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Invited review

Effectiveness of child sexual abuse prevention programs on knowledge acquisition: A meta-analytical study

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ABSTRACT

Background: Child sexual abuse (CSA) is a type of maltreatment considered a global health problem. CSA is a traumatic experience with important consequences for the victim's health. It is essential to report the effectiveness of CSA prevention programs to offer society useful tools to combat this abuse.

Objective: We aimed to study the effectiveness of CSA prevention programs on the knowledge acquisition based on comparing pre- and post-treatment changes, and also if their effectiveness is related to program-related and methodological variables.

Participants and settings: Standardised mean change (with studies that report pre-post program measures) of the effectiveness of CSA prevention programs published between 2014 and 2021 was carried out.

Methods: The general effectiveness of these programs and whether the results were influenced by program-related variables (the duration, the target population, participants' age, or the type of intervention) or by methodology-related factors (the agent who taught them, the geographical area where they were carried out or the way the programs were evaluated) were analysed. A total of 43 samples analysing knowledge about CSA as a dependent variable were included.

Results: The results reported a combined effect size considered large ($d_{MR} = -0.96$, 95 % CI [-1.10, -0.82], $p < .001$). High inter-study heterogeneity was observed in the meta-analysis, although only the geographic area where the studies were conducted appears as a significant moderator.

Conclusions: In conclusion, the prevention programs included in this analysis significantly improved the participants' knowledge acquisition.

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1. Introduction

1.1. Child sexual abuse

Child sexual abuse (CSA) is a type of maltreatment that involves the participation of a minor in sexual activity that they cannot understand, for which they are not prepared, and in which they are not in a position to give their consent (World Health Organization (WHO), 2017). Abuse may or may not include physical contact, with abuse through electronic means becoming increasingly frequent, especially in new generations (Ferragut et al., 2021a; Finkelhor et al., 2022). There are key aspects to be considered when defining CSA: a power dynamic, where the child is in a position of inequality; the exploitation of the child's vulnerability to their detriment; and the absence of consent (Mathews & Collin-Vézina, 2019). This abusive experience is considered a global health problem because it can produce significant consequences for the physical, psychological, social, and sexual health of the victims both during childhood and their subsequent adult development (Guiney et al., 2022; Noll, 2021; Selengia et al., 2020).

The worldwide prevalence of CSA has been the subject of numerous studies, often yielding diverse results. Different studies find different prevalence rates depending on the method of data collection, the instruments applied, differences in definitions of CSA used (whether they use behaviourally-specific questions), or the population included in the analysis (Barth et al., 2013; Mathews et al., 2020; Pan et al., 2020; Pereda et al., 2009; Stoltenborgh et al., 2011). However, in general, it can be considered a widespread problem in society, and the data are alarming (Mathews et al., 2023; Singh et al., 2014). The European Council estimates that 1 in 5 minors are victims of CSA, and recent research in our country finds prevalences ranging between 2.8 % and 18.5 %, depending on the different types of abusive experiences evaluated (Ferragut et al., 2021a), analysing the data retrospectively in a nationally representative sample. Consistently, in prevalence studies, females report higher rates in almost all types of CSA (Barth et al., 2013; Ferragut et al., 2021b; Guziak, 2020), although the most recent study conducted with the Spanish population has indicated that there are no significant differences between males and females in terms of certain types of abuses, particularly those involving penetration (Ferragut et al., 2021a).

As mentioned earlier, there are numerous and varied consequences of CSA on the victims and they affect the physical, psychological, sexual and social health of those who suffer this experience. CSA has been linked to significant sequelae that affect children's development (Friedrich et al., 2001; Noll, 2021; Putnam, 2003) and their subsequent adult life (Easton et al., 2011; Guiney et al., 2022; Hornor, 2010; Maniglio, 2009; Ortiz-Tallo & Calvo, 2020; Sarasua et al., 2013). Many victims of CSA subsequently experience difficulties in intimate relationships and often have to struggle to feel joy, as if they had no right to love and/or sex (Echeburúa-Odrizola, 2020). Although the specific impact of CSA may depend on variables such as the victim's age when the abuse began, their relationship with the perpetrator, and the frequency or duration of the abuse (Hornor, 2010), suffering this experience is associated with a high lifetime risk of suicide (Dube et al., 2001; Sapp & Vandeven, 2005). The impact of these consequences intensifies when the victim delays disclosing their situation, as they may not be able to seek help promptly, increasing the risk of the situation becoming chronic and resulting in long-lasting consequences.

In addition, it is a severe type of abuse that is difficult to detect (Save the Children, 2012), estimating that 85 % of cases remain concealed from society and the authorities (Save the Children, 2017). It is worth noting that victims often face significant barriers when attempting to disclose such situations (Alaggia et al., 2017; Lemaigre et al., 2017).

