Two-year Follow-up of Internet-based Parent Training with Telephone Coaching Aimed at Treating Child Disruptive Behaviors in a Clinical Setting during the COVID-19 Pandemic

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Abstract

Background: There is a lack of studies examining the long-term outcomes of internet-based parent training programs implemented in clinical settings during the COVID-19 pandemic.

Objective: To study two-year outcomes of families with 3–8-year-old children referred from family counseling centers to the Finnish Strongest Families Smart Website (SFSW), which provides digital parent training with telephone coaching aimed at treating child disruptive behaviors.

Methods: Counseling centers in Helsinki identified 50 3–8-year-old children with high levels of disruptive behavioral problems. Child psychopathology and functioning as well as parenting styles and parental mental health were reported by parents at baseline, posttreatment and at 6-, 12- and 24-month follow-ups.

Results: The SFSW program had positive long-term change on child psychopathology and parenting skills. Improvements in child psychopathology, including Strengths and Difficulties Questionnaire (SDQ) total score (Cohen's d = 0.47, p < .001), SDQ conduct scores (Cohen's d = 0.65; p < .001) and Affective Reactivity Index (ARI) irritability scores (Cohen's d = 0.52; p < .001) were maintained until the 24-month follow-up. Similarly, changes of parenting skills measured with the Parenting Scale, including overreactivity (Cohen's d = 0.41; p = .001) and laxness (Cohen's d = 0.26; p = .021), were maintained until the 24-month follow-up. However, parental hostility changes were not maintained at long-term follow-up (Cohen's d = ?0.04; p = .70).

Conclusions: The study shows that the SFSW parent training program can yield significant long-term benefits. Findings indicate that the benefits of the treatment may vary between different parenting profiles, which is important to consider when developing more personalized parenting interventions.

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The SFSW program had positive long-term change on child psychopathology and parenting skills. Improvements in child psychopathology, including Strengths and Difficulties Questionnaire (SDQ) total score (Cohen's d = 0.47, $p < .001$), SDQ conduct scores (Cohen's d = 0.65; $p < .001$) and Affective Reactivity Index (ARI) irritability scores (Cohen's d = 0.52; $p < .001$) were maintained until the 24-month follow-up. Similarly, changes of parenting skills measured with the Parenting Scale, including overreactivity (Cohen's d = 0.41; $p = .001$) and laxness (Cohen's d = 0.26; $p = .021$), were maintained until the 24-month follow-up. However, parental hostility changes were not maintained at long-term follow-up (Cohen's d = −0.04; $p = .70$).

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The study shows that the SFSW parent training program can yield significant long-term benefits. Findings indicate that the benefits of the treatment may vary between different parenting profiles, which is important to consider when developing more personalized parenting interventions.

Keywords:

parent training; disruptive behavior; child psychopathology; child functioning; internet-based; family counseling

Introduction

There is growing evidence from randomized controlled trials (RCTs) that parents can be trained to intervene and reduce child disruptive behaviors and improve their parenting skills [1–3]. Parent training has been found to be the most effective way to prevent and treat disruptive behaviors among children [4–6] and is considered one of the most-validated therapeutic techniques in child mental health [7]. In the face of the unmet need for accessible evidence-based treatment programs to tackle early-onset childhood disruptive behaviors, digitally administered remote treatments provide solutions that require fewer personnel, that may be less stigmatizing and that can reach geographically remote areas [8,9].

Examining long-term outcomes of an intervention is an essential step in ensuring the sustainability of its effects. A recent meta-analysis on RCTs showed that parenting interventions based on social learning theory are effective in reducing physical and emotional violence at immediate post-test, but effects decrease over time [10]. However, to our knowledge, there are no long-term follow-ups (i.e., more than 12 months) of digital parent training interventions in clinical settings. The Finnish Strongest Families Smart Website (SFSW) intervention is an 11-week program that includes parent training delivered through an interactive online platform and assisted by weekly telephone coaching. Previously, we conducted a RCT, screening families at regular health check-ups for 4-year-old children. Children who had parent-reported high levels of disruptive behavior were screened for targeted SFSW intervention. The sample included 232 children in each study group, an intervention group and an educational control group. At a 24-month follow-up after randomization, the results maintained efficacy in reducing a wide range of child psychopathology and improving parenting skills [11].

The present study extends the current knowledge on the long-term effects by evaluating the outcomes of families participating in the SFSW parent training program in a clinical setting at

baseline and at 12- and 24-months after baseline. A unique aspect of this study is that the SFSW parent training program was administered to the study cohort during the worst phase of the COVID-19 pandemic, when the Helsinki capital region was partially isolated from other parts of Finland. Other services were severely limited, albeit the need of services was great. Due to the crisis, it was considered ethically inappropriate to conduct a randomized controlled study design in this study. The program completion rate was high. The 6-month follow-up findings of this program were very promising, and have been reported previously [12]. There were significant changes in most of the child psychopathology measures, including the Child Behavior Checklist (CBCL) externalizing score (95% CI 4.9–9.0; $P < .001$), and when parenting skills were measured with the Parenting Scale (PS), the results showed significant changes in the total score (095% CI 0.4–0.7; $P < .001$) [12].

Our aim with this paper is to report long-term changes in children's functioning, psychopathology levels, parenting skills and wellbeing from baseline until the 24-month follow-up. We hypothesized that the previously reported positive effects of the SFSW at the 6-month follow-up [12] would be at least partly maintained at the 24-month follow-up.

