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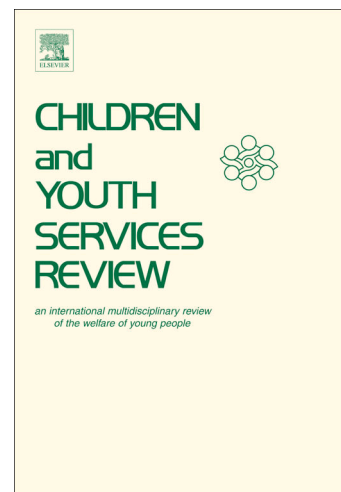
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**Online Parenting Support: Meta-Analyses of Non-Inferiority and Additional
Value to In-Person Support**

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Declarations of Interest

None of the authors declare conflicts of interest.

Ethical Considerations

This study was carried out in accordance with the European Cooperation in Science and Technology Association policy on inclusiveness and excellence, as written in the Memorandum of Understanding 104/18 for the implementation of the COST Action ‘The European Family Support Network. A bottom-up, evidence-based and multidisciplinary

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CRedit

PL: Conceptualization, Methodology, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Project administration, Funding acquisition; KR: Methodology, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing; OD: Writing – Original Draft, Writing – Review & Editing; BKA: Investigation, Funding acquisition, Writing – Review & Editing; MA: Investigation, Writing – Review & Editing. RK: Investigation, Writing – Review & Editing; ACC: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing.

Abstract

Parenting support to enhance parent and child mental health is increasingly offered on websites, apps, and through videocall. This development raises the question of how online parenting support compares to traditional in-person parenting support. Is online support non-inferior to traditional in-person support? Or should online support be used as a supplement to in-person support? In the COST Action EurofamNet (CA18123), we sought to answer these questions by systematically searching for randomized trials comparing online to in-person parenting support (Study 1) and trials comparing in-person parenting support augmented with online support elements to in-person parenting support only (Study 2). We registered our review in PROSPERO (CRD42022354393) and searched PsycINFO, MEDLINE, Web of Science, and Cochrane in May 2022. Our outcomes of interests were children's mental

health, parenting practices, parental mental health, and parents' satisfaction with the program. For Study 1, multilevel meta-analysis of seven eligible randomized trials (101 effect sizes; $N = 957$) showed consistent non-inferiority of online support and a trend that parents were more satisfied with online support. For Study 2, narrative synthesis of two eligible trials ($N = 279$) suggests that adding online support elements to in-person support can improve program satisfaction and short-term benefits, but does not contribute significantly to program benefits above and beyond in-person support. Our findings suggest that, provided appropriate online formats and sufficient guidance from professionals, online parenting support is non-inferior to in-person support. The additive value of online support elements to in-person support seems limited, but may still be meaningful. Future research should identify the circumstances under which parents prefer, and benefit more from, in-person versus online parenting support.

Keywords: ONLINE PARENTING SUPPORT; META-ANALYSIS; SYSTEMATIC REVIEW; E-HEALTH; PARENT MENTAL HEALTH; CHILD MENTAL HEALTH

1. Introduction

Evidence accumulates that parenting support to optimize parenting practices and parent and child mental health can be successfully delivered online (Canário et al., 2022; Thongseiratch et al., 2020). This evidence comes from across continents (e.g., Awah et al., 2022; Thongseiratch et al., 2020), target populations (e.g., parents of children with conduct problems, Enebrink et al., 2012; or anxiety, Morgan et al., 2017; and parents with mental health problems, Jones et al., 2014), outcomes (e.g., parent and child mental health; Thongseiratch et al., 2020), and delivery modes (e.g., websites, Enebrink et al., 2012; apps, Garfield et al., 2016). Most evaluation studies have compared online parenting support to a passive control condition (i.e., no intervention, waitlist, or minimal intervention such as factsheets; e.g., Baker et al., 2017; Sim et al., 2020). Much less is known about how online parenting support compares to traditional in-person support. Can we safely replace in-person with online parenting support? Or should online support be used as a supplement to in-person family support? We conducted two studies based on a systematic literature review to shed light on how online parenting support compares to its in-person counterpart.

Parenting programs are widely used to optimize parenting practices in order to improve parent and child mental health. For example, the World Health Organization (WHO) recommends parenting programs to reduce parental violence against children (WHO, 2016) and established guidelines recommend parenting programs as the primary strategy to reduce children's behavioral problems (Weisz & Kazdin, 2017). Parenting programs typically include psychoeducation for parents on typical and atypical child development and guide parents' efforts to enhance parent-child relationship quality and redirect children's behavior through parental modeling, differential attention, and non-violent disciplining (Kaehler et al., 2016; Leijten et al., 2019). The effectiveness of parenting programs to improve parent and

child outcomes has been established in hundreds of randomized trials (Backhaus et al., 2023) and dozens of meta-analyses (Mingebach et al., 2018).

Parenting programs are increasingly delivered online and this has only increased during the Covid-19 pandemic (De Witte et al., 2021). The format of online programs varies greatly. Some programs are delivered through videocall but resemble traditional in-person programs in other respects. This has been done successfully with both group and individual programs (Canário et al., 2021; Comer et al., 2017). Other programs are primarily self-directed, using online web portals (Enebrink et al., 2012), tablets (Breitenstein et al., 2016), apps (UNICEF ECARO, 2021), or podcast series (Morawska et al., 2014). These formats can include varying degrees of professional guidance. Dozens of trials and multiple meta-analyses consistently show that online parenting support programs with various formats are superior to passive controls (Spencer et al., 2020; Thongseiratch et al., 2020).

Studying non-inferiority is a critical next step in our understanding of the extent to which online parenting programs are a good alternative to traditional in-person programs. Non-inferiority analysis examines whether alternative programs that are perhaps easier to administer or less costly than established programs, are not less effective than these established programs (Angeli et al., 2010). Non-inferiority analysis of online parenting programs thus tests whether programs can be delivered online instead of in-person without compromising on program effectiveness.