The need to detect CSA early is evident through the analysis of its consequences. For this purpose, it is considered essential to address knowledge about CSA, demolishing myths and providing tools and resources with real and updated information. The lack of knowledge, together with misperceptions on the subject, can be an obstacle to engaging people in its prevention (Ferragut et al., 2020; Rueda et al., 2021).

The victim's shame, the pact of silence to which they are subjected, the lack of resources in society, and the closeness of the perpetrators make this problem difficult to approach. It is necessary to emphasise prevention, providing effective tools to help detect the abusive situation, the disclosure of those who suffer CSA, and the management and help of responsible adults.

1.2. CSA prevention programs

Numerous efforts have been made to develop CSA prevention programs, especially in school contexts, as schools have been considered optimal places to work universally on prevention and education (Wurtele & Kenny, 2010). These programs often include tools for minors, providing them with knowledge and skills to recognise and avoid potentially sexually abusive situations, as well as to minimise harm by seeking appropriate help in case of abuse or attempted abuse (Walsh et al., 2018). In addition, some prevention programs involve adults by offering strategies to respond quickly and effectively to potential disclosures so that they can protect children from further abuse. In general, these programs aim to transfer the knowledge and skills learned by the child or adolescent in the classroom to real-life situations (Gubbels et al., 2021; Walsh et al., 2018).

Most of the published prevention programs are conducted in school contexts and target minors. Studies have been published that analyse the effectiveness of this type of program. A broad variety of programs and a multitude of evaluation measures are used. Some meta-analyses and systematic reviews report an improvement in minors' knowledge about sexual abuse, with interventions to detect and disclose abuse proving effective (Del Campo & Fávero, 2020; Gubbels et al., 2021; Walsh et al., 2018).

Prevention programs are designed to reduce the incidence of CSA experiences or, at the very least, to detect them early. The initial step involves enhancing the knowledge of both children and adults to aid in the identification of CSA. The knowledge imparted in these programs typically encompasses a range of topics, including understanding one's own body (naming and identifying private parts),

setting personal boundaries, recognizing inappropriate touches, distinguishing between good and bad secrets, and identifying manipulation techniques used by perpetrators, as well as identifying trusted adults with whom to communicate (Walsh et al., 2018). These types of knowledge are often assessed using standardised and published instruments, such as the Children's Knowledge of Abuse Questionnaire (CKAQ) developed by Tutty (1995), the Child Sexual Abuse Myth Scale created by Collings (1997), or through questionnaires specifically designed by program authors to evaluate the knowledge imparted by each program.

Recently, a meta-analysis of prevention programs for all forms of child maltreatment in the school context has analysed which variables of these interventions may influence their effectiveness (Gubbels et al., 2021). In particular, the duration of the program and the number of sessions significantly moderate the effect size of improving children's knowledge. Programs with a longer duration and more sessions report significantly stronger effects on knowledge about CSA, indicating that knowledge gains can be achieved by increasing the time spent learning about prevention and child maltreatment (Gubbels et al., 2021). At the same time, larger effect sizes are found for programs with shorter sessions, arguing that programs in which content is divided into shorter segments allow the children to pay attention to the entire session, leading to greater content retention (Davis & Gidycz, 2000). Finally, it has been shown that participatory methodologies, which involve minors in the sessions and use recreational resources such as games, puppets, music or videos may increase the effectiveness of these programs (Davis & Gidycz, 2000; Gubbels et al., 2021; Scholes et al., 2014).

Some previous studies have also evaluated the effectiveness of CSA prevention programs targeting parents and educators. A recent systematic review (Rudolph et al., 2023) revealed that studies consistently reported positive outcomes for parents who participated in prevention programs. These outcomes included improved behavioral intentions, response efficacy, capabilities, and self-efficacy, although findings on knowledge and parental attitudes towards sexual abuse were less consistent. Some studies have also confirmed that adults who have adequate training can be highly effective as educators in transmitting knowledge and skills about sexual abuse (Wurtele & Kenny, 2010).

When analysed together, school programs that actively involve participants' parents show the largest effect sizes in preventing CSA (Gubbels et al., 2021). Research suggests that preschoolers are more likely to learn skills when they are introduced by their parents and they have the opportunity to repeatedly rehearse these skills through role-playing in different settings (Boyle & Lutzker, 2005; Deblinger et al., 2001).

Although a number of meta-analyses on child sexual abuse interventions have been published in recent years, some have focused on maltreatment (Cohen & Katz, 2021; Gubbels et al., 2021), others on online abuse (Patterson et al., 2022), and those that have directly addressed child sexual abuse interventions have not focused on knowledge but on other processes such as self-compassion (Zhan et al., 2021).