Methods

Study Population

The study focused on families with children between the ages of 3 and 8 years who exhibited elevated levels of disruptive behavior when screened by professionals from eight different family counseling centers in Helsinki. Family counseling centers operate under social services and provide low-threshold services. The centers contribute to child development by reinforcing parenting skills and family relationships. They provide direct support, offer advice to assisting services, and facilitate referrals to specialized services. At family counseling centers, parent training that addresses child-rearing challenges is offered through individual or group sessions. Healthcare and social welfare professionals from the counseling centers identified families that were in need for support for child disruptive behavior and selected families who were suitable for the remotely administered SFSW parent training program**.** During the pandemic lockdowns, face-to-face sessions were not possible, underscoring the importance of remote support methods.

Study design

Ethical approval for the study was received from the University of Turku, and the study also received a research permit from the city of Helsinki. This is a single-group study design with repeated measurements. Parents completed questionnaires at baseline, posttreatment and at 6, 12 and 24 months after starting the program. The study encompassed 50 families and took place from May 2020 to November 2022. Earlier findings comparing baseline, posttreatment and 6-month follow-up results have been reported previously [12].

Recruitment, eligibility and procedure

The professionals identified children with high levels of disruptive behavior problems. In addition, parents completed the Strengths and Difficulties Questionnaire (SDQ) [13,14] and were included if their child had a high level of conduct problems (≥ 5 points in the SDQ Conduct scale) and if the parents perceived their child to have difficulties concerning emotions, behavior or social interactions based on one item inquiring parents about these aspects. Additionally, inclusion in the study required at least one parent to be a native Finnish or Swedish speaker with access to both a telephone and a device with Internet connectivity. Exclusion criteria were if a child had been diagnosed with autism, Down syndrome, fetal alcohol syndrome, an intellectual disability or severe mental disorders. Eligible families were invited to participate. Commencing with the completion of baseline questionnaires, participants progressed through SFSW.

Intervention

The SFSW parent training program utilized interactive online materials (e.g. psychoeducational material, video clips, home exercises) and telephone coaching. The program focused on enhancing skills to improve parent-child relationships, complemented by weekly telephone sessions conducted by trained family coaches—licensed health care professionals, including nurses and public health nurses. All coaching calls were systematically recorded and subjected to random audits by the coach supervisor to ensure fidelity. The telephone sessions were scheduled at the end of the previous weekly call and scheduled for a duration of one hour each. Possible rescheduling was done per SMS. The family coach followed up in case the family missed an appointment.

The SFSW program has previously been shown to be effective [11,15] and can successfully make the transition to implementation settings [12,16-17]. Table 1 includes an outline of the weekly themes covered in SFSW. The program was sequential, that is, the parents completed one week theme before moving to the next. The primary goal was for parents to recognize positive behaviors in their

child and respond positively. The second aim was to apply learned skills in everyday situations, utilizing positive methods to reinforce the child's positive behavior. The end of the program focused on solidifying the application of newfound positive parenting skills in daily life to support the child's positive behavior. Parents practiced these skills with their child and discussed their progress during weekly telephone calls with their family coach, which were scheduled aiming to ensure sustainability beyond the program's completion. As previously reported [12], the average time spent on the program website for each of the 11 themes was 48.0 (SD 25.6) minutes and the mean duration of telephone coaching was 35.3 (SD 8.8) minutes per call. The total mean duration per theme, including both online materials and telephone coaching, was 83.3 minutes (SD 28.0).

Table 1. Themes of the SFSW[a] Internet-based parent training program for children with behavioral problems.

Session	Goals
1. Notice the good	Boost the child's self-esteem, boost the parent's self-esteem and change the parent's view of their child
2. Spread attention around	Strengthen the child's empathy skills
3. Ignore whining and complaining	Teach parents self-regulation
4. Prepare for changes	Reinforce good daily routines
5. Plan ahead at home	Boost the self-esteem of the child and parent and involve the child in planning
6. Chart and stickers	Involve the child in planning and reinforce good daily routines
7. Plan ahead outside the home	Boost the self-esteem of child and parent and involve the child in planning
8. Working with daycare	Help the child to manage and succeed
9. Time out	Teach self-regulation and consistency
10. & 11. Problem solving revision and future application of skills	Teach parents skills to support child development and prepare for future challenges
Booster	Remind parents of positive proactive parenting skills

[a] SFSW: Strongest Families Smart Website.

Measurements

The parents completed questionnaires at baseline, after the program and at 6-, 12- and 24- months after they had started the program. In addition, demographic details of the family, children, and parents were collected during the screening phase. All of the measurements used in this study have demonstrated adequate reliability and criterion validity metrics and are described more extensively in our previous paper [12]. For brevity, we mention them briefly below while a comprehensive description is provided as a supplementary material (Multimedia Appendix 1).