On the one hand, there are reasons why online parenting support may be inferior to in-person support. First, one of the hypothesized core elements of effective professional psychosocial support is the relationship that clients develop with their professional (Wampold, 2015). It may be more difficult to develop such a relationship in an online environment and some online programs do not include any contact with professionals (e.g., Piotrowska et al., 2019). Second, many in-person programs are delivered in groups. One main

reason for this is that exchanging experiences and peer support may be a powerful mechanism to normalize parents' concerns and as a result strengthen parents' feelings of self-efficacy and ability to guide children's behavior effectively (Webster-Stratton, 2001).

Although some online parenting programs are offered in groups (e.g., Canário et al., 2021) most of them are offered individually (Thongseiratch et al., 2020). Third, evidence suggests that practicing new parenting techniques, for example in roleplay, more effectively changes parenting practices than only reading about or discussing new parenting techniques (Knapp, & Deluty, 1989). Practicing techniques may be more difficult online and with less or no direct support from a professional or other parents.

On the other hand, there are reasons why online parenting support may not be inferior to in-person support. First, online support tends to be flexible (Canário et al., 2022), potentially increasing access, engagement, adherence, and benefit. Second, evidence from other mental health fields suggests that the same levels of alliance can be reached in online and in-person interventions (e.g., Arnedt et al., 2021). If the same holds for parenting support, this reduces the likelihood that online support is inferior to in-person support. Third, anonymity increases self-disclosure (i.e., the online disinhibition effect; Suler, 2014). Because online environments may increase parents' anonymity, or at least their perceptions thereof, they may be more likely to disclose parenting difficulties, which could perhaps improve their program benefits.

Because of the pros and cons of each delivery method (i.e., in-person and online), it may be that combining the two delivery methods in one intervention optimizes intervention effects. In such a combined intervention, parents can reap the benefits from in-person support by professionals, but also benefit from the additional support provided online. There is evidence, for example, that adding online support elements to in-person parenting program increases parental engagement in the program, such as higher rates of homework compliance

(Jones et al., 2021). Such increased engagement might be one mechanism through which online support elements result in increased effectiveness, as more engagement is known to predict better program outcomes (Berry et al., 2022).

In sum, we will examine whether online parenting support programs are non-inferior to their in-person counterparts (Study 1) and whether adding online parenting support elements increases the effects of in-person parenting support programs (Study 2). We will examine this for (i) children's mental health, (ii) parenting practices, and (iii) parental health, because these are the main targets of most parenting programs. In addition, we will examine (iv) parents' satisfaction with the programs because if two types of therapy are equally effective, parental preference becomes leading in decision making.

This study is part of the work of Working Group 3 of the COST Action 'The European Family Support Network. A bottom-up, evidence-based and multidisciplinary approach' (EurofamNet; <https://www.cost.eu/actions/CA18123/>). Earlier work by this Action indicated the increased use of online family support in Europe (Canário et al., 2022). With the present study we hope to provide more insight into the extent to which online family support can safely replace traditional in-person family support.

A better understanding of how online parenting support compares to in-person parenting support will also shed light on the extent to which key 'common elements' such as therapeutic alliance (Wampold, 2015) can be maintained in online intervention, and can guide decision making by policy makers and professional on when and how to use online parenting support as an alternative or supplement to in-person parenting support (Leijten, 2023). We included any type of parenting programs for any type of outcome, but given the dominance in the field of parenting program to reduce disruptive child behavior, we expected the majority of trials to focus on subclinical or clinical settings for disruptive child behavior.

2. Study 1: Non-Inferiority of Online Parent Support

The goal of this study was to test if online parenting support is non-inferior to in-person support in terms of reducing child mental health problems, improving parenting practices, parent mental health, and parents' satisfaction with the program. This study is a follow-up of a systematic review preregistered on PROSPERO (CRD42022354393), designed to identify the optimal combination of content for online parenting programs, and follows PRISMA guidelines (Page et al., 2021).

2.1 Methods

2.1.1 Eligibility criteria

In terms of PICOS, we sought to identify studies that included (i) parents of children with a mean age ranging between 2 and 12 years old (population) and evaluated (ii) an online parent support program (intervention) against (iii) an in-person parent support program (comparison). Parent support was defined as more than 50% of the program targeting parenting practices with the goal to improve children's mental health. Online delivery was defined as offering more than 50% of the program content online; in-person delivery was defined as offering more than 50% of the program content in-person. We examined program effects on (iv) child and parent mental health, parenting practices, and parents' satisfaction with the program (outcome) as evaluated in (v) randomized controlled trials (study type). We excluded trials on children with severe physical disabilities or medical illnesses such as brain injury or cancer ($n = 28$). We also excluded trials that compared online programs against a control condition, because these effects have been extensively reviewed elsewhere (e.g., Thongseiratch et al., 2020).

2.1.2 Information sources, search strategy, and selection process

We updated the systematic literature search strategy by Thongseiratch et al. (2020). In May 2022, we searched for randomized trials of online parent support programs in PsycINFO, MEDLINE, and Web of Science. We used key words relating to (i) parenting

(e.g., mother, father, family), (ii) support (e.g., intervention, program, coaching) and (iii) online delivery (e.g., digital, internet, e-health). Finally, we examined the reference lists or relevant systematic reviews and of identified primary studies. Appendix A includes our full search string. Titles and abstracts of 10% of the unique reports were screened in Rayyan (Ouzzani et al., 2016), independently by [first author initials blinded for review] and [last author initials blinded for review] to identify potentially eligible studies (97% overlap; disagreements resolved through discussion). All full-texts of these potentially eligible studies were independently assessed for meeting the criteria by [fifth author initials blinded for review] and [last author initials blinded for review] (88% overlap; disagreements resolved through discussion).