There are two recent meta-analysis that analyzes the effectiveness of CSA knowledge prevention programs. Walsh et al. (2018) included studies up to 2015 (although only one study was analysed that year), of programs carried out only in a school context with students in countries mainly of medium-high socioeconomic status, and >60 % of the programs were carried out in the United States. The authors find that children's participation in activities of CSA prevention programs at school increases self-protection skills and knowledge about CSA (Walsh et al., 2018). On the other hand, Lu et al. (2022) includes studies since 1986, but only three of them are published from 2018, being the last study published in 2020. This meta-analysis results informed that larger interventions (more than three sessions) and those with older children (upper 8 years old) are more effective.

We highlight that during the last few years, a wide variety of interventions aimed at preventing CSA are being implemented, which were not included in these meta-analysis. Therefore, it is crucial to continually providing scientific knowledge about the effectiveness of these programs and their particularities (Lu et al., 2022; Walsh et al., 2018) with the more recent literature.

The scientific literature has highlighted the importance of reporting the effectiveness of CSA prevention programs (essential to eradicate this type of abuse). Therefore, considering the growing number of scientific articles that analyse the programs, the scarcity of data on their specificities and on programs that include prevention tools and strategies targeting the adults in charge of the minors, a meta-analysis study was carried out on the effectiveness of CSA prevention programs that analyse the knowledge acquired and that have published the effectiveness data before 2022. Specifically, the objective of this paper is to answer the following questions:

- What is the overall effectiveness of the prevention programs on knowledge acquisition about CSA, based on comparing pre- and post-treatment changes?
- Are the program knowledge outcomes related to their duration, and/or to other characteristics such as the participants' age, the target population, or the type of intervention; and/or to other methodological characteristics of the studies, such as the agent who delivers them or the mode of evaluation of the programs?

2. Method

2.1. Search and selection of studies

This meta-analysis of the effectiveness of CSA prevention programs was carried out following the PRISMA guidelines (Page et al., 2021) and the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2022). For the literature search, the following inclusion criteria were considered: 1) being a study that analysed the effectiveness of a CSA prevention program by measuring knowledge of CSA in one or more samples of participants; 2) being published between January 2014 and December 2021; 3) collecting quantitative data before and after implementing the prevention program; and 4) being written in English or Spanish.

Excluded were studies that: 1) evaluated another dependent variable other than knowledge; 2) even if they applied a prevention program about knowledge of CSA, they did not report quantitative data on its effectiveness; 3) were not primary studies (i.e.,

systematic reviews or meta-analyses); 4) included measurements only after participation in the program (no pre-data).

We searched into the following databases to identify the studies: PsycInfo, Eric (both via EBSCO Host), Web of Science (via Clarivate platform), and Scopus (via Scopus platform). The search equation was “prevention program” AND “child sexual abuse” AND “knowledge” limited to the abstract sections, using the filters to narrow the years of publication to the results between January 2014 and December 2021. The flowchart reflects the results obtained in the search process (see Fig. 1). This search was done between March and September 2022.

2.1.1. Titles and abstracts screening

Of the total documents extracted from the database search ($n = 348$), after discarding duplicates and studies that did not include prevention programs, programs that were not on CSA, and review studies or meta-analyses, 77 papers evaluating CSA prevention programs were examined.

2.1.2. Full text screening

Of the 77 works examined, 19 were excluded due to one of the exclusion criteria. Finally, of the articles evaluated as eligible ($n = 58$), those that did not include data necessary to calculate the effect size ($n = 16$), those written in a language other than English or Spanish ($n = 3$), those that did not analyse knowledge about sexual abuse separately ($n = 1$), or those that included data repeated in another previous article ($n = 1$) were discarded.

2.1.3. Data extraction

A total of 31 pre-post studies were included in the meta-analysis (Bustamante et al., 2019; Czerwinski et al., 2018; Daigneault et al.,