Child psychopathology and functioning

Child psychopathology was assessed using the Finnish version of the 25-item SDQ [13, 14], which measures challenges the child experiences in emotions, behavior, or social interactions [18]. Perceived difficulties were gauged through a single question regarding challenges in emotions, behavior or social interactions, with response options ranging from no difficulties to severe difficulties. Disruptive behavior was gauged by the externalizing subscale of the CBCL for ages 1.5–5 years (99 items) [19], focusing on an externalizing subscale with 24 items related to attention issues and aggressive behavior along with the CBCL's total score. Child irritability was measured by the Affective Reactivity Index (ARI), which includes six irritability symptom items and one impairment item [20]. A 17-item questionnaire, derived from Barkley's Home Situations Questionnaire [21], measured the parents' experiences of their child's functioning and behavior in daily situations. We used the 24-item Inventory of Callous-Unemotional Traits (ICU) [22] to assess three precursors of child psychopathy: callousness, uncaring and unemotional traits [23, 24].

Parenting, parental mental health and satisfaction

The Parenting Scale (PS), a 30-item tool, was used to evaluate three dysfunctional parenting discipline styles: laxness, overreactivity, and verbosity; reflecting rule enforcement, responses to

mistakes, and lengthy verbal reactions, respectively [25, 26]. We used the 21-item Depression, Anxiety, and Stress Scale (DASS-21) to assess parental stress, anxiety and depression symptoms in the past week [27].

Statistical analysis

Descriptive statistics include numbers and percentages for categorical variables and means and standard deviations for continuous variables. The categorical variables were analyzed with Pearson's $\chi 2$ or Fisher's exact tests and the continuous variables with two-sample t-test. We analyzed the outcome variables using linear mixed-effect models for repeated measurements with time as a within-factor. The modelling framework enables to use restricted maximum estimation method which handles data with missing observations. Therefore, there was no need to apply any separate imputation method. We used linear contrasts to estimate changes from baseline to 12 and 24 months as well as changes from 12 to 24 months. We included the sex, age and maternal education of the children as covariates in all models. McNemar's test was applied to test the change in the number of children with a total SDQ score above the 90^{th} percentile (i.e., abnormal range) at baseline and at the 24-month follow-up. The effect sizes of all outcome variables were calculated as T-test effect sizes using Cohen's d. The statistical analyses were performed using SAS statistical software, version 9.4 (SAS Institute Inc.).

RESULTS

Participant Characteristics

The study comprised 50 families who were referred to the program, of which 44 (88%) completed the whole 11-week SFSW program. Twenty-four-month follow-up assessments were obtained from 37 (74%) families. As shown in Table 2, 37 (74%) of the 50 children were boys. Forty-eight (96%) children had definitive or severe behavioral problems at baseline, and only 2 (4%) had minor

behavioral problems based on a single item in parent report, “Overall, do you think that your child has difficulties in one or more of the following areas: emotions, behavior or being able to get on with other people?”. Table 2 also presents a comparison between the families who completed the 24-month follow-up and those who did not. The table shows the difference in maternal education—in the non-completer group, mothers were less educated.

Table 2. Demographics of enrolled families, and comparison between families completing and those not completing the 24-month follow-up measurements.

Demographics	All families (n=50)	Families completing the 24-month follow-up (n=37)	Families not completing 24-month follow-up (n=13)	P-value[a]
Parent and Family Characteristics				
Family structure, n (%)				
Biological parents	38 (76)	30 (81)	8 (62)	.21
One biological parent	11 (22)	6 (16)	5 (38)	
Other	1 (2)	1 (3)	0 (0)	
Age (years), mean (SD)				
Maternal	31.9 (4.3)	31.9 (3.5)	31.6 (6.2)	.86
Paternal	32.8 (3.7)	32.3 (3.6)	34.5 (3.7)	.10
Maternal educational level[b], n (%)				
College or university degree	38 (78)	31 (86)	7 (54)	.047
Lower	11 (22)	5 (14)	6 (46)	
Paternal educational level[c], n (%)				
College or university degree	32 (70)	23 (66)	9 (82)	.46
Lower	14 (30)	12 (34)	2 (18)	
Mother’s native language, n (%)				
Finnish	45 (90)	34 (92)	11 (85)	.55
Swedish	3 (6)	2 (5)	1 (8)	
Other	2 (4)	1 (3)	1 (8)	
Father’s native language[d], n (%)				
Finnish	37 (80)	29 (83)	8 (73)	.21
Swedish	3 (7)	1 (3)	2 (18)	
Other	6 (13)	5 (14)	1 (9)	

Child Characteristics				
Sex, n (%)				
Female	13 (26)	12 (32)	1 (8)	.14
Male	37 (74)	25 (68)	12 (92)	
Age (years), n (%)				
3–5	30 (60)	24 (65)	6 (46)	.33
6–8	20 (40)	13 (35)	7 (54)	
Behavioral problems, n (%)				
Minor	2 (4)	2 (5)	0 (0)	.43
Definite	30 (60)	20 (54)	10 (77)	
Severe	18 (36)	15 (41)	3 (23)	

[a] refers to statistical test comparing families completing the 24-month follow-up to those who did not. [b]1 missing observation.[c]4 missing observations. [d]4 missing observations.

Long-term Changes in Child and Parenting Measures

Descriptive statistics of child psychopathology, child function level, parental skills and parental mental health at baseline and 12 months and 24 months after baseline are presented in Table 3. A statistical comparison of the different time-points is presented in Table 4. In terms of child psychopathology, significant improvements between baseline and the 12-month follow-up as well as between baseline and the 24-month follow-up were found in CBCL total scores and externalizing scores; SDQ total scores and most sub-scales (emotional, conduct, hyperactivity and peer and problems); and irritability measured with the ARI scale. At the same time, there was a significant deterioration in CBCL total and externalizing scores and SDQ prosocial behavior scores between the 12-month and 24-month follow-ups.