2.1.3 Data collection process and items

For each study, we extracted information regarding (i) general study characteristics (e.g., year of publication, whether the trial was preregistered); (ii) intervention characteristics (e.g., whether the intervention was implemented for universal prevention, selective prevention, indicated prevention, or treatment purposes); (iii) sample characteristics (e.g., children's age, parental socioeconomic status and ethnicity); and (iv) standardized mean differences between conditions (i.e., sample size, means, and standard deviations for each outcome) for four outcome categories: child mental health (i.e., symptoms of internalizing or externalizing problems), parent mental health (i.e., symptoms of stress and DSM-V disorders), adequate parenting practices (i.e., parenting behavior known to predict child mental health; parenting behavior known to predict ill mental health were included and their standardized mean difference was reversed), and parental satisfaction with the program (i.e., indicators of usefulness and contentment). All data items were coded by [first author initials blinded for review] and [second author initials blinded for review] with excellent reliability (86% to 100% agreement; mean per item 97%).

2.1.4 Effect measures and synthesis methods

We used standardized mean difference as our effect size, calculated by subtracting post-intervention means in the in-person support condition from post-intervention means in the online support condition, divided by the pooled post-intervention standard deviation. Standardized mean differences are expressed as Cohen's d and reflect the number of standard deviations of increase in the outcome in the online parenting support condition relative to the in-person parenting support condition. We included all relevant effect sizes and dealt with their dependency by conducting multilevel meta-analysis in R (2022.07.2), using the metafor package (Viechtbauer, 2010).

Non-inferiority analysis requires setting a non-inferiority margin for the experimental intervention (i.e., online parenting support) versus the active comparator (i.e., in-person parenting support) (Trone et al., 2020). We used a non-inferiority margin of $d = 0.24$, which corresponds to 50% of the mean effect size of $d = 0.47$ (95% CI [0.55, 0.40]) of 156 randomized trials of primarily in-person parenting support versus primarily passive controls on children's mental health (Leijten et al., 2019). We decided on this margin for the following four reasons. First, $d = 0.24$ has been suggested as the minimal difference that is clinically meaningful for mental health (Cuijpers et al., 2014). Second, using a 50% margin is common for therapy non-inferiority analysis (Althunian et al., 2017). Third, our margin fits the non-inferiority margins proposed for psychotherapy research (i.e., $d = 0.24$ to 0.60; Steinert et al., 2017). Fourth, our margin is similar to the margin used by one of the trials in this study, suggesting it is in line with common practice in this field (Dadds et al., 2019). One other trial used a margin of 20% between conditions (Prinz et al., 2021). The remaining trials did not use a non-inferiority margin and used statistical significance instead.

We conducted three sensitivity analyses to test the robustness of our findings. First, we tested if findings were different if we only included trials in treatment settings (rather than

also trials in prevention settings). Second, we tested if findings were different if we specifically examined longer-term intervention effects (rather than also immediate intervention effects), to examine the sustainability of the effects of online support. Third, we tested if findings were different if we excluded parent-reports, because these may be biased based on parents perceived, rather than actual, effectiveness of the programs. To limit the number of statistical tests, we initially conducted sensitivity analyses for child mental health only and explored them further for other outcomes only in case of evidence for meaningful changes to the original findings.

2.1.5 Risk of bias and certainty assessment

We assessed study risk of bias using the Cochrane risk of bias tool 2.0 (Sterne et al., 2019). Reporting bias was assessed by comparing reported outcomes to preregistered outcomes. We assessed publication bias by visually examining a funnel plot symmetry for intervention effects on child mental health, the ultimate target of most programs. We assessed certainty of evidence using GRADE (Guyatt et al., 2011). In GRADE, evidence from randomized controlled trials starts at high quality and can be lowered in the case of serious risk of bias, inconsistency in findings between trials, indirectness of evidence, imprecision in findings, and publication bias.

2.2 Results

2.2.1 Study selection and characteristics

Our systematic literature search yielded 6,722 unique hits (Figure 1). Seven studies, reported in six peer-reviewed articles, met inclusion criteria (Table 1). The majority of studies were conducted in the United States (Comer et al., 2017; DuPaul et al., 2018; Farris et al., 2013; Prinz et al., 2022), one in Sweden (Ghaderi et al., 2018), and one in Australia (Dadds et al., 2019). All studies evaluated programs to reduce disruptive child behavior. Three studies compared online to in-person parent support in the context of treatment, with

children with disruptive child behavior problems referred to outpatient psychiatric clinics; four studies compared online to in-person parent support in the context of indicated prevention, with children showing elevated levels of disruptive behavior problems. Programs implemented in treatment contexts were delivered through videocall; programs implemented in indicated prevention contexts were delivered through web portals, with at least some form of therapist support.

All but one study compared online to in-person versions of the same program; Ghaderi et al. (2018) compared the online iComet program to the in-person Family Check-Up program. Although different ‘brands’ were evaluated (e.g., *Parent-Child Interaction Therapy*, *Triple P*, *Adventures in Parenting*), all programs were based on social learning theory principles, teaching strategies to reduce disruptive child behavior using relationship enhancement techniques, rule setting and clear instructions, and positive reinforcement and non-violent disciplining (Kaehler et al., 2016).

The majority of studies included primarily younger children (2 to 9 years), but Dadds et al. (2019; Study 2) and Ghaderi et al. (2018) also included early teens. Three trials were pre-registered (Dadds et al., 2019, Study 1 and Study 2; DuPaul et al., 2018). Most trials (72%) included blinded outcome assessors and all but one (Farris et al., 2013) included later follow-up assessments, ranging 12 weeks (Dadds et al., 2019) to 2 years (Ghaderi et al., 2018) post intervention.