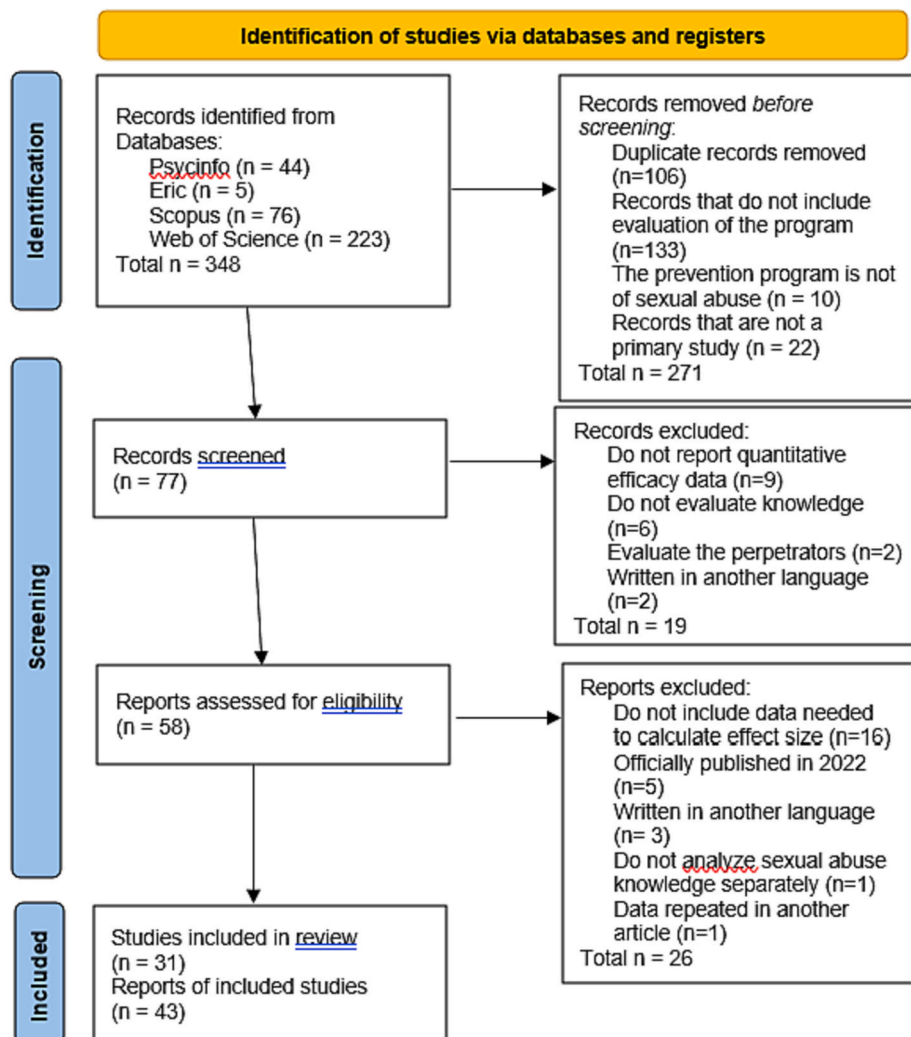


Fig. 1. Search flowchart.

2015; Dale et al., 2016; Edwards et al., 2020; Gámez-Guadix et al., 2021; Gushwa et al., 2019; Hudson, 2018; Jin et al., 2017; Jones et al., 2020; Kim & Kang, 2017; Mamani-Benito et al., 2020; Martin et al., 2020; Morris et al., 2017; Muller et al., 2014; Navaei et al., 2018; Nickerson et al., 2018; Nickerson et al., 2019; Nurse, 2017; Orak & Okanli, 2021; Ozgun & Capri, 2021; Pulido et al., 2015; Samson & Kulkarni, 2019; Tunc et al., 2018; Tutty et al., 2020; Urbann et al., 2020; Viñas et al., 2015; Warratch et al., 2021; Weeks et al., 2021; Wulanyani et al., 2019; Zhang et al., 2014). Seven out of the 31 studies include more than one treatment group. Every treatment group was included as specific sample in the meta-analysis, resulting in a total of 43 samples analysed.

This meta-analysis included all the studies published in scientific journals between 2014 and 2021. The coding of countries was carried out according to their geographical area, with 6 categories: Europe, North America, South America, Asia, Australia, and Turkey; that is, 5 categories similar to the existing continents, except for Turkey, which has been considered separately due to its belonging to two different continents. Specifically, studies were found in 13 different countries on all the continents, with Europe being the geographical area that provides the most samples in research. Most of the programs took place in the school context, in person, and with a school-aged population. More than half were implemented by professionals, included a participatory methodology, and used an evaluation instrument developed during the research (see Table 1).

Table 2 shows the summary data of all the included studies and their main coded characteristics: first author, year of publication, geographical area of the study, sample size, type of population, percentage of males, mean age of the sample, mean knowledge about pre- and post-treatment CSA, and pretreatment standard deviation for meta-analysis of related groups.

3. Results

We used the standardised mean change index to analyse the effect size of the studies, comparing the means of pre-post-treatment measures.

To perform a combined effect-size estimation of the 43 selected studies following a random-effects model, as taking into account both intra- and inter-study variability makes it a more realistic model. We used the R Studio program and the *metafor* package to carry

Table 1
Characteristics of studies included in the meta-analysis of related samples (pre-post).

