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Technology-Based Child Abuse and Neglect Prevention Programs: A Systematic Review

Teknoloji Destekli Çocuk İstismarını ve İhmalini Önleme Programları: Sistematik Derleme

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ABSTRACT

Child abuse and neglect is a widespread social problem. The prevalence of this problem threatens the present and future of children. Although various prevention programs have been proposed in the literature as a solution to the problem of child abuse and neglect, recently, technological applications have been increasingly used in prevention and intervention studies for abuse and neglect. This study aims to review the current literature on technologically assisted programs for preventing child abuse and neglect. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline was used to identify eligible studies. 22 evidence-based studies with pretest-posttest control were included in the review. The reviewed programs were structured to educate parents, children, and various professionals on appropriate parenting skills and child abuse and neglect. In the studies reviewed, web/internet-based applications were mostly used and effectiveness evaluation studies were mainly conducted on parents. With the exception of one study, the programs were found to be effective following interventions for abuse and neglect, and cognitive and behavioral improvements were noted in parents, children, and other professionals. As a result, it can be said that technology-based prevention programs are accepted practices for child abuse and neglect. To date, however, there is little data to support the use of such studies in preventive practices and strategies. More studies are needed to test the effectiveness of technological applications in preventing abuse among children and adolescents.
Keywords: Child abuse, child neglect, prevention, technology, application

ÖZ

Çocuk istismarı ve ihmali yaygın bir toplumsal problemdir. Bu problemin yaygınlığı çocukların bugününü ve yarınını tehdit altında bırakmaktadır. Çocuk istismarı ve ihmali sorununa çözüm olması adına alanyazında çeşitli önleme programları önerilmekle birlikte, son zamanlarda teknolojik uygulamaların istismara ve ihmale yönelik önleme ve müdahale çalışmalarında giderek daha fazla kullanılmaktadır. Bu çalışma, çocuk istismar ve ihmalinin önlenmesine yönelik teknolojik destekli programlara ilişkin mevcut literatürü gözden geçirmeyi amaçlamaktadır. Uygun çalışmaları belirlemek için Sistematik İncelemeler ve Meta-Analizler için Tercih Edilen Raporlama Öğeleri (PRISMA) kılavuzu kullanılmıştır. İncelemeye ön test-son test kontrollü olan kanıta dayalı 22 çalışma dahil edilmiştir. İncelenen programlar, ebeveynler, çocuklar ve çeşitli profesyonelleri uygun ebeveynlik becerileri ve çocuk istismarı ve ihmali konusunda eğitmek üzere yapılandırılmıştır. İncelenen çalışmalarda en fazla web/internet tabanlı uygulamalar kullanılmış ve daha çok ebeveynler üzerinde etkililiği değerlendirme çalışmaları yürütülmüştür. Bir çalışma dışında, programlar, istismar ve ihmale yönelik müdahaleler sonrası etkili bulunmuş ve ebeveynler, çocuklar ve diğer profesyonellerde bilişsel ve davranışsal gelişmeler kaydedilmiştir. Sonuç olarak, teknoloji destekli önleme programlarının çocuk istismarı ve ihmaline yönelik kabul gören uygulamalar olduğu söylenebilir. Bununla birlikte bugüne kadar bu tür çalışmaların önleyici uygulamalarda ve stratejilerde kullanımını destekleyen az sayıda veri bulunmaktadır. Teknolojik uygulamaların çocuk ve ergenler arasında istismarı önlemedeki etkinliklerini test etmek için daha fazla çalışmaya ihtiyaç bulunmaktadır.
Anahtar sözcükler: Çocuk istismarı, çocuk ihmali, önleme, teknoloji, uygulama

Introduction

Child maltreatment is a global public health problem (Self-Brown et al. 2022), and there are many cases of child abuse in every country in the world (Raflesia, 2018). Child maltreatment is defined as abuse and neglect of children under the age of 18 (World Health Organization [WHO] 2022). The concept of child abuse and neglect includes all forms of physical and/or emotional maltreatment, sexual abuse, neglect, and commercial or other exploitation that cause actual or potential harm to the health, survival, development, or dignity of the child in

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the context of a relationship of responsibility, trust or power (WHO 2022). Abuse is an intentional act that can lead to physical or mental injury (Offidani et al. 2022). When the concepts of child abuse and neglect are differentiated, the main difference between them is that abuse involves active behavior while neglect involves passive behavior (Yurdakök 2010). In child abuse, there is a dynamic behavior toward the child that can result in all kinds of physical, sexual, and emotional harm (e.g. slapping the child or exposing the child to sexual content contrary to the developmental period). In neglect, there is a passive situation where caregivers do not meet the child's basic needs and do not fulfill what they should do (e.g. not providing basic education to the child, not providing health needs; Koçtürk 2020). When the incidence rates of child abuse and neglect are evaluated, these rates are highest in the first year of life (Wu et al. 2004), and neglect is the most common category in children under one year of age (Reeves et al. 2015). According to World Health Organization (WHO 2022) data, approximately 3 out of every four children aged 2-4 years -300 million children - are regularly exposed to corporal punishment and/or psychological violence by their parents and caregivers, and one in every 5 women and one in every 13 men report having been sexually abused during childhood between the ages of 0-17.

Today, technology consumes a large part of young people's lives (Badillo-Urquiola et al. 2017), and children are increasingly vulnerable to sexual abuse, bullying, and emotional violence in online environments (Pasha et al. 2022). Online sexual exploitation is quite common and has damaging effects on mental health in children and adolescents (Dimitropoulos et al. 2022). As maltreatment is one of the most hurtful situations children can experience, it is often hidden, making it challenging to ensure that existing prevention and treatment mechanisms reach those in need (Dias et al. 2018), but due to the devastating effects of child maltreatment on both families and communities, there is a need to develop standardized prevention programs (Howe et al. 2017). On the other hand, children can easily be exposed to various types of abuse due to their limited knowledge about their personal safety and the fact that young children are not aware that it is unethical for an adult to abuse their body. Therefore, it is necessary to educate children about this type of abuse (Othman and Yahaya 2015). Moreover, regardless of the circumstances in which children live, depending on their care needs, it is crucial to develop an appropriate approach, especially for children exposed to high-risk environments and with few protective factors in their living conditions (Bentovim 2002). There are significant obstacles to the adequate provision of mental health services to low-income families, especially those living in rural areas. At this point, with the increasing use of the Internet, technological tools and applications can be utilized to prevent child maltreatment. With the versatility and increasing prevalence of digital technologies, these technologies are seen in the literature as promising tools for reducing and eliminating violence against children (e.g. Cronin et al. 2017).

While the Internet offers essential opportunities for children's education and social development (Singh 2018), the use of serious games as a form of education and training has become an increasingly preferred practice (Zhao et al. 2019). On the other hand, telehealth technologies offer an innovative approach for trained professionals to effectively and efficiently improve access to mental health services in underserved schools in various locations (Stewart et al. 2019). Advances in technology are increasingly providing access to remotely delivered interventions designed to promote parenting practices that protect against child maltreatment (Bagget et al. 2017), while online services can reach an increasing number of parents and provide support tailored to their needs and situations (Lamberton et al. 2017). Mobile health interventions promote the access and sustainability of family-focused, evidence-based interventions for child maltreatment prevention, health promotion, and health promotion using mobile technology (tablets and smartphones) platforms for interventions to improve health outcomes (Breitenstein et al. 2017).