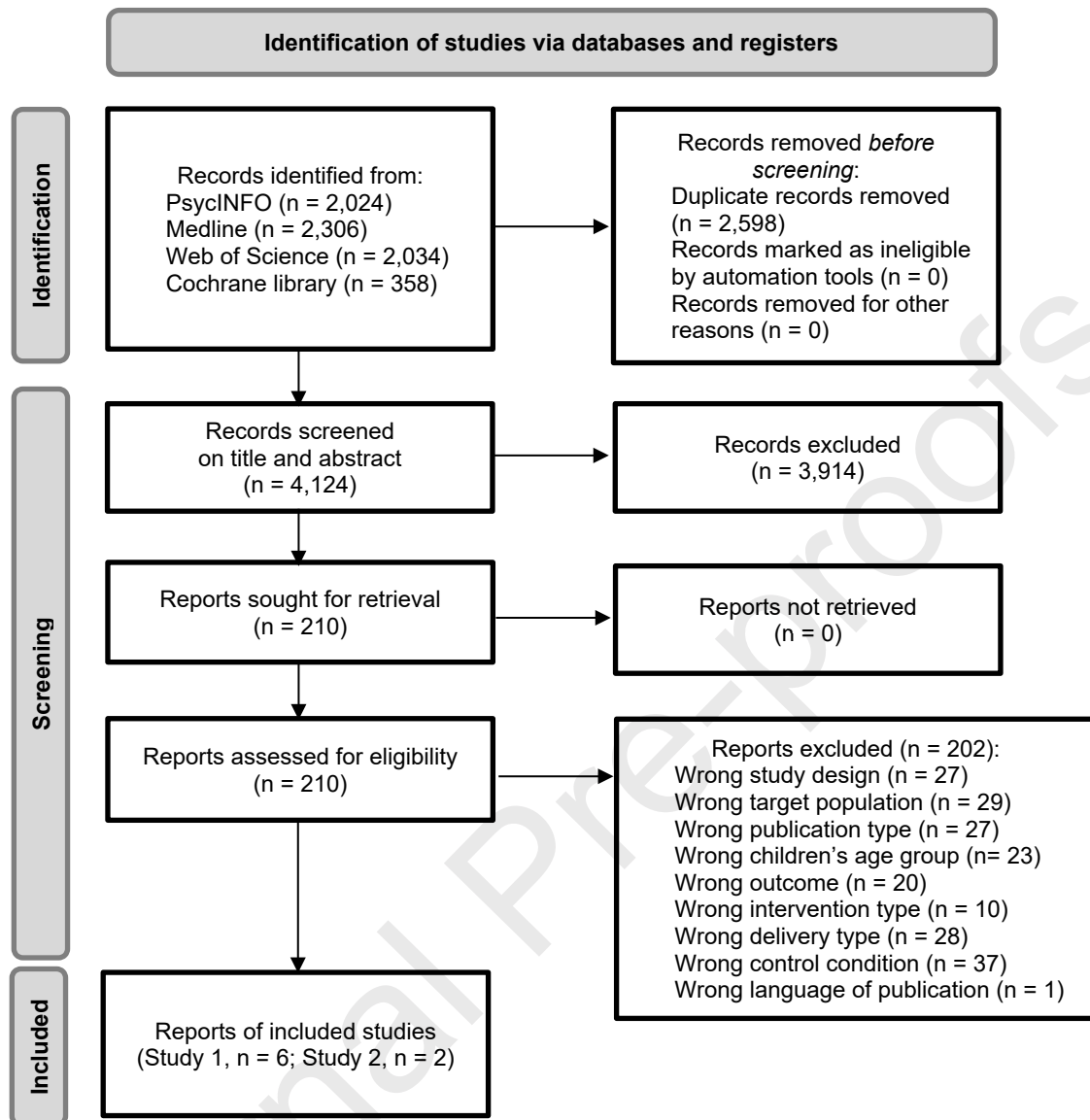


Figure 1

Flow Chart of Included Reports in Study 1 and Study 2

Study	In-person program	Online program	Online delivery method	Prevention or treatment	N	Child age	Outcome
Comer et al (2017)	Parent-Child Interaction Therapy (individual)	I- Parent-Child Interaction Therapy	Videocall	Treatment	40	3–5 yrs	Child mental health (<i>ECBI; CBCL-Externalizing; CGAS; CGI-severity</i>) Parent satisfaction (<i>CSQ; TAI</i>)
Dadds et al (2019) Study 1	Integrated Family Intervention (individual)	AccessEI	Videocall	Treatment	133	3–9 yrs	Child mental health (<i>SDQ; Conners Oppositional; DISCAP diagnosis ODD/CD</i>) Parent mental health (<i>BSI depression/anxiety</i>) Parent satisfaction (<i>contentment</i>)
Dadds et al (2019) Study 2	Integrated Family Intervention (individual)	AccessEI	Videocall	Treatment	73	3–14 yrs	Child mental health (<i>SDQ; Conners Oppositional; DISCAP diagnosis ODD/CD</i>) Parent mental health (<i>BSI depression/anxiety</i>)

							Parent satisfaction (<i>contentment</i>)
DuPaul et al (2018)	Behavioral Parent Training (group)	Behavioral Parent Training	Website + weekly phone calls	Indicated prevention	47	3–5 yrs	Child mental health (<i>Conners mood/affect, defiant/aggressive, inattention/overactivity</i>) Parent mental health (PSI) Parent satisfaction (<i>IRP</i>)
Farris et al (2013)	Adventures in Parenting (group)	Adventures in Parenting	Website	Indicated prevention	99	2 yrs	Parent mental health (<i>SC-90-R</i>)
Ghaderi et al (2018)	Family Check-Up (individual)	iComet	Website + autogenerated feedback	Indicated prevention	231	10–13 yrs	Child mental health (<i>SDQ; DBDRS</i>) Parenting practices (<i>PKMS control and solicitation; ACRS warmth and conflict</i>)
Prinz et al (2021)	Standard Level 4 Triple P (individual)	Online Triple P	Website + weekly phone calls	Indicated prevention	334	3–7 yrs	Child mental health (<i>ECBI; CADBI opposition, hyperactivity, conduct problems; observed disruptive behavior</i>) Parenting practices (<i>observed positive and aversive parenting</i>)

