



Evaluation of Siblings' Perceived Relationship Outcomes with Their Parents in an Open Trial of the SIBS Intervention for Children with Chronic Disorders

Trude Fredriksen ^{1,2} · Torun M. Vatne ³ · Yngvild B. Haukeland ² · Nikolai O. Czajkowski ² · Claire E. Wakefield ^{4,5} · Krister W. Fjermestad ^{2,3}

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Abstract

The SIBS intervention aims to prevent mental health problems for siblings of children with chronic disorders and has shown promising results. The mechanisms behind these changes have not been examined. Parent-child relationship quality is a predictor of mental health in siblings. Our first objective was to investigate whether sibling-perceived relationship quality between siblings and parents changes over time after participating in SIBS. Second, as the intervention requires participation of only one parent, we examined with a dual scale (anxiety and avoidance attachment style) whether relationship quality was associated with which parent participated. Third, as SIBS aims to promote parents' communication skills, we examined whether sibling-perceived communication quality with parents predicted relationship quality over time. The sample comprised 99 siblings ($M = 11.5$ years, $SD = 2.0$; range 8–16; 54% girls, 46% boys) of children with chronic disorders and one parent per sibling (63% mothers). We administered the questionnaires at pre-intervention, at three- and 6-months post-intervention. We applied growth curve models for relationship quality over time with communication quality as a predictor, controlling for parent gender. We found significant improvement in sibling-perceived relationship quality with the participating and the non-participating parent on the relationship anxiety scale over time, with small to medium effect sizes. Higher communication quality significantly predicted improvement of relationship quality in all four relationship outcomes. We conclude that change in relationship quality may be part of the positive outcomes of the SIBS intervention and is mainly explained by communication enhancement. Controlled trials of the SIBS intervention are indicated.

Keywords Siblings · Chronic disorders · Interventions · Family relationships · Communication

Highlights

- We investigated change in sibling perceived relationship quality between siblings and parents after participation in the SIBS intervention.
- The anxiety dimension of the sibling perceived relationship quality between siblings and both parents improved over time after the intervention.
- Communication improvement was a significant predictor of relationship quality over time.
- The SIBS intervention may enhance communication and relationship quality between siblings and their parents.

✉ Trude Fredriksen
fredriksentrude@gmail.com

¹ Innlandet Hospital Trust, Po Box 104, 2381 Brumunddal, Norway

² University of Oslo, Department of Psychology, Forskningsveien 3a, 0373 Oslo, Norway

³ Frambu Resource Centre for Rare Disorders, Sandbakkvn 18, 1404 Siggerud, Norway

⁴ School of Clinical Medicine, UNSW Medicine and Health, UNSW Sydney, Kensington, NSW, Australia

⁵ Behavioural Sciences Unit, Kids Cancer Centre, Sydney Children's Hospital, Randwick, NSW, Australia

A chronic disorder (CD) is defined as an intellectual (cognitive) and/or physical impairment (disability) characterized by prolonged duration and no spontaneous or complete cure (Stanton et al., 2007). Siblings of children with chronic disorders (which we will refer to as siblings from hereon) are affected by the CD in several ways (Pinquart, 2023). Siblings may experience anxiety about their family's well-being, have fears about their brother's or sister's health, have concerns about their own health, and feel lonely and resentful about perceived loss of parental attention (Long et al., 2018; Parker et al., 2020; Tregidgo & Elander, 2019). Siblings may also be exposed to potentially frightening situations (e.g., sudden deterioration of the CD, hospitalizations, recurring episodes of unpredictable behavior) which can lead to separation from parents or uncertainty in everyday life (Brown et al., 2008; O'Brien et al., 2009). Siblings have been found to have significantly more emotional, social, and behavioral problems than children who grow up with typically developing brothers and sisters and are at risk for developing mental health problems (Feudtner et al., 2021; Kelada et al., 2022; Schamong et al., 2022). Overall, siblings have an increased risk for developing mental health problems, however some studies also show that siblings report experiences of growth and resilience (Wolff et al., 2022). Having a child with a CD impacts all members of the family, how they interact with each other, and how they organize everyday life (Eccleston et al., 2015). Moreover, how children cope with both acute and prolonged stressful experiences depends on their parents' ability to support and guide the children (Afzal et al., 2023).