In conclusion, although there is extensive literature on child maltreatment, child abuse and neglect, and prevention efforts, only a tiny proportion of the strategies adopted to prevent and combat child abuse and neglect deal with the use of technology (e.g., Baggett et al. 2017, Fujiwara et al. 2020, Guastaferro, 2016, Gülırmak and Orak 2020, Hamilton-Giachritsis et al. 2018, Kang et al. 2020, Lefever et al. 2017, Malamsha et al. 2021, Mast et al. 2014, Ondersma et al. 2017, Schein et al. 2022). However, there is no scoping review study evaluating the use of technology tools for the prevention of child abuse and neglect in the literature. A scoping review of existing and published studies focusing on interventions based on the use of technology and providing a detailed picture of existing preventive strategies using digital tools for children and adolescents will guide researchers' new studies, and it will be a guide for field workers to empower children and families. For all these reasons, the aim of this study is to review evidence-based studies that use technology-based practices to prevent child abuse and neglect. In this context, the research question "What are the characteristics of evidence-based studies that use technology-based applications to prevent child abuse and neglect?" is sought to be answered.

Method

The systematic review of technologically based practices used in the prevention of child neglect and abuse was conducted by considering the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Page et al. 2021) principles were taken into consideration. A literature review was conducted by searching the keywords "Technology" OR "Technologies," OR "technology-based," OR "web-based," OR "APP," OR "application," OR "mobile application") and ("child abuse" OR "child maltreatment" OR "child neglect" OR "child abuse and neglect" OR "physical abuse" OR "emotional abuse" OR "sexual abuse" OR "physical neglect" OR "emotional neglect") from Web of Science, ERIC and TR Index databases.

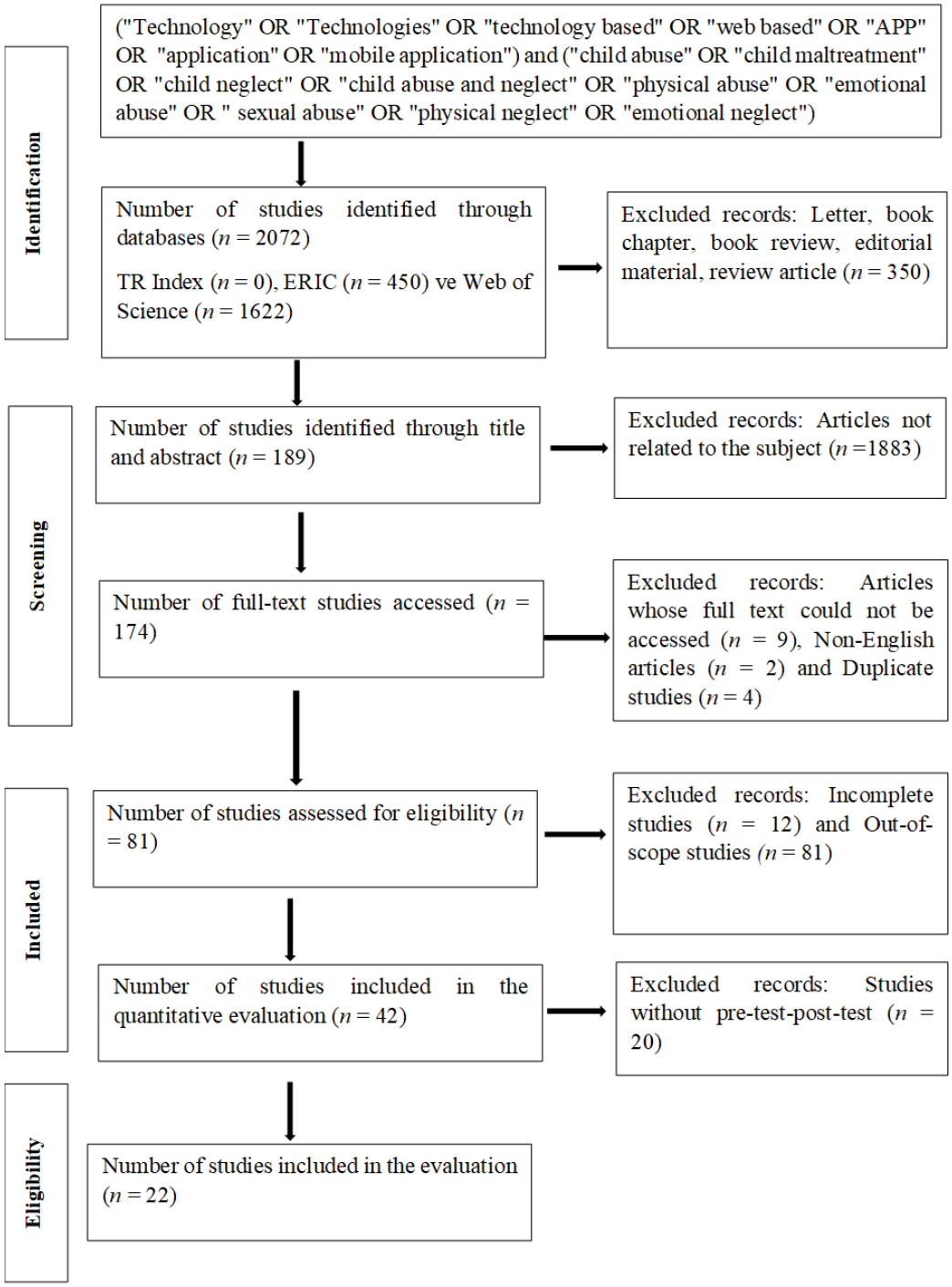

Figure 1. PRISMA flow diagram

In the first stage of the search, excluding letters, book chapters, book reviews, editorial materials, and review articles (n = 350), 2072 studies were reached. After reading the titles and abstracts, 189 studies were identified by excluding 1883 articles that were not related to the subject. Of these studies, 174 full texts were analyzed by excluding articles whose full text could not be accessed (n = 9), non-English articles (n = 2), and duplicate studies (n = 4). After excluding incomplete studies (n = 12) and studies not within the scope of the topic (n = 81), 81 articles were evaluated for eligibility. Among the assessed articles for eligibility, 42 articles were included in the quantitative evaluation, and 22 articles, including pre-test and post-test, were included in the qualitative synthesis. The flowchart of the entire article selection process is presented in Figure 1.

The inclusion criteria for studies are as follows: Empirical studies including pre-test and post-test; technological applications to prevent direct and indirect child and adolescent abuse; technological applications to intervene in direct and indirect child and teenage abuse; technological applications for individuals responsible for the care of children, technological applications for people who are obliged to report child abuse and studies written in English or Turkish. Exclusion criteria for studies are: Studies that are not related to the subject; letters, book chapters, book reviews, editorial materials, review articles, meta-analysis studies; non-experimental studies; studies without pre-test-post-test; adult abuse prevention studies; non-technology-based prevention studies; studies whose research process has not been completed; technological applications developed for abuse but whose effectiveness has not been evaluated; articles not written in English or Turkish languages.

Results

As emphasized above, 22 articles, including pretest-posttest, were included in the qualitative synthesis. These studies included in the review were conducted between 2022-2007. Heterogeneity in the 22 studies included in the qualitative synthesis, both in terms of the form of intervention and the technologies used to prevent child abuse and neglect. It was determined that most studies (n = 5) were conducted in 2017. The sample size used in the studies ranged from 5961 (Fujiwara et al. 2020) to 1 person (Gaskin et al. 2012). 41% (n = 9) of the studies were conducted only with parents, 44% (n = 4) of these studies were applied only to mothers, and 56% (n = 5) were used to both mothers and fathers. Of the other studies, 18% (n = 4) were conducted only with children and adolescents; 14% (n = 3) with mothers and children; 9% (n = 2) with parents and children; 5% (n = 1) with dentists; 5% (n = 1) with child care professionals; 5% (n = 1) with foster parent candidates; and 5% (n = 1) with psychological counseling students. 41% (n = 9) of the studies used the single group pretest-posttest experimental model; 36% (n = 8) used the experimental model with pretest-posttest control group; 14% (n = 3) used the experimental model with pretest-posttest comparison control group; 9% (n = 2) used the experimental model with pretest-posttest comparison group. 14% (n = 3) of the studies were conducted as pilot studies. On the other hand, to make the results obtained in the present review more understandable for the reader, the selected articles were divided into five categories according to the type of technology used: Web/internet-based applications, hybrid applications, mobile applications, mobile phone-enabled applications and other applications (video intervention, virtual reality, TV series, and digital frame). Of the studies, 40% (n = 9) were web/internet-based applications, 27% (n = 6) were other applications, 14% (n = 3) were hybrid applications, 9% (n = 2) were mobile applications, and 9% (n = 2) were mobile phone supported applications.