Characteristics		N studies (Percentage)	Mean
Methodological	Sample size	<200	33 (76.74)
		>200	10 (23.26)
	Type of instrument	Author elaboration	25 (58.14)
		Standardised	18 (41.86)
Program	Number of sessions		4.07
	Treatment duration (days)		17.29
Type of intervention	Type of program	Participatory	31 (72.09)
		Non-participatory	1 (2.33)
		Not explicit	11 (25.58)
		Face-to-face	37 (86.05)
		Web	4 (9.30)
Program implementer		Book	1 (2.32)
		Not explicit	1 (2.32)
		Professionals	31 (72.09)
		Teaching staff	9 (20.93)
		Parents	1 (2.32)
Participants	Mean age	Not explicit	2 (4.65)
		Minors	33 (76.74)
		Adults	10 (23.26)
Context			9.16
		Academic	35 (81.39)
		Religious	1 (2.33)
		Social	6 (13.95)
		Rural	1 (2.33)
Geographical area of the study			37.22
		Europe	12 (27.91)
		Australia	3 (6.98)
		North America	11 (25.58)
		Asia	9 (20.93)
		South America	3 (6.98)
		Turkey	5 (11.63)
Extrinsic	Year of the study	2014	2 (4.65)
		2015	3 (6.98)
		2016	1 (2.33)
		2017	5 (11.63)
		2018	10 (23.26)
		2019	5 (11.63)
		2020	10 (23.26)
		2021	7 (16.28)
	Publication Source	Scientific journal	43 (100)

N total samples = 43.

Table 2
Coding of the studies included in the meta-analysis of related groups (pre-post).

Id	Authors	Publication year	Area	N	Population type	% Females	Mean age	Pre-mean	Post-mean	Pre-SD
1	Muller	2014	Europe	137	Minors	47.40	9.08	0.63	0.79	0.16
2	Zhang	2014	Asia	78	Minors	50.00	4.17	2.04	3.50	0.95
3	Daigneault	2015	North America	372	Minors	56.00	16	8.23	8.99	1.29
4	Pulido	2015	North America	195	Minors	55.40	8.26	13.29	15.14	3.84
5	Viñas	2015	South America	86	Minors	45.00	6	11.53	12.94	1.55
6	Dale	2016	Australia	131	Minors	49.62	6.14	11.19	13.12	2.27
7	Jin	2017	Asia	159	Minors	52.20	7.91	6.69	9.24	2.36
8	Jin	2017	Asia	170	Minors	58.80	7.77	6.56	8.36	2.36
9	Kim	2017	Asia	39	Minors	43.60	10.56	7.59	7.97	1.25
10	Morris	2017	North America	695	Minors	51.32	9	0.56	0.83	0.2
11	Nurse	2017	North America	538	Adults	61.70	39	54.87	59.79	5.65
12	Czerwinski	2018	Europe	151	Minors	44.40	8.65	39	46.01	8.76
13	Czerwinski	2018	Europe	60	Minors	58.30	8.6	38.5	46.57	9.09
14	Hudson	2018	Europe	53	Adults	81.20	–	9.2	13	2.5
15	Hudson	2018	Europe	14	Adults	92.90	–	7.8	12.8	3.1
16	Hudson	2018	Europe	16	Adults	92.90	–	9.01	12.8	3.8
17	Hudson	2018	Europe	92	Adults	68.50	–	9.3	12.6	4.8
18	Hudson	2018	Europe	77	Adults	87.70	–	9.25	13	4.9
19	Navaei	2018	Asia	31	Adults	96.75	37.7	7.3	9.3	1.4
20	Nickerson	2018	North America	226	Adults	88.50	39.01	68.51	68.84	6.65
21	Tunc	2018	Turkey	40	Minors	42.50	4.75	5.9	20.2	6.14
22	Bustamante	2019	South America	407	Minors	53.56	9.2	60.97	68.67	14.27
23	Gushwa	2019	North America	61	Adults	97.00	34.5	71.41	89.66	20.98
24	Nickerson	2019	North America	1151	Minors	49.00	7.19	17.26	18.89	3.14
25	Samson	2019	Asia	100	Minors	–	12.5	12.91	19.33	4.81
26	Wulanyani	2019	Asia	37	Minors	–	–	18.52	43.52	12.48
27	Edwards	2020	North America	48	Minors	62.50	10	0.72	0.78	0.12
28	Jones	2020	Australia	45	Minors	53.12	9.7	14.02	15.22	0.3
29	Jones	2020	Australia	48	Minors	53.12	9.7	13.54	15.08	0.33
30	Mamani-Benito	2020	South America	28	Minors	42.90	10.18	22.89	28.32	9.93
31	Martin	2020	Asia	40	Adults	–	35.9	22	29.47	3
32	Urbann	2020	Europe	63	Minors	45.65	9.66	4.79	5.93	1.59
33	Urbann	2020	Europe	63	Minors	45.65	9.66	3.24	5.02	1.16
34	Urbann	2020	Europe	63	Minors	45.65	9.66	6.3	9.64	3.22
35	Tutty	2020	North America	1114	Minors	–	6.5	4.7	7.3	2.2
36	Tutty	2020	North America	5084	Minors	–	10	6	8.3	2.5
37	Gamez-Guadix	2021	Europe	320	Minors	53.70	13.41	6.96	9.87	1.95
38	Orak	2021	Turkey	20	Minors	–	9.65	6.55	7.75	1.32
39	Orak	2021	Turkey	23	Minors	–	9.65	7.48	9.83	1.41
40	Orak	2021	Turkey	20	Minors	–	9.65	7.35	9.55	1.42
41	Ozgun	2021	Turkey	29	Minors	34.48	8.32	18.96	35.86	5.4
42	Warritch	2021	Asia	15	Minors	100.00	12.4	1.73	9.33	1.22
43	Weeks	2021	North America	1159	Minors	51.86	–	0.7	0.78	0.16