Note. ACRS = Adult-Child Relationship Scale; BSI = Brief Symptom Inventory; CADBI = Child and Adolescent Disruptive Behavior Inventory; CBCL = Child Behavior Checklist; CGAS = Children's Global Assessment Scale; CGI = Clinical Global Impression; CSQ = Client Satisfaction Questionnaire; DBDRS = Disruptive Behavior Disorders Rating Scale; DISCAP = Diagnostic Interview Schedule for Children Adolescents and Parents; ECBI = Eyberg Child Behavior Inventory; IRP = Intervention Rating Profile; PKMS = Parental Knowledge and Monitoring Scale; PSI = Parent Stress Index; SDQ = Strengths and Difficulties Questionnaire; TAI = Therapy Attitude Inventory.

Table 1

Studies and Their Main Characteristics Included in Study 1

2.2.2 Main Results

Online parenting support was non-inferior to in-person parenting support in reducing children's overall mental health problems ($d = 0.02$; 95% CI $[-0.08, 0.12]$), parents' mental health problems ($d_{\text{mental health}} = -0.05$; 95% [CI $-0.32, 0.22]$), and in improving parenting practices ($d = -0.04$; 95% CI $[-0.11, 0.02]$) (Table 2). There was a trend that parents were more satisfied with online parenting support ($d_{\text{satisfaction}} = 0.32$; 95% CI $[-0.15, 0.79]$), but the difference between online and in-person support was not significant. The only outcome where non-inferiority could not be concluded was children's internalizing problems. The differential effect on this outcome was similar to that of other child and parent mental health outcomes ($d = 0.03$), but estimated effects on this outcome had a wide confidence interval (95% CI $[-0.29, 0.35]$) that included both -0.24 and 0.24 . This wide confidence interval is probably caused by the small number of studies ($n = 2$) and effect sizes ($k = 7$).

Sensitivity analyses show that the non-inferiority of online parenting support to reduce children's overall mental health problems holds in treatment settings (3 trials; 22 effect sizes; $d = -0.08$; 95% CI $[-0.25, 0.08]$), for longer-term effects (5 trials; 35 effect sizes; $d = 0.03$; 95% CI $[-0.11, 0.17]$). The differential effect was similar for blinded outcomes (5 trials, 25 effect sizes; $d = -0.002$; 95% CI $[-0.33, 0.32]$), but inconclusive because its 95% CI includes both -0.24 and 0.24 .

	SMD	95% lower bound	95% upper bound	Non-inferior
Child mental health problems	0.02	-0.08	0.12	Yes
Child externalizing problems	0.02	-0.15	0.18	Yes
Child internalizing problems	0.03	-0.29	0.35	Inconclusive
Adaptive parenting practices	-0.04	-0.11	0.02	Yes
Parent mental health problems	-0.05	-0.32	0.22	Yes
Parental satisfaction with the program	0.32	-0.15	0.79	Yes

Note. Positive values indicate stronger increases (or weaker reductions) in in-person support relative to online support; SMD = standardized mean difference.

Table 2

Non-inferiority of Online Parent Support Compared to In-person Parent Support

2.2.3 Risk of bias and certainty assessment

Risk of bias was low for most criteria for most trials. However, the randomization process was not always described in detail (e.g., Comer et al., 2017) and for the preregistered trials (Dadds et al., 2019; Ghaderi et al. 2018), the trial registries included outcome measures that were not reported in the papers, suggesting potential reporting bias. Selective reporting bias for the remaining trials was coded as unclear. Several other study characteristics, however, resulted in less risk of bias than typically seen in parenting program evaluation trials. Using two active conditions, rather than a parenting program condition and a passive control condition, reduced the likelihood that parents were aware of any study hypotheses that may have impacted their perceptions and assessments. In addition, the majority of trials (57%) included blinded outcomes. Overall, we conclude that there was no evidence of serious risk of bias.

Visual inspection of the funnel plot (Figure 2) showed no evidence for publication bias. Distribution of effect sizes was fairly symmetrical. Most effect sizes fell in the funnel; effect sizes falling outside the funnel did so symmetrically.

Certainty of evidence was high, based on the randomized controlled designs, relative low risk of bias, consistency in findings between trials (i.e., all individual trials conclude non-inferiority for most or all outcomes) directness of evidence, and no evidence for publication bias. However, findings were relatively imprecise, as indicated by their generally wide confidence intervals. This may be due to the relatively small numbers of trials and effect sizes.