Web/Internet-Based Applications

Web/internet-based applications constitute 40% of the studies (n = 9). Table 1 provides a summary of the studies included in the review. Gülırmak and Orak (2020) aimed to increase parents' awareness of emotional abuse and correct attitudes towards child rearing and to determine the effectiveness of a web-based distance education in preventing emotional abuse and neglect of children. This application was presented as a 6-week web-based distance education, including visuals, voiceovers, videos, and written materials. The application consists of 6 modules ranging from 15-24 minutes. In the study conducted using pre-test and post-test measurements, a t-test was used to compare the scores. Although there was no significant difference between the experimental and control groups in terms of essential awareness of emotional abuse ($p > .05$), considering the post-test scores of the training program (29.50±4.075), the implementation significantly increased parental awareness of emotional abuse in the experimental group ($t = -5.485$, $p < .05$).

Baggett et al. (2017) aimed to obtain information on whether mothers at high risk of maltreatment would participate in and benefit from an evidence-based, technology-adapted parenting intervention and assessed whether the intervention could improve parenting skills and reduce the potential for child abuse among high-risk mothers and their infants. The study used the 11-session bilingual version of the e-PALS Infant-Net program, an internet adaptation of the Baby-Net, Play, and Learning Strategies (PALS) program. Baby-Net

teaches understanding the infant's cues, responding with warm and sensitive behaviors, maintaining infants' interest, and using sentences with rich verbal content to the infant through physical play. The app includes video-based examples, check-in questions using individualized feedback, homework action plans, videotaped demonstrations of mother-infant interactions, and coach interviews. Pre- and post-test assessments included direct observations of maternal, infant, and family characteristics as well as scales of maternal, infant, and family functioning. Trained evaluators conducted a 2-hour home visit with mothers to complete pre-and post-assessments, and data were analyzed using regression analysis.

Table 1: Summary of included studies on web/internet-based applications

	Study	Technology	Sample (N, gender, age)	Intervention Type and Duration	Method	Measurement Tools	Results
1	Gülırmak ve Orak (2020)	Web-based distance learning	N = 60 (34 F, 26 M parents) 18-65 years old EG: *n* = 30 (19 F, 11 M) CG: *n* = 30 (15 F, 15 M) 15 F, 15 M	It was developed to increase parents' awareness of emotional abuse and appropriate attitudes toward raising children. It was presented as a 6-week web-based distance learning including visuals, voiceovers, videos, and written materials. The application consists of 6 modules ranging from 15-24 minutes.	A quasi-experimental model with a pretest-posttest control group was used.	Personal Characteristics Form, Parental Attitude Research Instrument, Recognition of Emotional Maltreatment Scale	6-week web-based distance learning was found to increase parents' awareness of child rearing and emotional abuse.
2	Baggett et al. (2017)	Internet-based parenting app "Baby-Net"	N = 140 mothers*	Baby-Net is an 11-session bilingual version of the e-PALS Infant-Net program, an internet adaptation of the Play and Learning Strategies (PALS) program. The application included video-based examples, check-in questions using individualized feedback, homework action plans, videotaped practices of mother-infant interaction, and coach interviews.	An experimental model with a pretest-posttest control group was used.	Demographic Characteristics Form, Conflict Tactics Scale, Concepts of Development Questionnaire, Postpartum Depression Screening Scale, Personal Relationship Inventory, Pearlin Mastery Scale, Child Abuse Potential Inventory, Landry Parent-Child Interaction Scale	The intervention increased positive parenting behavior and reduced the potential for child abuse.
3	van Rosmalen-Nooijens et al. (2017)	Internet-based self-help app "Feel the ViBe."	N = 40 adolescents and young adults 12-25 years old EG: 1 M, 19 F CG: 20 F Those included in the pre-post test analysis: N = 14 Group 1: *n* = 8 Group 2: *n* = 6	Feel the ViBe (FtV) is a freely available self-help application for adolescents and young adults experiencing domestic violence. The application was used for 12 weeks.	An experimental model with a pretest-posttest control group was used.	Impact of Event Scale, Depression, and Anxiety subscales of the Symptom CheckList-90-R (SCL-90)	Although there are no definite conclusions about its effectiveness since the number of participants was relatively low, it was reported to be an acceptable practice by the participants (47%, 9/19).
4	Al-Dabaan et al. (2016)	Web-based child protection training program	*n* = 82 dentist (37 M, 45 F) ≤30- 60 years old	The training program was aimed at dentists and included audio and visual materials. The didactic component of the training package consisted of 8 modules.	A one-group pretest-posttest experimental design was used.	A set of eight questions related to the subject material was presented in each module—also, an 11-question survey was sent to participants after one month.	Education has been effective in increasing knowledge and changing attitudes towards child protection.

5	Rheingold et al. (2015)	Web-based child abuse prevention training	Participation in the pre-post test: N = 306 Completing 3-month follow-up: N = 267 18-64 years old (85% F, 15% M)	This study conducted a web-based and face-to-face evaluation of an existing CSA prevention program, Stewards of Children. The web-based training was completed by participants within two weeks.	An experimental model with a pretest-posttest control group was used.	Demographic Information Form, Childhood Sexual Abuse Myths Scale, Childhood Sexual Abuse Information Questionnaire, 21 questions on Childhood Sexual Abuse Prevention Behaviors	Although short-term training for childcare professionals effectively prevented CSA, no difference was found between face-to-face and web-based training methods.
6	Mast et al. (2014)	Web-based parenting skills program	N = 7 families (5 Mother/stepmother, 2 Father/stepfather) Web-based (I-INTERACT): *n* = 4 Internet resources used comparison group (IRC): *n* = 3	The web-based I-Interact program consists of 10 main sessions and five optional additional sessions. The I-InTERACT program is designed as a web-based program.	An experimental model with a pretest-posttest control group was used.	Dyadic Parent-Child Interaction Coding System, Eyberg Child Behavior Inventory, Child Behavior Checklist	Web-based parenting skills training effectively improved parent-child interactions and reduced the intensity of child behavior problems.
7	Müller et al. (2014)	Web-based child abuse prevention training "Cool and Safe"	N = 286 child (141 M, 145 F) 8-11 years old EG: *n* = 137 CG: *n* = 149	"Cool and Safe" is a prevention program targeting children of primary school age. The application is divided into five thematic units that must be completed in a pre-designed sequence. The entire program is set to take approximately two hours to complete.	A 2 (Group) × 2 (Measurement Period) mixed factorial design was used with a pretest-posttest control group and two measurements.	A nine-item self-report questionnaire, 4 sample situations measuring behavioral intention, a five-item scale to assess individual anxiety level, an Emotion Awareness Questionnaire, and a one-question questionnaire to determine the degree of acceptance of "Cool and Safe".	The training increased knowledge about CSA and safe behaviors. Children rated the education as acceptable and were reported to hide their emotions less.
8	Delaney et al. (2012)	Web-based pre-service training for parents	N = 92 foster parent candidate (%60 F, %40 M) EG: *n* = 41 CG: *n* = 51	The study compared the effectiveness of online and classroom versions of a session from a widely used pre-service training program. The online course titled "Child Abuse and Neglect" consisted of three integrated training sections. The online course module lasted 2 hours.	An experimental model with a pretest-posttest control group was used.	Background Information, Knowledge of Child Abuse and Neglect, Empathy & Perspective Questionnaire, User Satisfaction Questionnaire	Online education was found to be more effective than face-to-face education in increasing the level of knowledge on child abuse and neglect.
9	Kenny (2007)	Web-based training on child maltreatment	N = 105 undergraduate and graduate counseling students 20-59 years old (%95 F, %5 M)	In the study, a program was developed to train students in education and counseling on child abuse and reporting practices. The online training comprised 87 pages of information divided into various sections and was implemented in approximately 1 hour.	Single-group pretest-posttest experimental design and qualitative research design were used.	Mandated Reporter Tutorial Formative Evaluation, 20 multiple choice questions assessing the information presented in the training.	The training increased the level of knowledge of counseling students on child abuse.