out these calculations. The combined effect size obtained by the model is -0.96 (standard error = 0.07), with a CI of $[-1.10, -0.82]$, indicating an effect size considered large and statistically different from zero. Fig. 2 presents the Forest Plot, showing the results of the effect sizes and their CIs for each study, as well as the graphic representation of the weights assigned to each one.

As can be seen, one study presents a very broad CI, although it has a small assigned weight, which may be an atypical case that could be influencing the results. To analyse these possible influences, the *leave1out* function of the metafor package was applied, which allows for analysing the size of the combined effect and the inter-study variance if one of the primary studies is eliminated each time. This analysis found no substantial variation by eliminating any of the primary studies, so we decided not to rule out any of them.

In general terms, the representativeness of the obtained combined effect relies heavily on the homogeneity of the effect sizes among themselves. To investigate this, we conducted a heterogeneity analysis, which revealed significant differences in the effect sizes among the studies. This became evident as the Q coefficient reached high and statistically significant values ($Q(42) = 536.2089$; $p < .0001$). Furthermore, the I^2 statistic has a value above 94 %, which is considered very high [69], so it can be assumed that the effect sizes of the included studies are heterogeneous.

The values obtained in the Q and I^2 statistics of the random effects model indicate a high heterogeneity of the effect sizes of the studies, so we must examine what moderating variables could be the cause of this heterogeneity. For this purpose, each moderating variable was analysed by applying regression models (meta-regression). As shown in Table 3, most of the combined effect sizes of each category were significant (except for the South America category of the Geographic Area variable), showing the effectiveness of the programs in the studies included in all these categories. However, when comparing the differences between these effect sizes, only the geographical area showed statistically significant results to explain the variability of the effect size between categories ($QM = 16.14$, $p < .05$). However, after including this variable as a moderator in the model, there was still unexplained variance in the effect sizes ($QE = 489.31$, $p < .0001$). The inclusion of the geographical area as moderator was confirmed through a likelihood ratio test, confirming

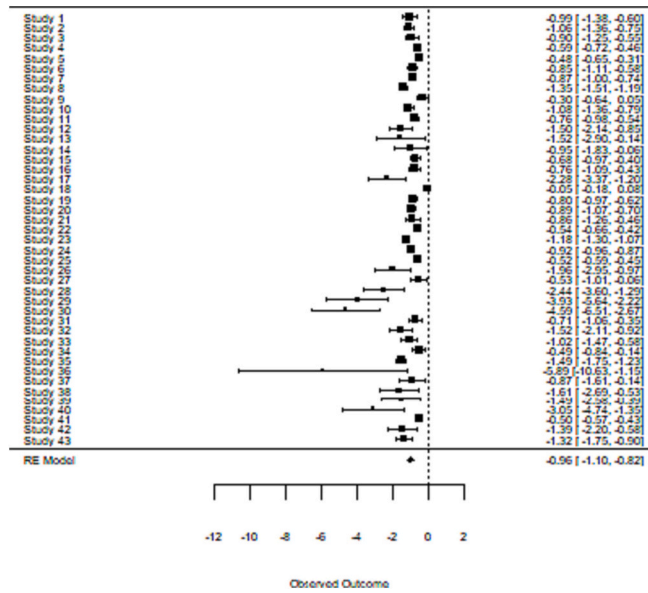


Fig. 2. Forest plot.

Table 3
Moderator analysis for the effect size.