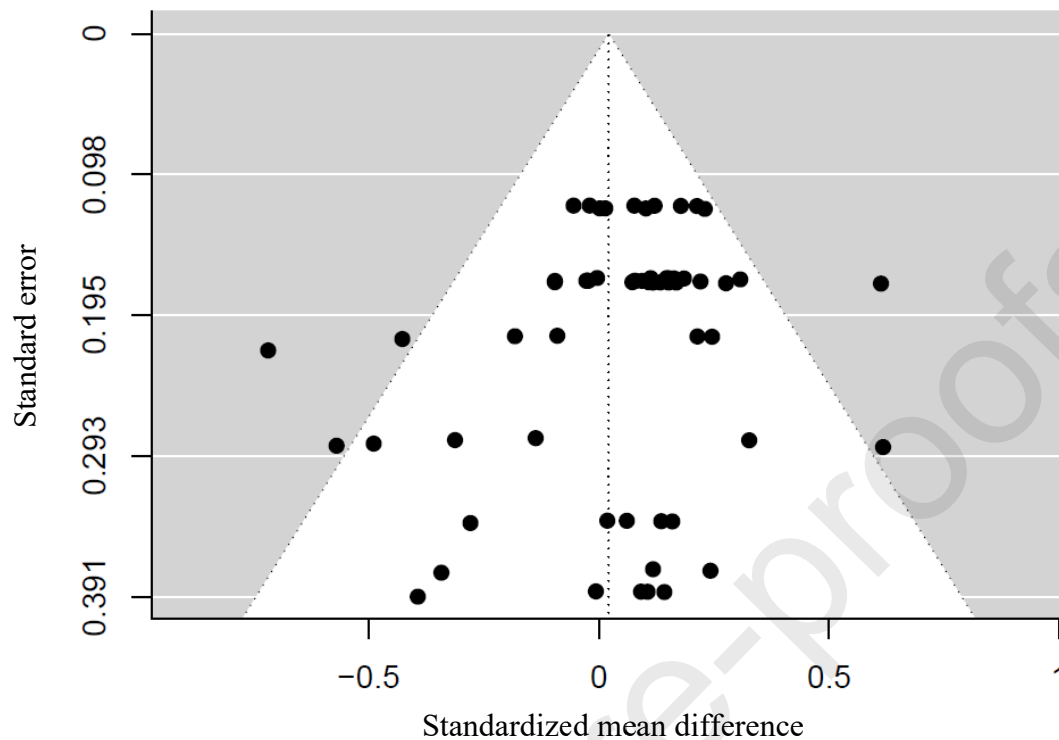


Figure 2

Funnel Plot with Symmetrical Spread of Effect Sizes around the Mean Effect Size for Child Mental Health

2.3 Discussion

Study 1 shows that online parenting support is non-inferior to in-person parenting support in reducing child and parent mental health problems and in improving parenting practices. Parents seemed more satisfied with online parenting support, but this effect was not significant.

One main explanation for our finding may be that all online support programs under evaluation included at least some kind of professional guidance. The three trials conducted in treatment settings were conducted through videocall; the four trials in prevention settings were conducted through a web portal where parents were regularly in touch with the professional. This means that in addition to specific content (i.e., specific parenting

techniques taught), all online programs included important non-specific elements such as receiving mental support from a professional (Wampold, 2015). It thus remains unclear whether similar results would be obtained in online parenting support without professional guidance. Initial evaluations of such programs suggest that their findings can be meaningful (Piotrowska et al., 2020), but trials examining their non-inferiority to guided or in-person programs are limited.

Our finding is in line with evidence from other fields (e.g., adult insomnia, Arnedt et al., 2021, and adult anxiety, Axelsson et al., 2020) where online support is at least as effective as in-person support. Importantly, and perhaps in line with our findings that parents generally preferred the online programs, evidence suggests that online support can outperform in-person support especially if the intervention targets individuals facing cumulative stressors or stigma (e.g., Constantino et al., 2015, on women experiencing intimate partner violence).

Strengths of Study 1 include the relatively high quality of the trials, including the use of blinded outcomes and assessment of longer-term effects. In addition, our multilevel analysis allowed us to include all 105 effect sizes from the trials, increasing precision of our overall estimates. Lastly, although non-inferiority margins are always arbitrary, ours was in line with guidelines and common practices in psychotherapy research, allowing for comparing our findings to those from other types of psychotherapy.

Limitations of Study 1 include the limited number of trials. Related to this, the 95% confidence intervals were relatively wide. This makes more stringent analysis of non-inferiority difficult. In addition, Study 1 did not allow for disentangling non-inferiority patterns by program format, because of a perfect confound between target population and format: all trials in treatment settings used videocall and all trials in prevention settings used a web portal. Last, the limited number of trials also did not allow for examining individual

family differences in parents' satisfaction with online versus in-person parenting support.

This will be an important avenue for future research.

3. Study 2: Added Value of Online Parent Support

The goal of this study was to estimate whether adding online parent support elements to in-person parent support programs increases the effects of in-person parent support programs.

This study is part of the same systematic review as Study 1, preregistered on PROSPERO (CRD42022354393) and following PRISMA guidelines (Page et al., 2021).

3.1 Methods

3.1.1 Eligibility criteria

We sought to identify (i) randomized controlled trials that compared (ii) an in-person support program *with* online support elements against (iii) an in-person parent support program *without* online support elements. Parent support was defined as more than 50% of the program targeting parenting practices with the goal to improve children's mental health. Our criterion for child age was (iv) a mean age between 2 and 12 years old. We excluded trials on children with severe physical disabilities or medical illnesses because these more complex populations may require different types of support.

3.1.2 Information sources, search strategy, selection process

We used the same information sources, search strategy, and selection process as for Study 1.

3.1.3 Data collection process and items

For each study, we reviewed information regarding (i) general study characteristics (e.g., year of publication, whether the trial was preregistered); (ii) intervention characteristics (e.g., whether the intervention was implemented for prevention or treatment purposes); (iii) sample characteristics (e.g., children's age, parental socioeconomic status and ethnicity); and

(iv) differences between conditions in child mental health, parent mental health, parenting practices, and parental satisfaction with the program.

3.1.4 Synthesis method

Because this field of research is very small and studies include different treatment outcomes, we used narrative synthesis instead of statistical synthesis. We followed Cochrane guidelines for narrative synthesis (Ryan, 2013) to (1) examine both similarities and differences between the findings of different studies, (2) explore patterns in the data where study findings may be related to the study design, and (3) provide possible reasons for similarities and differences in the findings, as well as possible explanations for any identified patterns.

3.1.5 Risk of bias and certainty assessment

We used the same procedures to assess risk of bias and certainty as in Study 1. Publication bias was not examined because we expected the number of studies to be too small to create a meaningful funnel plot.