Notes. EG = Experimental Group; CG = Control Group; MA = Mean age; F = Female; M = Male; * = Demographic information was not provided by the authors.

Overall, the results of this study showed that the majority of mothers at high risk for child maltreatment participated in the intervention. Among high-risk mothers (n = 31) who received more of the targeted intervention, significantly more positive parenting behaviors were observed compared to other mothers (b = .35; p < .05; f2 = .16, medium effect) and a reduction in child maltreatment potential (b = −.48; p < .01; f2 = .28, medium effect).

Van Rosmalen-Nooijens et al. (2017) evaluated the effectiveness of the internet-based self-help application "Feel the ViBe" (FtV). FtV is a freely available, internet-based self-help application for adolescents and young adults experiencing domestic violence and has three main objectives: (1) to provide information, (2) to offer peer support, and (3) to support participants in finding appropriate health services for their needs. Participants could access FtV from any computer and use the application for 12 weeks. After 12 weeks on the Web, participants mostly expressed satisfaction with FtV (58%, 11/19), but only 16% (3/19) felt that FtV helped them solve their problems. FtV received an average score of 7.47 (range 6-9) on a Likert scale of 1-10. All of the participants in this study had experienced domestic violence and sought help on how to change their circumstances because they were aware of their situation at home. The researchers have suggested that FtV can be easily implemented without extensive resources and can be adapted to public health services.

Al-Dabaan et al. (2016) aimed to evaluate the impact of a web-based training program on child abuse and neglect and child protection on the knowledge and practices of dentists in Saudi Arabia. The nonparametric Wilcoxon signed-rank test for paired data was used to evaluate the pre-test and post-test measurements. After participating in the child protection training program, a significant increase was observed in dentists compared to their previous knowledge levels (p < .001), and it was determined that the training was effective in increasing knowledge and changing attitudes towards child protection. At the one-month follow-up of the study, positive attitudes towards the training program continued, and there was an increase in the reporting of suspected cases of child abuse and neglect in the last month. 21% of participants had adopted or planned to adopt a child protection policy in their practice, and 29% had identified a staff member to lead child protection after completing the program. However, almost all participants recognized signs of child abuse and neglect (CAN) in their daily practice, and 27.4% of participants reported a suspected case of CAN in the period after the training.

Rheingold et al. (2015) aimed to evaluate the impact of Stewards of Children, an existing child sexual abuse (CSA) prevention program offered in both face-to-face and web-based formats, on primary and secondary prevention efforts, including childcare professionals' knowledge, attitudes, and behaviors related to CSA prevention. The Stewards of Children program is based on an approach that emphasizes that adults who care for children, including parents and childcare professionals, should take primary responsibility for preventing CSA. When the implementation results were examined, both the face-to-face and the web-based Stewards of Children program were effective in knowledge, attitudes, and preventive behaviors regarding abuse. In the study, chi-square analyses were used to compare participants who completed and did not complete the 3-month assessments regarding key variables. A mixed-effects regression model was used to determine the effectiveness of Stewards of Children. Data from participants showed that knowledge about CSA prevention was maintained immediately after the training and at the 3-month follow-up (β = .54, SE = .17, t (558) = 3,18, p = .002). There was no difference between the training methods (e.g. face-to-face versus web-based) for CSA knowledge and preventive behaviors (β = .42, SE = .65, t (198) = .65, p = .518)

In order to prevent abusive head trauma (AHT), Mast et al. (2014) piloted a web-based intervention involving live coaching practices to improve positive parenting and functional child behaviors. The study included a comparison of two approaches: a web-based I-Interact program emphasizing positive parenting skills and consistent discipline methods and an internet resource access group with links to various web-based resources. The web-based I-InTERACT program consists of 10 main sessions and five optional additional sessions. The I-InTERACT program was designed as a web-based program to teach positive parenting skills and consistent discipline methods. The IRC is a website study with links to various web-based resources, including educational material, associations, support groups, recovery and coping skills, and parenting resources related to traumatic brain injuries. When the study was completed, parents who participated in the InTERACT parenting skills program demonstrated significantly more positive parenting behaviors and fewer undesirable behaviors than parents who received access to internet resources. In addition, children in the parenting skills intervention group responded more compliantly to parental commands than children in the other group.

"Cool and Safe," developed by Müller et al. (2014) is a web-based child sexual abuse prevention program that aims to provide information about safe behaviors, appropriate and inappropriate touches, and good and bad secrets for primary school children (Müller et al. 2014). In the study, a t-test was used in the pre-test and post-test results to evaluate the effectiveness. As a result of the study, it was observed that the training increased

knowledge about sexual abuse (t (136) = 9.93, p < .001, d = 1.24) and taught safe behavior strategies (t (136) = 6.54, p < .001, d = .76). At the same time, there was a decrease in children's behavior of hiding their emotions compared to the control group (t (136) = 3.91, p < .001, d = .46).

Delaney et al. (2012) compared the effectiveness of online and classroom versions of a widely used pre-service training program for prospective foster parents in a pilot study. The study assessed whether the online training format was as effective as the classroom format in improving participants' knowledge about child abuse and neglect and their empathy towards biological parents. Analysis of covariance (ANCOVA) and multivariate analysis of covariance (MANCOVA) were used to evaluate the study. The online training on Child Abuse and Neglect consisted of three integrated training sections: "understanding child maltreatment, empathizing with biological parents, and recognizing and reporting maltreatment". At the end of the training, it was found that online instruction was more effective than face-to-face instruction in increasing parents' knowledge about child abuse and neglect (F (1, 89) = 22.85, p < .00).

Kenny (2007) conducted a short-term online training to determine the effectiveness of providing Web-based information on child maltreatment to undergraduate and graduate counseling students. The t-test and Wilcoxon signed-rank tests were used in the pre-and post-training evaluations. According to the results of the pre-test (15.3 ± 1.4) and post-test (17.8 ± 1.8), there was a significant increase in counseling students' knowledge about child maltreatment after the Web-based training (t (103) = 12.17, p < .001).