Moderator	K	ES	SE	Z	P	95 % CI	Tau ²	I ²	QE	QM	
Agent	39	Professionals	-1.48	0.69	-2.17	<0.05	-2.83 -0.14	0.16 (SE = 0.05)	94.74 %	415.39 (p < .0001)	0.69 (p = .71)
		Teaching staff	-0.92	0.15	-6.02	<0.0001	-1.21 -0.62				
Instrument	42	Author elaborated	-1.00	0.09	-10.84	<0.0001	-1.18 -0.82	0.15 (SE = 0.04)	94.44 %	509.37 (p < .0001)	0.63 (p = .43)
		Standardised	-0.89	0.11	-8.05	<0.0001	-1.11 -0.67				
Geographical Area	42	North America	-0.71	0.12	-5.78	<0.0001	-0.95 -0.47	0.16 (SE = 0.05)	94.97 %	489.31 (p < .0001)	15.96 (p = .007)
		South America	-0.66	0.25	-2.62	<0.05	-1.15 -0.78				
		Asia	-1.12	0.17	-6.53	<0.0001	-1.45 -0.78				
		Australia	-1.73	0.36	-4.77	<0.0001	-2.44 1.02				
		Europe	-1.02	0.14	-7.64	<0.0001	-1.29 -0.76				
		Turkey	-1.64	0.30	-5.39	<0.0001	-2.23 -1.04				
Sample type	42	Adults	-0.91	0.16	-5.80	<0.0001	-1.21 -0.60	0.16 (SE = 0.05)	94.86 %	507.86 (p < .0001)	0.17 (p = .68)
		Minors	-0.98	0.08	-11.88	<0.0001	-1.14 -0.82				
Mean age	34	Intercept	-0.97	0.08	-12.05	<0.0001	-1.13 -0.81	0.17 (SE = 0.05)	94.91 %	417.90 (p < .0001)	0.44 (p = .51)
		Age	0.01	0.01	0.66	0.51	-0.01 0.02				
Nr of sessions	39	Intercept	-0.99	0.08	-12.43	<0.0001	-1.15 -0.83	0.18 (SE = 0.05)	94.61 %	447.31 (p < .0001)	0.29 (p = .59)
		Nr of sessions	-0.01	0.03	0.54	0.59	-0.04 0.07				
Treatment Duration	34	Intercept	-1.02	0.09	-10.80	<0.0001	-1.78 -0.82	0.24 (SE = 0.07)	96.41 %	439.53 (p < .0001)	0.01 (p = .94)
		Duration	0.01	0.01	0.07	0.94	-0.01 0.01				

Note: k (sample size); ES (combined effect size); SE (standard error); z (statistic value); Tau² (residual inter-study variance); I² (percentage of variability due to heterogeneity); QE (residual variance test with its probability); QM (moderator test with its probability).

through ANOVA that the difference between the model that includes the moderator and the one that does not was significant, $F(2, 7) = 16.75, p = .005$. The studies carried out in Australia showed the largest effect sizes, followed by Turkey, Asia, and Europe, with the American continent presenting smaller effect sizes.

Finally, we analysed the possible publication biases of the study. Specifically, the Egger test was performed to study the asymmetry of the Funnel Plot. The results revealed publication bias ($z = -6.39, p < .0001$), showing in Fig. 3 an asymmetry that supports this suspicion of publication bias.

4. Discussion

CSA is a global problem affecting an alarming number of children and producing significant health consequences. Prevention programs seek to provide society with tools to detect and respond effectively to this abuse. The present study proposed to carry out a meta-analysis on the effectiveness of the CSA prevention programs carried out between 2014 and 2021 that analysed the knowledge acquired, published efficacy data, and compared pre-post-intervention measures. Specifically, the objective of this work was to determine the effectiveness of prevention programs on knowledge acquisition about CSA; whether the results of these programs are related to their duration, characteristics such as the participants' age, or the type of target population; whether the results of these interventions are influenced by methodology-related characteristics of the studies, such as where they were carried out, the agent delivering them, or the mode of program evaluation; and finally, whether or not the efficacy data reported by the studies that analyse intragroup changes (pre-post measures) are similar.

A total of 31 primary studies (with 43 different units of analysis or samples and a total of 13,669 participants) were analysed, which included knowledge about CSA before and after the prevention program as a dependent variable and that had at least a group with pre- and post-treatment measures. The results obtained a combined effect size considered large ($d_{MR} = -0.96, 95\% \text{ CI} [-1.10, -0.82], p < .001$), so it can be said that the CSA prevention programs included in this analysis significantly improved participants' knowledge after the intervention. Therefore, it seems that carrying out eminently participatory prevention programs with more than three sessions, focused to school-aged population and in school contexts can be an effective intervention for participants to increase their knowledge about this type of abuse, in line with previous studies (Lu et al., 2022; Walsh et al., 2018).

However, the results of the Cochran Q statistic and the I^2 index show that the effect sizes analysed are heterogeneous, which led to an examination of which moderating variables could be affecting this variability of the effect sizes. The geographical area where the study was carried out is the only variable of those analysed that explains part of the variability between the effect sizes of the prevention programs, although even taking this variable into account, there is still unexplained variance. Four of the six geographic areas included find effect sizes >1 , with Australia and Turkey reporting the largest sizes, followed by Asia and Europe. The American (both north and south) continent presents the lowest sizes. All of them achieve a significant improvement in the post-measures of knowledge compared to the baseline. On the other hand, when continuous variables are taken into account, such as participants' average age, number of sessions, and treatment duration; as well as the rest of the qualitative variables: the agent who imparts the programs, mode of evaluation of the programs or instrument and type of sample, the moderator test was nonsignificant and there was still a significantly high amount of unexplained variance after including these variables. This heterogeneity in effect sizes showed that there may be specific variables that statistically influence the improvement of knowledge, although they do not seem to be included in this study.