We conducted an additional analysis of 37 (74%) of the 50 parents who completed the SDQ questionnaire both at baseline and at the 24-month follow-up as well as the parent training program. This analysis showed that 30 (81%) of the 37 children had a total SDQ score above the 90th percentile (i.e., abnormal range) at baseline, while only 14 (38%) remained in the abnormal range at the 24-month follow-up ($P < .001$, McNemar's test), based on the population sample of 4–16-year-old children [12]. When using the 80th percentile cut-off point (i.e., abnormal or border range), 36 (97%)

children were above the cut-off point at baseline, while the respective figure at the 24-month follow up was 23 (62%), indicating a highly significant change (P < .001, McNemar's test).

When parents were asked about perceived difficulties regarding their child's behavior problems with a single question—"Overall, do you think that your child has difficulties in one or more of the following areas: emotions, behavior or being able to get on with other people?"—at baseline, 2 (5%) out of 37 had no or minor problems, 20 (54%) had definite problems and 15 (41%) had severe problems. The respective figures at the 24-month follow-up were 14 (38%), 14 (38%) and 9 (24%) (P = .001, McNemar-Bowker test).

Among the child psychometric measures, callousness and uncaring improved between baseline and the 12-month follow-up. However, uncaring deteriorated between the 12-month and the 24-month follow-up, and no significant improvement was found between baseline and 24 months. The SFSW parent training program did not have any significant positive association with unemotional traits at the 12-month or the 24-month follow-up.

Child functioning in everyday situations (e.g., transitions, dining, home and outside home activities) improved significantly between baseline and both follow-up points. No significant change was observed between the 12- and 24-month follow-up comparisons.

Table 3. Child psychopathology, child functioning level, parental skills and parental mental health at baseline and 12 months and 24 months after the baseline (n = 50).

Variable	Baseline[a] Mean[d] (SE)	12 months[b] Mean (SE)	24 months[c] Mean (SE)
Child psychopathology			
SDQ[e]			
Total	19.8 (1.1)	14.4 (1.3)	15.3 (1.3)
Emotional symptoms	3.5 (0.5)	2.1 (0.5)	2.7 (0.5)
Conduct problems	7.3 (0.4)	5.1 (0.4)	5.2 (0.5)
Hyperactivity	6.8 (0.6)	5.5 (0.7)	5.7 (0.7)
Peer problems	2.1 (0.4)	1.5 (0.4)	1.5 (0.5)
Prosocial behavior	5.6 (0.5)	6.4 (0.5)	5.8 (0.5)
Impact	3.2 (0.4)	2.0 (0.4)	2.7 (0.4)
ARI[f]			
Irritability	9.3 (0.8)	6.2 (0.8)	6.4 (0.8)
CBCL/1.5-5[g]			
Total	61.8 (5.5)	43.8 (5.8)	50.2 (5.9)
Externalizing	25.5 (1.9)	18.0 (2.2)	20.2 (2.2)
ICU[h]			
Total	25.9 (1.8)	22.5 (2.0)	24.1 (2.0)
Callousness	8.1 (0.8)	6.2 (0.9)	6.1 (1.0)
Uncaring	14.0 (0.8)	12.0 (0.9)	13.3 (0.9)
Unemotional	4.2 (0.7)	4.6 (0.7)	5.1 (0.8)
Child functioning level			
Everyday situations			
Child behavior - total	42.4 (2.7)	33.4 (3.0)	33.6 (3.0)
Transition situations	13.9 (1.1)	10.5 (1.1)	11.1 (1.1)
Dining situations	7.8 (0.7)	6.7 (0.7)	6.4 (0.7)
Situations outside home	10.3 (0.8)	8.0 (0.8)	7.8 (0.8)
Home situations	10.3 (0.8)	8.0 (0.9)	8.2 (0.9)
Parental skills	mean (SE)	mean (SE)	mean (SE)
Parenting scale			
Total	3.5 (0.1)	3.1 (0.1)	3.2 (0.1)
Laxness	2.8 (0.2)	2.4 (0.2)	2.5 (0.2)
Overreactivity	4.4 (0.3)	3.6 (0.3)	3.8 (0.3)
Hostility	2.2 (0.2)	1.9 (0.2)	2.2 (0.2)
DASS-21[i]			
Total	24.4 (3.8)	20.3 (3.9)	23.5 (4.0)
Depression	8.2 (1.5)	6.7 (1.5)	7.7 (1.5)
Anxiety	2.7 (1.0)	2.9 (1.1)	3.4 (1.2)
Stress	13.5 (1.7)	10.6 (1.8)	12.5 (1.9)

[a] Measurements before the program started, [b] Measurements at 12 months after starting the program, [c] Measurements at 24 months after starting the program, [d]Least-squares means, [e]SDQ = Strengths and Difficulties Questionnaire; [f]ARI = questionnaire for irritability; [g]CBCL/1.5-5 = Child behavior checklist for preschool children; [h]ICU= Inventory of Callous-Unemotional Traits; [i]DASS-21= 21-item Depression, Anxiety, and Stress Scale.

Table 4. Changes from baseline to 12 months and 24 months after, in child psychopathology, child function level and parental skills.