Table 2. Summary of included studies on hybrid applications

	Study	Technology	Sample (N, gender, age)	Intervention Type and Implementation Duration	Method	Measurement Tools	Results
1.	Schein et al. (2023)	Tele-health-Hybrid Application	N = 70 families * 27 families (fully telehealth) 43 families (face-to-face/telehealth)	A telehealth or hybrid home visiting program was implemented for parents who experienced early adverse life events with their children aged 6-24 months (ABC-Infant) or 24-48 months (ABC-Child). The intervention was designed to last ten sessions.	The experimental model with the pretest-posttest control group was used.	The parental sensitivity assessment was coded in Likert format by seven researchers.	An increase in parental sensitivity was achieved.
2.	Şenol and Üstündağ (2021)	WhatsApp and Online Training Program	N = 67, Parent with a child aged 4-6 years EG: *n* = 32 (28 F, 4 M) MA = 34.0 CG: *n* = 35 (30 F, 5 M) MA = 34.03	The "Child Neglect and Abuse WhatsApp and Online Training Program", designed to increase the knowledge and awareness of parents during the COVID-19 pandemic, was implemented by sending WhatsApp messages about child neglect, physical abuse, emotional abuse, and sexual abuse and providing four sessions of online training via Zoom.	The quasi-experimental model with pre-test, post-test, and control group was used.	Personal Information Form, Child Neglect and Abuse Awareness Scale for Parents, Parental Abuse Scale	The implemented training increased parents' knowledge and awareness of child abuse and neglect.
3.	Kang et al. (2020)	Hybrid Application (CSAPE-H) Mobile application and Web application	N = 83 (46 M, 37 M) students EG: *n* = 48 (25 F, 23 M) 10-11 years old CG: *n* = 35 (21 F, 14 M) 10-11 years old	A hybrid application (app) with simultaneous access between web-based and smartphone-based applications was used. The application includes five sessions of 40 minutes, a final session of 30 minutes, and a 10-minute evaluation section consisting of 16 questions.	The quasi-experimental model with pre-test, post-test, and control group was used.	Demographic Information Questionnaire, CSA Knowledge Scale, Scale of Self-Protective Behaviors Against CSA, Satisfaction Level of Education Questionnaire.	The knowledge level of those who received child sexual abuse training in the classroom or with hybrid application increased. CSAPE-H was found to be more effective in self-protection behaviors compared to children who took traditional courses. CSAPE-H implementation improved children's self-care skills.

Notes. EG = Experimental Group; CG = Control Group; MA = Mean age; F = Female; M = Male; * = Demographic information was not provided by the authors

Hybrid Applications

Hybrid applications constitute 14% (n = 3) of the evaluated studies. Schein et al. (2022) examined whether the Attachment and Biobehavioral Catch-up (ABC) program, a short prevention/intervention program that aims to increase parental sensitivity in virtual home visiting services for families with young children during the COVID-19 pandemic, is effective. To measure the effectiveness of the intervention, parent coaches conducted sensitivity analyses before and after ABC implementation. The ABC observational sensitivity analyses were paired with 27 post-ABC observational sensitivity assessments for the hybrid ABC group. For families who received ABC entirely through telehealth (n = 43), t-tests were conducted to compare parental behaviors before and after TeleABC. Results showed a significant increase in following leadership from before TeleABC (3.35±1.25) to after TeleABC (3.93±1.01; t (42) = 2.90, p < .01). There was also a significant decrease in intrusiveness from before TeleABC (1.81± .96) to after TeleABC (1.47±.83; t (42) = 2.15, p < .05). These findings demonstrated that ABC's brief targeted intervention can be successfully implemented via telehealth (Schein et al. 2022).

In the study by Şenol and Üstündağ (2021), it was aimed to increase the knowledge and awareness of parents with children aged 4-6 years about child abuse and neglect through social media applications and programs during the COVID-19 pandemic. Participants in the experimental group were sent three messages each day via WhatsApp on child neglect, physical abuse, emotional abuse, and sexual abuse, respectively, and online training was provided via Zoom in four sessions on the same topics and the same order, including detailed information and topic examples. As a result of the t-test and Wilcoxon Sign Test analyses performed by taking pre-test and post-test measurements, it was determined that there was no statistically significant difference between the pre-test and post-test scores of the parents in the control group (p > .05), while there was a substantial difference between the pre-test and post-test scores of the parents in the experimental and control groups in favor of the experimental group (Z = 3.916; p < .05). Based on this finding, the researchers concluded that the implemented training affected parents' knowledge and awareness of child neglect and abuse.

Kang et al. (2020) aimed to test the effects of a child sexual abuse prevention (CSA) education program using a hybrid application (CSAPE-H). The main focus of the study was to provide health education that promotes and ensures the safety of children through self-care. In this study, self-care was accepted as an individual activity performed independently for oneself and defined as the ability of students to acquire knowledge and engage in self-protective behaviors to prevent CSA. In the study, 5th-grade students' knowledge about preventing sexual abuse and their self-protective behaviors against sexual abuse were examined. The experimental group received six sessions of CSA training using a hybrid application that included a mobile and web-based application.

In contrast, the control group received the program during a lesson in the classroom environment. The effectiveness of CSAPE-H was evaluated using pre-test and post-test questionnaires. At the intervention's end, participants' CSA knowledge increased significantly in both groups (t = 2.26, p = .027). In addition, children's self-care skills were improved through the intervention. A t-test was used to compare the difference between CSA knowledge and self-protection behaviors against CSA. A significant difference was observed between the two groups in self-protective behaviors against CSA, and the sub-dimensions of self-protective behaviors, "understanding discrimination" and "behavior in safe and unsafe situations," increased significantly (t = 2.62, p = .010). Based on these results, it was emphasized that CSAPE-H can be effective for primary school students, especially in self-protection behaviors (Kang et al. 2020).

Mobile applications

Mobile applications constitute 9% (n = 2) of the evaluated studies. Table 3 provides a summary of the studies included in the review. Malamsha et al. (2021) aimed to develop a socioculturally appropriate, mobile-based game to educate young children (<5 years), parents, and caregivers in Tanzania about sexual abuse prevention. Through surveys and focus group discussions, the HappyToto children's game was co-designed with 111 parents/caregivers of children under 18 and 24 child experts. As a result of the surveys, it was found that parents and caregivers showed interest in the developed game, and parents' confidence levels in talking about sexual abuse with their children increased (p <.001).

Moon et al. (2017) aimed to develop and evaluate the effects of SAP_MobAPP, a sexual abuse prevention mobile application for primary school children. The experimental group received training using SAP_MobAPP, control group A received web-based sexual abuse prevention training, and control group B received textbook-based sexual abuse prevention training. The mobile application-based training program included applications showing what to do about sexual abuse indoors and outdoors. In the study's data analysis, ANOVA and $\chi 2$ test were

performed for the homogeneity test of the experimental group and control groups A and B. The difference between the effectiveness of the two groups over time was analyzed with repeated measures ANOVA. When the results of the study were examined, although the differences between the groups were not statistically significant ($p > .05$), an increase was observed in awareness ($F = .73$, $p = .490$) and avoidance skills ($F = .99$, $p = .379$) in preventing sexual abuse of children immediately and four weeks after the mobile application training.

Table 3. Summary of included studies on mobile applications

	Study	Technology	Sample (N, gender, age)	Intervention Type and Implementation Duration	Method	Measurement Tools	Results
1.	Malamsha et al. (2021)	Mobile children game	In development: N = 111 parents (58 F, 53 M), 20-41+ years In the implementation phase: *n* = 32 parents (18 F, 14 M) *n* = 5 children (2 girls, three boys) 3-5 years	The HappyToto children's game was developed to educate young children (< 5 years), parents, and caregivers in Tanzania about sexual abuse prevention. The game consists of 3 levels: Special sections, prizes or gifts, and a safe environment.	Mixed method research was used. A pretest-posttest experimental model was applied to parents. Interviews were conducted with children about the use of games.	Questionnaires, focus group discussions, and observations were used to collect qualitative and quantitative data.	It has been reported that the HappyToto game can be an effective technology-based intervention to improve parents' and children's knowledge and skills in preventing sexual abuse.
2.	Moon et al. (2017)	Sexual Abuse Prevention Mobile Application (SAP_MobAPP)	N = 45 Ten years old EG (SAP_MobAPP): *n* = 15 CG 1 (Web-based): *n* = 15 CG 2 (Textbook-based): *n* = 15	This intervention was designed to teach children to recognize child sexual abuse and to develop their skills to avoid and protect themselves from misuse. Primary school students were trained once a week for 40 minutes for three weeks.	A quasi-experimental model with a pretest-posttest and control group was used.	Recognition of Sexual Abuse Questionnaire, Skills to Avoid Sexual Abuse Questionnaire	Awareness and skills to prevent sexual abuse of children increased.