To study and ensure the validity of the meta-analysis, we considered the sources of potential threats, such as study quality, homogeneity, and publication bias. Regarding the quality of the primary studies, we considered the reporting quality. Methodological quality was specifically taken into account by including pre-test measures of knowledge in the analysis. The studies presented in this meta-analysis could include a heterogeneity problem, as the CSA prevention programs included many different variables to assess their effectiveness. To overcome this heterogeneity, only studies that analysed knowledge as a dependent variable were included in the analysis. The form of knowledge evaluation was also a variable in this analysis. Different standardised instruments were used and, in addition, about half of the included studies used an author-elaborated instrument, which hindered the homogeneity of results. Moreover, the tests performed found publication bias. The selective publication of studies based on their findings poses a risk to the validity of any meta-analysis.

This meta-analysis has some limitations that must be taken into account. A large number of studies had to be excluded for not reporting sufficient data for analyses. Some variables could be having a moderating effect that could not be taken into account, as most of the articles included little information about the programs carried out (for example, about 20% of the studies included in the meta-analysis did not report whether or not the programs used a participatory methodology). The different assessment instruments used could also affect the results, but the high variability of the instruments, both standardised and developed for each study, hindered their analysis. On the other hand, some concentrations of data in specific variables made it impossible to compare their categories. For example, about 90% of the included studies were conducted in a school setting, and $>80\%$ of the interventions were face-to-face. No differences between genders have been conducted in this meta-analysis due to the scarce data reported in the studies, without disaggregated information in the articles regarding the disparities in knowledge acquisition between boys and girls. Finally, it's worth noting that our search strategy was limited to using simple terms in the abstract sections of scientific literature, excluding grey literature. Therefore, it's possible that some relevant research may not have been included.

To improve the quality of meta-analyses in the field of CSA prevention programs, the studies analysing the effectiveness of these programs should present exhaustive explanations and details of the characteristics of the interventions: how they were carried out, under what conditions, what topics were included in the program or what application methodology was used. This could significantly help to codify the studies and analyse these variables as potential moderators. In addition, the use of standardised instruments that can accurately assess research-dependent variables would provide consistency and homogeneity for future meta-analyses on efficacy.

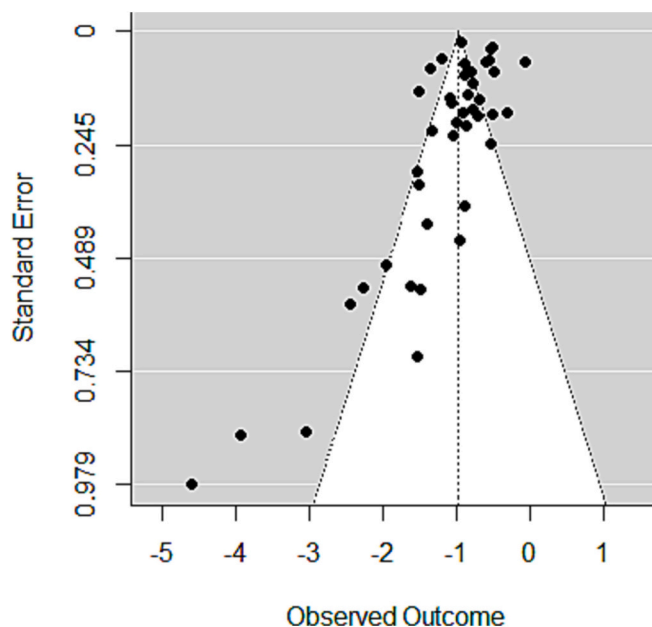


Fig. 3. Funnel plot.

Finally, it could be valuable for authors of future primary studies to consider and include disaggregated information in their articles regarding the disparities in knowledge acquisition between boys and girls.

To conclude, we can state that the results of this work show that these prevention programs are helpful in improving the participants' knowledge. To evaluate the possible influence of other variables and analyse in depth the variability in the effect sizes, it would be interesting for future meta-analyses to analyse possible moderating variables such as the specific characteristics of the treatments. The studies included herein analyse knowledge through questionnaires generally designed for this knowledge, so it may be influencing the high effect sizes. In addition, it is necessary, or even essential, to also report in the manuscript on the reliability and validity data of the instruments developed to assess the variables studied. Therefore, it may be advisable to include other dependent variables, such as behaviours or self-protection skills, to analyse in depth the effectiveness of these programs. In short, prevention programs report sufficient effectiveness to continue working and directing efforts to provide resources to minors and their responsible adults, as well as to society. Research is responsible for shedding light on this path by disseminating results, analysing possibilities for improvement, and guiding towards a safer society for children.

Data availability

Data will be made available on request.

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