3.2 Results

3.2.1 Study selection and characteristics

Of the 6,722 unique hits (Figure 1), two studies met inclusion criteria (Table 3). Both were conducted in the United States and targeted parents of young children (2 to 7 year-olds and 3 to 8 year-olds) with elevated levels of disruptive behavior. The programs under evaluation were *Parent-Child Interaction Therapy* and *Helping the Noncompliant Child*. Both are behavioral programs based on Constance Hanf's (1969) model of treating disruptive child behavior by enhancing parent-child relationship quality and using operant and social learning theory principles to redirect children's behavior (Kaehler et al., 2016). In both programs, parents receive intensive training in skill use and observations of parents' skill use determines their progression through the program.

In terms of online support elements added to the in-person program, Jent et al (2021) used an e-book with written and video-based content (e.g., voice-over animations) and Jones et al (2021) used a web portal with daily surveys of skills practice to guide the program's mid-week calls and sessions, weekly video-recorded home practice, daily text reminders about skill practice and appointments, reinforcing messages regarding progress, a homework checklist, and videos.

Study	In-person program	Online support	Prevention or treatment	N	Child age	Outcome
Jent et al (2021)	Parent-Child Interaction Therapy	Multimedia e-book with (i) text; (ii) videos; (iii) interactive widgets	Indicated prevention	178	2–7 yrs	Child mental health (<i>ECBI</i>) Parenting practices (<i>DPICS</i> “do” and “don’t” skills)
Jones et al (2021)	Helping the Noncompliant Child	Online portal that allowed therapists to monitor and tailor parent activity with (i) daily surveys; (ii) weekly video-recorded home practice; (iii) daily text reminders; (iv) mid-week video calls; and (v) videos series to model and share skills.	Indicated prevention	101	3–8 yrs	Parent satisfaction (<i>program satisfaction; ease of skill use; usefulness of skills</i>)

Note. DPICS = Dyadic Parent Child Interaction Coding System; ECBI = Eyberg Child Behavior Inventory.

Table 3

Studies and Their Main Characteristics Included in Study 2

3.2.2 Main results

Only one of the studies (Jent et al., 2021) examined the additive effects of online support elements on child mental health. More specifically, they compared the relative effects of parent-child interaction therapy with and without e-book on parent-reported disruptive behavior. Jent et al. (2021) found that compared to the original in-person program, the in-person + online program had stronger effects on reduced disruptive child behavior mid-treatment, but that this advantage had disappeared post-treatment and at later follow-up.

Similarly, only Jent et al. (2021) examined the additive effects of online support elements on parenting practices. More specifically, they observed parents' use of the specific parenting techniques taught in *Parent-Child Interaction Therapy* (e.g., "do skills" such as labeled praise and reflections, and "don't skills" such as questions and commands). Jent et al. (2021) found no differences between conditions in parenting, suggesting no additive effect of the online support elements.

None of the studies examined effects on parent mental health.

Only Jones et al. (2021) examined effects of the additive effects of online support elements on parental satisfaction with the program. They found no differences in overall program satisfaction or ease of skill use, but slight superiority of the augmented program in terms of parents' perceived usefulness of the skills.

Both studies yield additional findings that are of interest to understand the additive effect of online support elements to in-person family support. First, Jent et al. (2021) hypothesized that adding the e-book to the in-person program would enhance program efficiency such that families receiving online support elements would need fewer sessions to acquire the target skills. This was not the case. In contrast, Jones et al. (2021) found that adding the web portal increased program efficiency: parents in the augmented program needed fewer weeks, albeit not significantly fewer sessions, to complete treatment. Second,

the goal of the study by Jones et al. (2021) was to test if adding an interactive web portal to the *Helping the Noncompliant Child* program enhances parental engagement in the program. It did: parents in the augmented condition participated in more mid-week calls and completed more homework. However, it did not increase parents' attendance to in-person sessions.

3.2.3. Risk of bias and certainty assessment

Risk of bias was similar to that in Study 1: low on most criteria for most studies. Certainty of evidence was moderate. Both studies used a randomized controlled design, evidence was direct, and risk of bias was relatively low. We lowered our rating from 'high' to 'moderate' because there are only two eligible trials and none of our target outcomes were examined in both. In addition, findings were often inconsistent within trials. For example, some indicators of program satisfaction by Jones et al. (2021) suggested superiority of the online support condition while others indicated condition equivalence.

3.3 Discussion

Study 2 provides limited evidence for the additive value of online support elements to in-person parenting support. Both studies included in our review provided at least some evidence for additive value (i.e., stronger immediate effects on child mental health in Jent et al. 2021; higher levels of perceived usefulness in Jones et al. 2021), but findings were inconsistent across outcomes and, in the case of Jent et al. (2021), faded over time.

One main explanation for our finding may be that the level of effectiveness and program satisfaction of the evaluated in-person programs (*Parent-Child Interaction Therapy* and *Helping the Noncompliant Child*) tends to be relatively high (Khavjou et al., 2020; Thomas et al., 2017), making it difficult to further increase effectiveness. This may have been the case especially in the study by Jent et al. (2021) where the e-book may have been a relative light-touch addition to a relatively intensive in-person program. In the case of less

intensive in-person treatment, the added value of more intensive online support elements may be greater.

That said, both studies identified at least some unique benefits of the added online support elements in terms of engagement and efficiency. Our findings therefore by no means suggest that online support elements would not be meaningful. Instead, they suggest that careful experimenting is needed to identify combinations of online support elements that optimize in-person parenting support. In addition, there likely are individual differences in preference and benefits regarding online supplemental content. Because session attendance predicts program benefits (Berry et al., 2022), online support elements may be helpful especially for parents for whom it is more challenging to always attend sessions in-person.

Strengths of Study 2 include the high-quality trials that were comparable in terms of their target population and theoretical underpinnings of the parenting program. The main limitation is that there was only one eligible trial for each outcome, and only two eligible trials in total. Our findings should therefore be considered preliminary and hopefully setting the stage for future research on how in-person and online parenting support can be combined to optimize parenting program benefits for families.