Notes. EG = Experimental Group; CG = Control Group; MA = Mean age; F = Female; M = Male; * = Demographic information was not provided by the authors..

Table 4. Summary of included studies on mobile phone-enabled applications

	Study	Technology	Sample (N, gender, age)	Intervention Type and Implementation Duration	Method	Measurement Tools	Results
1.	Lefever et al. (2017)	Mobile phone-enabled parent-child interaction app	N = 371 mothers and children MA of mother: 28.91 MA of child: 4.56 (%44 F, %56 M) PCI (traditional): *n* = 113 C-PCI (cell phone supported): *n* = 142 CG: *n* = 116	The study is a mobile phone-assisted version of a parent-child interactions app involving home visits—the intervention aimed to promote positive interactions between parents and children. Mothers received text messages twice daily, five days a week, and at least one phone call between home visits during the intervention.	An experimental model with pre-test, post-test, and control group was used.	Keys to Interactive Parenting Scale, Parent-Child Interactions Checklist, Behavior Rating Scale for Children-2-Parent Report Scale, Child Behavior Rating Scale, Beck Depression Inventory-II	An increase in parental sensitivity, generalization of newly learned parenting skills, decrease in maternal depression, increase in cooperative behaviors in children, and decrease in externalizing behaviors were found.
2.	Bigelow et al. (2008)	Using cell phones to enhance parenting interventions	N = 19 family (mother) *	Planned Activities Education (PAE) is a five-session intervention that aims to improve parent-child	An experimental model with a pretest-	Planned Activities Training Checklist, Parent Satisfaction Survey	Mobile phone-assisted PAE contributed to improvement in

				interactions. Cell phone-supported PAE (CPAE) was used in addition to family home visits. In the process, Family Coaches called at least once between weekly home visits to talk about their use of PAE and interactions with the child, made additional calls when visits were not available, sent text messages to implement PAE strategies twice a day five days a week; about three days a week, parents received an alert about PAT, and on the remaining two days, text messages were sent about fun, free activities in the community, tips and suggestions.	posttest control group was used.		parenting behaviors.

Notes. EG = Experimental Group; CG = Control Group; MA = Mean age; F = Female; M = Male; * = Demographic information was not provided by the authors.

Mobile phone-Supported Applications

Mobile phone-supported applications constitute 9% (n = 2) of the evaluated studies. Table 4 provides a summary of the studies included in the review. (2017) evaluated whether the mobile phone-assisted version (PCI-C) of the Parent-Child Interactions (PCI) intervention improved long-term parenting practices, maternal depression, and children's aggression. Regression analysis was used to evaluate the effectiveness of the interventions. As a result of the study, parenting skills improved in both intervention groups compared to the control group between baseline and 12-month follow-up (β = .403 for PCI; SE = .090; p < .001; Cohen's d = . 58 for PCI-C and β = .259; SE = .090; p = .004; Cohen's d = .352) and decreased maternal depression (β = -.508; SE = .119; p < .001 for PCI-C and β = -.271; SE = .127; p = .033 for PCI-C). Children in the PCI-C group were rated as more cooperative and less aggressive than children in the control group (β = .187; SE = .069; p = .042; Cohen's d = .383).

Bigelow et al. (2008) aimed to develop and test the effectiveness of Planned Activities Training (PAT), a parenting program supported by the use of mobile phones to encourage parents' active participation in-home visits. In CPAT, a cell phone intervention was developed to help parent coaches maintain contact with families throughout the PAT interventions through phone calls between home visits and daily text messages. Across all 19 families participating in the study, the average baseline PAT score was 32%, ranging from 0% to 58%. The average percentage correct after the intervention was 52%, ranging from 11% to 85%. Looking at the intervention results, parents significantly increased their use of PAT in the activities addressed by the intervention. According to parent reports, the PAT intervention greatly improved the interaction between parents and children.

Other Applications

Of the studies, 27% (n = 6) consisted of other applications. Table 5 presents a summary of the included studies. Fujiwara et al. (2020) in Japan, it was investigated whether showing an educational video about the dangers of baby crying, shaking, and choking during home visits by midwives, public health nurses, or trained volunteers in the 2nd month after birth reduces self-reported shaking and choking behaviors in the 4th month after birth. The 11-minute educational video included the characteristics of infant crying, the danger of shaking, a simulation of the anatomical mechanism of shaken baby syndrome using computer graphics and an anatomical baby, the risk of suffocation, and how to respond to crying. At the four-month follow-up (2 months after the training), participants were administered a questionnaire about the video, self-reported shaking and choking behaviors, and other covariates. Parents who watched the video were 74% less likely to shake their babies, 43%

less likely to choke their babies, and 52% less likely to shake or choke their babies. It was concluded that an educational video on infant crying, the dangers of shaking and choking, and the anatomical mechanism of shaking could halve the risk of self-reported shaking and choking by parents when their infants were four months old.

Starting from the idea that perspective-taking (cognitive awareness of another's situation) and the ability to empathize are essential traits in being sensitive, cooperative, and constructive parents that help foster adaptive functioning for children, Hamilton-Giachritsis et al. (2018) used an immersive virtual reality app to put parents in the shoes of a child and aimed to assess its impact on perspective taking and empathy. Mothers virtually appeared in the body of a 4-year-old child, experiencing childhood from a first-person perspective, and virtual and natural body movements were synchronized in the app. Mothers interacted with a mother avatar who responded to them positively or negatively. Participants felt like a child and reported that this enhanced their perspective of being a child. The participants' experience with the negative mother increased their level of empathy, and the negative mother avatar led to increased feelings of fear of violence. The researchers suggested that any improvements in empathy that lead to changes in parenting behavior can potentially influence children's developmental outcomes.

Table 5: Summary of studies on other included practices

	Study	Technology	Sample (N, gender, age)	Intervention Type and Implementation Duration	Method	Measurement Tools	Results
1.	Fujiwara et al. (2020)	Educational video	N = 5961 ≤19- 45⁺ years old EG: *n* = 1634 (1627 F, 7 M) CG: *n* = 4327 (4,295 F, 32 M)	This intervention provided information on infant crying and the correct responses to the infant. An 11-minute training video simulating the anatomical mechanisms of shaking and choking was used in a home visit program to prevent self-reported infant abuse, and parents were allowed to watch the video multiple times.	A quasi-experimental model with a pretest-posttest control group was used.	Participants were administered the video developed by the researchers, a questionnaire about self-reported shaking and choking behaviors and other covariates, and the Edinburgh Postnatal Depression Scale.	It was determined that the training video could prevent physical abuse of infants.
2.	Hamilton Giachritsis et al. (2018)	Immersive virtual reality (IVR)	N = 20 31-47 years old. 20 Mother	With the virtual reality application, mothers interacted with a virtual mother by appearing in the body of a small child so that they could easily empathize with their children. In the first experimental phase (five minutes), the mother's body was replaced with the body of a 4-year-old virtual child. Participants were asked to pause/rest to take primary physiological data in the second phase. In the third phase, the virtual avatar mother responded positively or negatively to the participants. Two days later, the same procedure was followed in the second session.	One group pretest-posttest experimental model was used.	Parenting Scale Inventory, Mind in the Eyes Test of Empathy, Adult Adolescent Parenting Inventory-2, semi-structured interview.	Experiencing negative maternal behavior increased individuals' levels of empathy towards their children.
3.	Ondersma et al. (2017)	Software-supported E-parenting program	N = 413 Mother MA = 23,6	It was developed for use by mothers to draw attention to the main risk factors for early home visits	An experimental model with a pretest-posttest control group was used.	Participant Satisfaction Questionnaire, Working Alliance Inventory-Short Form,	Using the technology tested in the study combined with intensive early home