Variable	Baseline[a] to 12 months[b]			Baseline to 24 months[c]			12 months to 24 months	
	Mean (95% CI)	*P* Value	Cohen's d	Mean (95% CI)	*P* Value	Cohen's d	Mean (95% CI)	*P* Value
Child psychopathology								
SDQ[d]								
Total	5.4 (3.5 – 7.3)	<.001	0.62	4.5 (2.4 – 6.5)	<.001	0.47	-0.9 (-2.1 – 0.3)	.34
Emotional	1.4 (0.7 – 2.1)	<.001	0.43	0.8 (-0.0 – 1.7)	.053	0.21	-0.6 (-1.1 – -0.1)	.031
Conduct	2.2 (1.6 – 2.8)	<.001	0.78	2.1 (1.4 – 2.8)	<.001	0.65	-0.1 (-0.7 – 0.5)	.68
Hyperactivity	1.2 (0.5 – 2.0)	.002	0.34	1.0 (0.3 – 1.8)	.008	0.29	-0.2 (-0.8 – 0.3)	.44
Peer	0.6 (0.1 – 1.0)	.018	0.25	0.6 (0.1 – 1.2)	.025	0.24	0.1 (-0.4 – 0.6)	.77
Prosocial[e]	-0.8 (-1.4 – -0.2)	.009	-0.27	-0.2 (-0.8 – 0.4)	.45	-0.08	0.6 (0.1 – 1.1)	.024
Impact	1.2 (0.6 – 1.8)	<.001	0.45	0.5 (-0.2 – 1.1)	.15	0.16	-0.7 (-1.3 – -0.2)	.012
ARI[f]								
Irritability	3.1 (1.9 – 4.3)	<.001	0.57	2.9 (1.7 – 4.1)	<.001	0.52	-0.2 (-1.4 – 1.0)	.71
CBCL/1.5-5[g]								
Externalizing	7.5 (4.7 – 9.9)	<.001	0.66	5.2 (2.4 – 8.1)	.001	0.39	-2.3 (-4.1 – -0.4)	.016
Total	17.4 (9.8 – 25.0)	<.001	0.49	11.0 (3.5 – 18.5)	.005	0.32	-6.4 (10.2 – -2.7)	.001
ICU[h]								
Total	3.4 (0.9 – 5.9)	.008	0.30	1.7 (-0.8 – 4.2)	.17	0.15	-1.7 (-3.7 – 0.4)	.11
Callousness	1.9 (0.6 – 3.2)	.004	0.31	1.9 (0.5 – 3.4)	.008	0.29	0.0 (-1.2 – 1.3)	.94
Uncaring	2.0 (0.7 – 3.2)	.003	0.33	0.8 (-0.3 – 1.8)	.17	0.15	-1.2 (-2.3 – -0.2)	.027
Unemotional	-0.4 (-1.0 – 0.1)	.14	-0.16	-0.9 (-1.8 – 0.0)	.044	-0.22	-0.5 (-1.2 – 0.2)	.14
Child's ability to function								
Everyday situations (child behavior)								
Child behavior total	9.1 (5.3 – 12.9)	<.001	0.52	8.9 (4.9 – 12.8)	<.001	0.49	-0.2 (-3.3 – 3.0)	.91
Transition situations	3.4 (2.0 – 4.9)	<.001	0.52	2.8 (1.2 – 4.4)	.001	0.38	-0.6 (-1.7 – 0.5)	.27
Dining situations	1.0 (0.2 – 1.9)	.013	0.28	1.4 (0.6 – 2.3)	.001	0.37	0.4 (-0.4 – 1.2)	.36
Situations outside home	2.3 (1.1 – 3.4)	<.001	0.43	2.6 (1.4 – 3.7)	<.001	0.49	0.3 (-0.7 – 1.2)	.54
Home situations	2.2 (1.1 – 3.3)	<.001	0.45	2.0 (0.9 – 3.2)	.001	0.40	-0.2 (-1.2 – 0.9)	.73

Parental skills								
Parenting scale								
Total	0.5 (0.3 – 0.6)	<.001	0.68	0.4 (0.2 – 0.5)	<.001	0.49	-0.1 (-0.2 – 0.0)	.15
Laxness	0.4 (0.1 – 0.6)	.002	0.35	0.3 (0.1 – 0.5)	.021	0.26	-0.1 (-0.4 – 0.1)	.39
Overreactivity	0.8 (0.5 – 1.1)	<.001	0.59	0.6 (0.3 – 0.9)	.001	0.41	-0.2 (-0.4 – 0.1)	.091
Hostility	0.2 (0.0 – 0.3)	.013	0.28	-0.0 (-0.3 – 0.2)	.70	-0.04	-0.2 (-0.5 – -0.0)	.031
DASS-21[i]								
Total	4.0 (-0.8 – 8.9)	.10	0.18	0.9 (-4.2 – 5.9)	.73	0.04	-3.2 (-8.3 – 1.9)	.22
Depression	1.5 (-0.7 – 3.8)	.17	0.15	0.6 (-1.4 – 2.6)	.57	0.06	-1.0 (-2.8 – 0.8)	.29
Anxiety	-0.2 (-1.7 – 1.2)	.74	0.04	-0.7 (-2.7 – 1.2)	.45	0.08	-0.5 (-2.0 – 1.0)	.51
Stress	2.9 (0.7 – 5.0)	.009	0.29	1.0 (-1.1 – 3.2)	.34	0.10	-1.9 (-4.3 – 0.6)	.14

[a] Measurement before the program started, [b] Measurement at 12 months after the program started, [c] Measurement at 24 months after the program started, [d]SDQ = Strengths and Difficulties Questionnaire; [e]Increase in prosocial SDQ subscore indicates improvement. [f]ARI = questionnaire for irritability; [g]CBCL/1.5-5 = Child behavior checklist for preschool children; [h]ICU= Inventory of Callous-Unemotional Traits; [i]DASS-21 = 21-item Depression, Anxiety, and Stress Scale.