4. General Discussion

The Covid-19 pandemic has accelerated trends to increasingly offer mental health support online (De Witte et al., 2021). In two studies, we synthesized evidence regarding the non-inferiority and additive effects of online parenting support versus in-person parenting support to reduce child and parent mental health problems and strengthen parenting practices. We also examined how parental satisfaction with the perceived support compares.

Study 1 shows that at least when professional guidance is present, online parenting support is an effective, non-inferior alternative to in-person support and may actually be preferred by parents. Findings were robust across outcomes (i.e., child and parent mental

health and parenting practices) and set the stage for new questions about online parenting support. First, what conditions must online support meet in order to be non-inferior to in-person support? An important shared feature of the online programs in our study is interaction between parents and professionals. Because therapist-client alliance is a key factor driving psychotherapy effects (Wampold, 2015), high-quality professional guidance may be one of those conditions. Some new programs challenge this assumption (Piotrowska et al., 2020) and future research will need to reveal when professional guidance is less or more essential for effective online parenting support. Second, under what conditions do parents prefer, and potentially benefit more from, online support over in-person support? Evidence from other types of psychotherapy (e.g., adult depression; Karyotaki et al., 2021) suggest that more intensive guidance is needed especially in the case of more severe problems. At the same time, families with the most severe problems may be hardest to reach to engage in in-person sessions (Weisenmuller et al., 2021). This suggests that there may be a tension between access (i.e., the likelihood that families can and will engage in parenting support) and effectiveness (i.e., the magnitude of benefit that can be expected from parenting support). Future studies are needed that disentangle this tension, to predict when in-person or online support is the right choice for families.

Study 2 suggests that the additive value of online support elements to in-person support seems limited, but may still be meaningful. With only two eligible studies, Study 2 mainly identified a gap in the literature: very little is known about how online support elements can be used to effectively enhance the effectiveness of parenting support programs. This may in part be because randomized trials are resource-intensive and may not be the most versatile design to experiment with adding different types of online support elements. Alternative research designs, such as factorial experiments that efficiently test effects of multiple elements in one experiment (Leijten et al., 2021), and within-trial analysis of parental use of

online resources and how this predicts their responses to the program, could be helpful alternatives and supplement traditional randomized trials. Within-trial analysis is possible in pre-posttest designs without a control condition and can yield meaningful findings for clinical practice regarding important program elements (e.g., Frederick et al., 2022; Högström et al., 2015).

Our findings have implications for children and youth policy and practice. The identified trials in Study 1 provide examples of how parenting support can be moved from the clinic to online without compromising on program effectiveness, at least as long as parents remain actively supported by professionals. In addition, the trend that parents seemed on average more satisfied with online support than with in-person support, suggests that perhaps online support should be offered more often. These findings are relevant for the European context of the COST Action EurofamNet (Canário et al., 2022), and other contexts where the use of online family support has significantly increased.

Questions for future research include how the effects of different formats of online parenting programs (e.g., through videocall, web portals, or apps) compare. This is in part a question of the level of professional guidance that is needed for effective parenting support, but also of what the content in different formats should be. One thing we have learned from decades of research on parenting support, is that effective support can be provided in many more ways than only in-person in the clinic in therapist-led sessions. Creative solutions are developed every day (e.g., using bread wrappers to provide parents with advice on how to best support their children in the face of war and refuge; El-Khani et al., 2016) and research is trying to keep up with these developments in terms of mapping and evaluating them. This is challenging especially with fast-paced technological development, encouraging us to ask and answer more overarching questions (e.g., what are the conditions under which

professional guidance is less or more essential) and try to translate them to different settings (e.g., how to adapt support in the context of a pandemic or war?).

In addition, future research should investigate whether the non-inferiority of online programs compared to in-person programs holds beyond programs focused on parents of children with subclinical or clinical levels of disruptive behavior. It may be that key parenting techniques used for this population (e.g., using positive reinforcement to redirect children's behavior) are easier to teach online than techniques for other mental health problems. This knowledge is important because parenting programs are also increasingly used to reduce other mental health problems in children as well, such as anxiety (Morgan et al., 2017). Similarly, future research should investigate whether findings hold across countries and cultures. The majority of studies in this review were conducted in the United States.

To conclude, Study 1 suggests that to enhance child and parent mental health, and parenting practices, parenting support through videocall is a good alternative to in-person parenting support in treatment settings, and website-based parenting support with some form of professional guidance is a good alternative to in-person parenting support in prevention settings. In addition, Study 2 provides suggests that the additive value of online support elements to in-person parenting programs is limited in terms of overall effectiveness, but may still be meaningful.

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Declarations of Interest

None of the authors declare conflicts of interest.

Ethical Considerations

This study was carried out in accordance with the European Cooperation in Science and Technology Association policy on inclusiveness and excellence, as written in the Memorandum of Understanding 104/18 for the implementation of the COST Action ‘The European Family Support Network. A bottom-up, evidence-based and multidisciplinary approach’ (EurofamNet) CA18123. COST (European Cooperation in Science and Technology). <https://www.cost.eu/actions/CA18123/>

CRedit

PL: Conceptualization, Methodology, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Project administration, Funding acquisition; KR: Methodology, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing; OD: Writing – Original Draft, Writing – Review & Editing; BKA: Investigation, Funding acquisition, Writing – Review & Editing; MA: Investigation, Writing – Review & Editing. RK: Investigation, Writing – Review & Editing; ACC: Conceptualization,

Methodology, Formal analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing.

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Highlights

- Online parenting support seems non-inferior to in-person support for parent and child well-being.
- Video calling is an effective format in treatment settings.
- Websites that included guidance by professionals are an effective format in prevention settings.
- The added value of online support elements to in-person support seems limited.

Declaration of Interest Statement

None of the authors declare conflicts of interest.

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