			EG (Technology supported): N = 142 MA = 23,8 EG (Traditional): *n* = 141 MA = 23,2 CG: *n* = 130 MA = 23,6	to prevent child maltreatment. The program consists of eight 20-minute modules delivered via computer.		Conflict Tactics Scales—Parent–Child version, Edinburgh Postnatal Depression Scale, Alcohol, Smoking, and Substance Involvement Screening Test, HOME scale, and Self-reported maltreatment risk factors were measured.	visiting was ineffective.
4.	Guastaferro et al. (2016)	Digital Frame	N = 4 couples (mother and child at risk of maltreatment) Age of mother: 20-30 years Child: ≤1 year*	The SafeCare PII module on parent-infant interaction teaches mothers to relate to their infants in developmentally appropriate ways and to encourage positive behaviors. A digital picture frame was used to develop the PII module through self-modeling. The sessions ranged from 45 to 90 minutes, depending on the content and mothers' mastery of the skills.	A single-subject experimental model was used.	Daily Activities Checklist, Home Visitor Assessment Form, Parent-Infant Interaction Satisfaction Survey, Digital Frame Satisfaction Survey	The technology used contributed to making the SafeCare PII module more effective. The use of a digital frame increased mother-infant interaction.
5.	Gaskin et al. (2012)	Digital Frame	N = 1 mother with intellectual disability 23 years old	In this study, with the help of the digital framework, the SafeCare® PII module was adapted to the needs of a mother with an intellectual disability, using technology and self-modeling. The study was completed eight weeks after its inception. Follow-up observations were conducted at 1-month, 2-month, and 3-month intervals to evaluate the skills taught.	A single-subject experimental model was used.	Observation-based Home Visitor Evaluation Form.	Digital frame technology made the SafeCare PII module more effective for a mother with an intellectual disability. The SafeCare® PII module with digital frame support effectively increased parent-infant interaction skills.
6.	Calam et al. (2008)	Television series "Driving Mum and Dad Mad" Access via television or the Television Website	N = 723 parents and 723 child (267 girls, 456 boys) GPE 1 Great Parenting Experiment I):*n* = 453 Child MA: 2-9 yaş GPE 2 (Great Parenting Experimen II): *n* = 270 Child MA: 2-10 years.	Driving Mum and Dad Mad is a television program about five families participating in Triple P. Group Triple P is an 8-week course consisting of 4 × 2-hour sessions, three weeks of 30-minute phone calls, and a final 2-hour group. GPE1 had six episodes and lasted 30 minutes, while GPE2 had five episodes and lasted 60 minutes.	A pre-test-post-test full experimental model was used.	Family Background Questionnaire, Eyberg Child Behavior Inventory, Parenting Scale, Parental Anger Inventory, Parental Problem Checklist, Parenting Tasks Checklist, Depression Anxiety Stress Scale, Relationship Quality Index	Significant improvements were found in their children's behavior, dysfunctional parenting, parental anger and depression, and self-efficacy.

Notes. EG = Experimental Group; CG = Control Group; MA = Mean age; F = Female; M = Male; * = Demographic information was not provided by the authors.

Ondersma et al. (2017) developed eight 20-minute computer-assisted modules for mothers to use during early home visits (EHV) to prevent child maltreatment. The e-parenting program was designed to focus on key maltreatment risk factors using evidence-based intervention approaches. The study used general linear model F-tests to assess differences between groups. All maltreatment risk factor outcomes were analyzed using generalized linear mixed model growth curve analyses. Follow-up at 6 months ($t(281) = -0.68$, $p = .497$) and 12 months ($t(281) = -0.453$, $p = .651$. The results showed that the technology tested in this study was not an effective supplement for ongoing, intensive EHV ($p > .05$).

SafeCare is an evidence-based parent education program for families with children up to five years old that reduces child maltreatment - especially neglect - through structured behavioral skills training during weekly home visits. The SafeCare parent-infant interaction (PII) module, the focus of this research, teaches mothers to engage with and encourage their infants in developmentally appropriate ways to increase positive attachment behaviors such as looking, talking, touching, and smiling. A digital picture frame is a tool used to enhance the PII module through self-modeling (Guastaferro et al. 2016). To better understand the effectiveness of digital picture frames in improving parenting skills, Guastaferro et al. (2016) investigated the effectiveness of a technological enhancement to the PII module (PII+) with the participation of multiple mothers with different risk levels for child maltreatment. Frames based on self-modeling include photographs of mother-infant pairs representing the desired behaviors in the PII module of SafeCare. In this study, participants' skills were assessed by observations of home visitors. Results showed that the percentage of emergence of positive skills observed in both the standard PII and enhanced PII+ conditions increased with the implementation of the intervention, and the PII+ intervention maintained the skills learned during the 1-month follow-up. At the same time, PII+ was useful for parents trying to practice skills regardless of risk level.

Gaskin et al. (2012) conducted a study on adapting the SafeCare® parent-infant interactions (PII) module for a mother with intellectual disabilities using a digital picture frame. They worked with a mother and her infant with disabilities to examine the potential effectiveness of the program and the ease of implementation. A skills-oriented multiple-probe design was used to evaluate the module's effectiveness. In the study, the mother had a skill increase of over 83% from baseline in physical skills. After the training was completed, the mother continued to show improvement in the skills she was trained in and demonstrated 100% physical skills and 83% non-physical skills. At the 3-month follow-up, 90% and 88.75% increase in physical and non-physical skill sets were observed. The adapted SafeCare® PII module with digital framework support contributed to improving parent-infant interaction skills in this study.

Calam et al. (2008) aimed to examine the relationship between parent characteristics, child variables, and program outcomes in a sample of parents who watched the TV series "Driving Mum and Dad Mad" about families participating in the Triple P Positive Parenting Program. This program teaches parents the interventions they should apply in preventing and reducing their children's emotional and behavioral problems, encourages positive parenting skills, and determines the program's effectiveness. In the program, which was divided into two groups, standard and advanced, the traditional group only received e-mails from watching the series. In contrast, the group in the advanced program received a workbook on parenting, web pages, audio and video messages, and watching the series. In the study, a t-test was conducted to compare the scores of the outcome measures from baseline to post-intervention and from baseline to follow-up. As a result of the study, parents in both groups were found to have higher scores in their children's behavior ($t = 9.626$, $df = 227$, $p < .001$), dysfunctional parenting behaviors ($t = 12.520$, $df = 220$, $p < .001$), parental anger (($t = 11.403$, $df = 200$, $p < .001$) and depression ($t = 4.339$, $df = 209$, $p < .001$), and self-efficacy beliefs ($t = –14.634$, $df = 222$, $p < .001$). In the 6-month follow-up of the study, it was observed that the improvements continued. Researchers emphasized that media interventions used in parenting programs can be a useful tool to reach families who have difficult access to child maltreatment prevention programs.