Interestingly, there were differences between parenting profiles regarding the long-term changes. Parental overreactivity and laxness improved between baseline and the 12-month follow-up and between baseline and the 24-month follow-up. Parental hostility showed improvement between baseline and the 12-month follow-up but not between baseline and the 24-month comparison. In fact, hostility showed significant deterioration between the 12-month and the 24-month follow-up. We observed no significant association in parental mental health problems, measured with DASS-21, between baseline and either of the follow-ups.

Finally, to graphically illustrate the key findings, Figures 1 A–D describe the changes of main outcome measures across time points including posttreatment and at the 6-month follow-up, which has previously been reported in detail [12]. Of note, the parenting scales and ICU were not measured posttreatment. The figures illustrate that SDQ conduct, and ARI irritability scores exhibited the largest improvement between baseline and posttreatment and further improvement between posttreatment and the 6-month follow-up; the findings at the 12- and 24-month follow-ups were rather stable. Among the ICU measures, callousness and uncaring showed improvement between baseline and the 6-month follow-up. After that, callousness stayed quite stable while uncaring and unemotional showed deterioration. As for the parenting measures, all parenting styles showed improvement between baseline and the 6-month follow-up. After that, overreactivity and laxness were quite stable, while hostility showed deterioration.

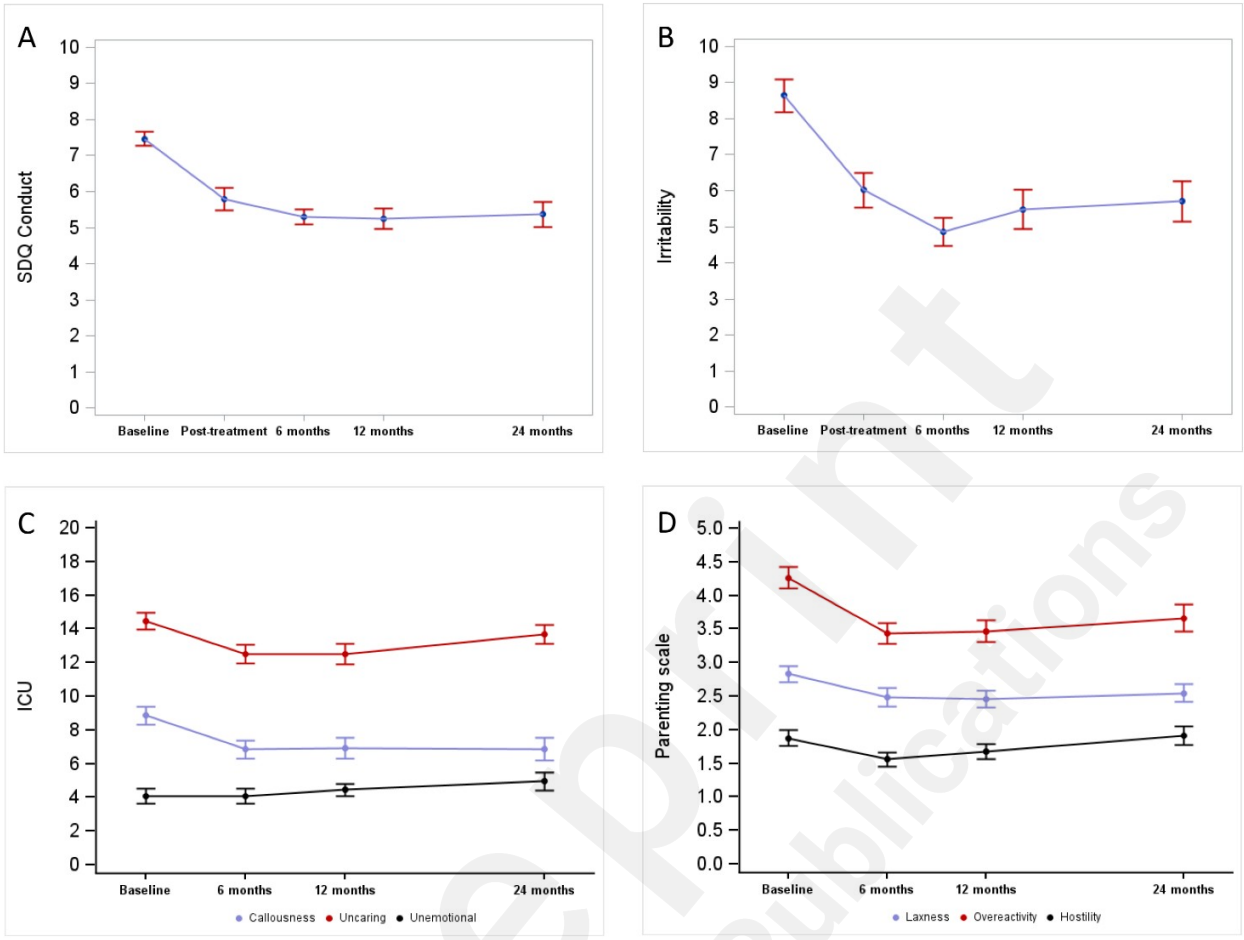

Figure 1 A-D. Mean curves of SDQ (Strengths and Difficulties Questionnaire) conduct scores, irritability score, ICU (Inventory of Callous-Unemotional Traits) score and Parenting Scale subscores. (A) SDQ conduct scores over time (model-based least-squares means (SE)). (B) Irritability score over time (model-based least-squares means (SE)). (C) ICU subscales over time (model-based least-squares means (SE)). (D) Parenting Scale subscores over time (model-based least-squares means (SE)).

