvar = maLife$TE)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = PYdataM,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Previous year experience, outcome name, Male, by UNICEF region")

maLife
forest(maLife,sortvar = maLife$TE)```
```

Past year, Female

```
```{r pyfemale, fig.height=10, fig.width=10}
PYdataF<- ind1dataGender %>%
filter(Outcome=="outcome name") %>%
filter(RecallP=='during the COVID-19 outbreak'|RecallP=='Past 3
months'|RecallP=='Past 30 days'|RecallP=='Past 6 months'|RecallP=='Past
year (12 months)') %>%
filter(Gender=='Female') %>%
drop_na(NumCases)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
data = PYdataF,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
```
```

```
prediction=T,
title="Previous year experience, outcome name, Female")

maLife
forest(maLife,sortvar = maLife$TE)

maLife<-metaprop(event=NumCases,
n=`Analytical sample size`,
studlab=`Study`,
subgroup=`Geographical location of the study_Region (UNICEF)`,
data = PYdataF,
method="GLMM",
sm="PLOGIT",
common = F,
random = T,
prediction=T,
title="Previous year experience, outcome name, Female, by UNICEF region")

maLife
forest(maLife,sortvar = maLife$TE)```
```

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