Discussion

This review examined all pretest-posttest controlled studies focusing on technologically based interventions for the prevention of child abuse and neglect. The 22 included studies tested five main categories of technological interventions: web/internet-based, hybrid, mobile, cell phone-enabled, and other. Most of the identified studies were web/internet-based applications (Al-Dabaan et al. 2016, Baggett et al. 2017, Delaney et al. 2012, Gülırmak and Orak 2020, Kenny 2007, Mast et al. 2014, Müller et al. 2014, Rheingold et al. 2015, van Rosmalen-Nooijens et al. 2017). One important reason for this may be that the Internet offers many opportunities for parents to provide parenting support (Nieuwboer et al. 2013), and the use of telehealth may facilitate greater access to

services for parents who may face significant barriers in many areas, including geographical distance, transportation problems and access to childcare (Fogarty et al. 2022).

When the studies are examined, it is seen that mobile phone applications are also used in training and face-to-face applications. For example, Lefever et al. (2017) and Bigelow et al. (2008) included cell phone applications in the intervention process; they worked with parents and their children. These new applications contributed to the improvement of the existing intervention process. The addition of mobile phone apps to parenting interventions is beneficial in that it encourages repetition - that is, practice - and generalization of recently learned skills, facilitates more frequent communication between parents and intervention staff, and provides a quick and reliable way to schedule intervention visits (Lefever et al. 2017). At the same time, it can be argued that cell phone apps also serve as reminders and reinforcers. It is thought that the messages and calls received for the implementation of parenting interventions contributed to the increase in the frequency of interventions, and more frequent feedback from parent coaches in the process was reinforcing to maintain appropriate behaviors. This may be more useful for individuals who are external control-oriented and in need of social support. However, no definite opinion can be reached due to the limited number of studies on this subject and the lack of data collection or comparison of these variables in the relevant studies. On the other hand, it has been determined in previous studies that hybrid practices used to prevent abuse contribute to the cognitive and behavioral development of individuals (Kang et al. 2020, Schein et al. 2022, Şenol and Üstündağ 2021). Hybrid applications are also seen as appropriate tools in terms of usefulness as they increase accessibility to training. Integrating the programs used in preventing abuse with a hybrid application to improve their practical use in daily life can increase the efficiency of training programs with increased accessibility using both mobile technology and the Internet (Kang et al. 2020). In the studies conducted, it is thought that using technological applications together helps increase their effectiveness by encouraging individual participation.

The use of a television series in one of the parenting program studies evaluated (Calam et al. 2008) is an example of the selection of television as a useful intervention tool to which the public is interested and has the most access. Considering these examples, it is essential to consider the interest of the target group and the ease of access to the intervention for education to prevent abuse effectively. On the other hand, in the studies examined, virtual reality application, one of the innovative technologies, can facilitate the integration of individuals with children's bodies, changing their perspectives and facilitating empathy with their children (Hamilton-Giachritsis et al. 2018). Individuals more empathetic towards their children may tend to avoid negative behaviors. Another innovative practice is using digital frames to improve parenting skills (Gaskin et al. 2012, Guastaferro et al. 2016). Digital frames are based on parents developing their parenting skills by modeling themselves through photographs. It is stated in related studies that digital frames can be used as tools to help prevent child abuse and neglect by increasing parent-infant interactions because they are cheap and straightforward to use but effective.

Another important finding of this study is that most of the studies examined were conducted with only parent samples (Bigelow et al. 2008, Fujiwara et al. 2020, Gaskin et al. 2012, Gülırmak and Orak 2020, Hamilton-Giachritsis et al. 2018, Mast et al. 2014, Ondersma et al. 2017, Rheingold et al. 2015, Schein et al. 2022, Şenol and Üstündağ 2021). It can be said that including parents in the program and keeping them in the program is one of the strategies primarily targeted in prevention studies in the success of prevention programs (Calam 2008). Indeed, parenting programs have positive effects in low-, middle- and high-income countries, and the implementation of these programs as primary, secondary, or tertiary interventions is effective in reducing child maltreatment (Chen and Chan 2015). Protective factors and family strengths minimize the risk of child abuse and neglect (Ridings et al. 2016). On the other hand, parents' misperceptions and negative attitudes towards child abuse and neglect can be changed through comprehensive education programs that are implemented at regular intervals and appropriate to the educational level of individuals (Keser et al. 2010).

In the studies reviewed, it was observed that technological applications were used through home visits (Bigelow et al. 2008, Fujiwara et al. 2020, Gaskin et al. 2012, Guastaferro et al. 2016, Lefever et al. 2017, Ondersma et al. 2017, Schein et al. 2022). Home visiting programs support positive parenting in populations at risk of child maltreatment (Lefever et al. 2017). However, during the COVID-19 pandemic, home visiting services for families with young children continued to provide services virtually (Schein 2022). Thus, there has been an increase in the use of technological applications for home visits. The addition of technological interventions to routine home visits contributes to the participation of participants in the programs. Thus, parents with high participation rates benefit more from programs and information.

In some of the studies evaluated, it is seen that support was received from experts and students from different branches. For example, studies conducted with childcare professionals (Rheingold et al. 2015), dentists (Al-

Dabaan 2016), and counseling students (Kenny 2007) are essential in terms of involving professionals in the prevention process. On the other hand, the sensitivity of professionals working with children and families is key for early identification of child maltreatment (Cracamo et al. 2021). Informing professionals and students about the risks, causes, and consequences of child maltreatment, protective factors, and available support services is important because primary prevention aims to raise awareness and educate the public (Rantanen et al. 2022).

Delaney et al. (2012) compared the effectiveness of online and classroom versions of a widely used pre-service training program for prospective foster parents. They found that online training was more effective than classroom training. Children in foster care often experience early traumas that significantly affect their neurobiological, psychological, and social development (Kemmis-Riggs et al. 2017). At this point, it is thought that providing preliminary information to prospective foster parents about child maltreatment, abuse, and neglect will be effective in preventing children's traumatic experiences due to abuse, and more accessible online accessibility of the training and flexible hours for participation will contribute to parents to benefit more from the training.

Technology-supported applications used in the reviewed studies effectively prevented abuse and neglect, except for one study (Ondersma et al. 2017). In Ondersma et al.'s (2017) study, the software-supported e-parenting program used in addition to the home visits program did not contribute to increasing the effectiveness of the current practice but did not reduce child maltreatment. Apart from the abovementioned study, other studies suggest using different technologies to improve home visiting programs. In this review, it was observed that three studies were only piloted (Delaney et al. 2012, Gaskin et al. 2012, Mast et al. 2014). In order to prove the effectiveness of these applications, there is a need for more applications by improving the sample size.

The results of this review should be interpreted within the framework of various limitations. This review specifically focused on studies that included the measurement of the effectiveness of technology-based interventions for the prevention of child maltreatment, abuse, and neglect. There were 22 publications that met the eligibility criteria for this review, and there was heterogeneity among the studies regarding methodology and results. Due to the limited number of studies identified and differences in reported statistics, a quantitative synthesis of the findings of the studies selected for this review is not possible, and therefore, this study does not quantitatively present the effects of prevention interventions. As a second limitation, a literature review was conducted by applying a language filter in English and Turkish; therefore, essential findings in other languages may have been missed. Finally, although this review shows that the use of technological applications is effective in preventing child abuse and neglect, technological applications with incomplete implementation processes could not be included in the review study, and therefore, some of the new specialized tools that are developing rapidly every day may have been overlooked.

Conclusion

This review provides insight into programs that have been tested for their effectiveness in preventing and responding to child abuse and neglect and shows a growing interest in technological applications for prevention. The available findings suggest that technology-assisted programs provide generally acceptable support for preventing child abuse and neglect. However, data supporting the use of such programs in prevention strategies and preventive practices is limited. Further studies are needed to test the effectiveness of new technologies in preventing abuse and neglect for children.

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