Discussion

Principal Findings

To the best of our knowledge, this is the first study on long-term follow-up of digital guided parent training intervention among children referred to treatment from specialized care. The findings mostly complement the previously conducted 6-month follow-up study [12] by showing that the SFSW program was associated with significant improvements in children's externalizing symptoms at 12 months and 24 months after baseline. Of note, most of the improvement took place between baseline and posttreatment assessment, and the level of externalizing problems showed stability from the 12- to the 24-month follow-up. The current study's importance is in demonstrating that digital parent training with weekly remote phone coaching, seems to lead to enduring improvements in disruptive behavior problems in children with severe disruptive behavior problems. The findings align with a 24-month follow-up study of the SFSW program [11, 15-16, 28], which was utilized as a preventive and early intervention among 4-year-old children, identified through national medical check-ups [29]. However, since the target group was different, the level of disruptive behavior problems among the children in the present study were much more severe [12], which suggests the promise of such interventions in supporting populations with different levels of symptom severity.

Most comorbidities such as hyperactivity, emotional and peer problems, and child functioning in everyday situations maintained their improvement from baseline to the 12-month and 24-month follow-ups as well. Interestingly, the program seemed to have very clear association with decreased irritability. This novel finding implies that some of the major effects of parent training may be associated with decreasing irritability in parent–child interactions; this requires further research.

For some problems, such as callous-unemotional traits, improvement was reported at the 12-month follow-up but not at the 24-month follow-up. Callous-unemotional traits characterize a specific

subgroup of children exhibiting early-starting, stable and severe conduct problems. It has been argued that conventional parenting interventions frequently prove ineffective within this subgroup [30,31].

Another important finding was that parenting profiles seemed to have different responses to the parent training program. Improvements in parent overreactivity and laxness were shown both in the comparison between baseline and the 12- and 24-month follow-ups, while parental hostility improved until the 12-month follow-up then deteriorated to the same level as at baseline. It could be interpreted that parental hostility is, in the long run, resistant to parent training programs.

There is limited research on the effects of parenting interventions on reducing parental hostility. Parental hostility can have broad impacts within the family, potentially disrupting the ability of one parent to maintain a positive relationship with their child [32]. There is a significant positive correlation between parent hostility and child aggression, indicating that the more hostile parents are toward others, the more aggressive their children tend to be [33]. Similar findings regarding conduct problems, callous-unemotional traits and parenting were made in a previous study [34], where higher levels of parental harshness were related to higher levels of child conduct problems and callous-unemotional traits. Children subjected to abuse resulting from their parents' aggressive behavior may suffer adverse effects on their self-control and exhibit challenges in impulse control by acting impulsively, speaking before thinking, and demonstrating a reduced capacity to tolerate frustration or cope with failure [35]. There are also findings showing that parental attitudes play a substantial role in the gradual enhancement of a child's self-control, exerting a significant impact on the individual [33]. In cases where parent training proves to be ineffective in the long term in reducing parental hostility, the parent could benefit from receiving personal support or therapy to address this issue. It is likely that more tailor-made and targeted interventions and treatment plans would benefit this subgroup of families, which are at risk to fall into this kind of negative cycle.-

When the study started in May 2020, Helsinki was grappling with the peak of the COVID-19 pandemic, marked by a state of emergency declared nationwide in Finland. Stringent social distancing measures were enforced in the region to curb the virus's transmission, significantly affecting families residing in the area. The COVID-19 pandemic has highlighted the importance of exploring remote, digital or digitally assisted solutions for ensuring that young children, and their families, are provided with prompt support for mental health problems. This study demonstrated that technology can provide effective alternatives to traditional face-to-face interventions and can overcome a number of barriers during crises. Technology can be used to provide the right treatment at the right time, with high levels of support and fidelity, providing greater access and convenience, and requiring fewer costs and less time.

Limitations

It is important to acknowledge certain limitations. The study design did not allow for direct conclusions regarding the program's efficacy as it lacked an intervention-control group design. However, the COVID-19 pandemic meant that treatment and family counseling services could not be provided in the usual way, and conducting a randomized controlled study design would have been considered ethically inappropriate. The constraints of social distancing, which included school closures, also prevented us from conducting direct observations of parenting, clinical assessments and teacher ratings.

Conclusions

This study provides support for the utility of remotely delivered parent training interventions. Incorporating remote interventions into child mental health services also serves as a safeguard during crises situations such as COVID-19.

The study shows that remote digital child mental health services bring substantial benefits to families that can last for up to two years. Overall, the study emphasizes that guided digital parent training programs can be a crucial component in developing evidence-based treatment practices for children and families.

The study also emphasizes the importance of conducting long-term follow-ups to understand long-term intervention gains. The study results indicate that different parenting profiles and child psychopathology may have varying effects on the long-term outcome of the program. This finding is important when developing personalized parenting interventions for increased impact.

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Conflicts of Interest

Andre Sourander is the founder and director of Digifamilies, a provider of evidence-based treatments to Finnish public health services. The remaining authors have no conflicts of interest to disclose. All authors read and approved the final manuscript.

Abbreviations

ARI: Affective Reactivity Index

CBCL: Child Behavior Checklist

COVID-19: coronavirus disease

ICU: Inventory of Callous-Unemotional Traits

PS: Parenting Scale

RCT: Randomized controlled trial

SFSW: Strongest Families Smart Website

SDQ: Strengths and Difficulties Questionnaire

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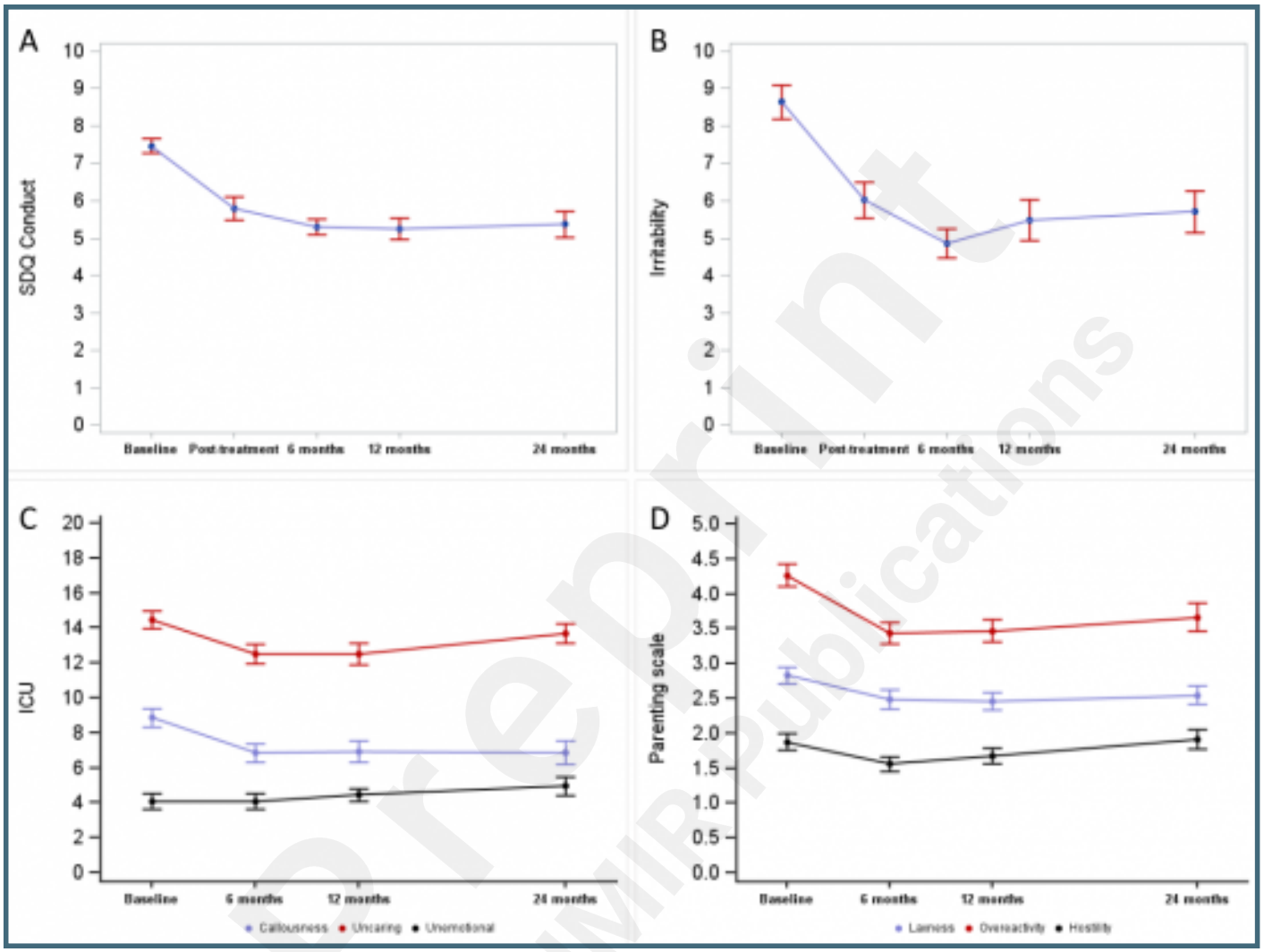
Supplementary Files

Figures

Mean curves of SDQ (Strengths and Difficulties Questionnaire) conduct scores, irritability score, ICU (Inventory of Callous-Unemotional Traits) score and Parenting Scale subscores. (A) SDQ conduct scores over time (model-based least-squares means (SE)). (B) Irritability score over time (model-based least-squares means (SE)). (C) ICU subscales over time (model-based least-squares means (SE)). (D) Parenting Scale subscores over time (model-based least-squares means (SE)).



Multimedia Appendixes

Comprehensive description of measurements.
URL: http://asset.jmir.pub/assets/e0a59641d957c0db6ef78df502d70f8f.docx