Being the parent of a child with a CD can be very demanding and may affect parents' health and parenting (Cohn et al., 2020; Mitchell et al., 2021; Pinquart, 2018). Everyday life for parents of children with a CD can be characterized by continuous concerns about the health condition of the child with a CD, extra caregiver tasks, feelings of incompetence as a parent, and/or finding the parenting role as less rewarding than parenting children without a CD (Golfenshtein et al., 2016). In family systems theory the mechanisms of how parental stress (e.g., anxiety, worry, sadness) affects children's behavioral and emotional functioning is well described (e.g., Bowen & Kerr, 2009; Minuchin, 2018). Several studies support the family systems theory and how it may explain the multi-directional effects of burdens or incidents in family life (Helgeson et al., 2012; Streisand et al., 2005). Increased stress levels reduce people's capacity to be attentive to others and their surroundings (Luyten et al., 2012; Nolte et al., 2013). This mental mechanism is also relevant for parents of children with a CD. The parental burdens associated with a childhood CD may influence parents' ability to provide adequate developmental support to their children (Weijers et al., 2018). Increased stress level may also negatively affect relationship quality between healthy siblings and their parents (Meirsschaut et al., 2010). In

a meta-analysis specifically addressing the parent-child relationship, lower levels of parental responsiveness (220 studies) were found (Pinquart, 2013). Higher levels of parental demandingness (143 studies), overprotection (81 studies), authoritarian parenting (8 studies) and neglectful parenting (6 studies) were also found in the families of a child with CD compared to families without a child with CD (Pinquart, 2013). Another review (12 studies) found that having a child with a CD in the family may lead to changes in family relationships that often results in reduced communication and a suppression of healthy siblings' needs (Deavin et al., 2018). A topical review of studies that have observed family communication in families of a child with CD (14 studies) suggests that these families may demonstrate lower levels of warm and structured communication and higher levels of hostile/intrusive and withdrawn communication compared with families with healthy, typically developing children (Murphy et al., 2017). Hence, a family systems approach to understand how having a child with a CD in the family affects relationships, communication, and each family member, is expedient.

How are Siblings Being Taken Care Of? Legal Rights for Siblings in Norway

In Norway, where the current study was carried out, the law for health personnel was changed in 2017 to improve the legal rights of siblings as next of kin. This change of law came as result of an earlier legislation where the focus was on children as next of kin to parents with mental health disorders, drug addiction and/or severe somatic illnesses or injuries (The Health Personnel Act, §10a, 2010). The increasing knowledge about the effects of being a sibling of a child with severe and prolonged health challenges and the recognition of that fact that the legislative change did not comprise siblings' rights, led to a specification of the health personal act in 2017 (The Health Personnel Act, § 10a). A specification that obliges health care personnel to ensure and safeguard siblings were thus added. However, there are no guidelines about how the health needs of siblings as next of kin are best met.

SIBS: An Intervention for Siblings and Parents of Children with CD

The development of the SIBS (short for "siblings") intervention has sought to meet the need for a feasible and empirically based intervention for siblings in Norway. The main aim of the SIBS intervention is to prevent mental health problems in siblings of children with a CD. The intervention further aims to promote parents' communication skills with their children, and thereby promote their ability to meet the siblings' need for information and recognize the emotions

associated with being a sibling of a child with a CD. SIBS was developed based on research findings by clinical psychologists working with siblings of children with a CD together with families and delegates from patient organizations. The intervention was pilot tested, and the pilot results formed the basis for further adjustment of the final version of SIBS intervention (Vatne et al., 2019). Initially, the SIBS intervention was developed in a two-stage process: (1) Establishment of a knowledge base and (2) Development and pilot-testing of the intervention (Vatne et al., 2019). The intervention was then carried out in an evaluation study by Haukeland et al. (2020). The SIBS intervention comprises five sessions of a duration of twenty to sixty min (see Fig. 1). Three sessions are separate for siblings and parents, and two are joint parent-sibling sessions. The first separate session focuses on knowledge about the CD and the second separate session on the siblings’ feelings associated with being a sibling of a child with a CD. A key element in the intervention is the joint sessions for each sibling and their parent. These are sessions where parents practice communication skills using questions or statements prepared by the siblings. The questions are prepared by the siblings during the separate sessions with assistance from the group leaders. During the joint sessions, the group leaders may guide the parent according to communication principles rehearsed in the separate sessions. Only one parent is invited to participate, as the two joint sessions are meant to be dyadic (i.e., not triadic). Another reason for inviting only one parent to participate, is that this makes it practically easier for families to attend SIBS. The same parent is participating through all

sessions and are encouraged to share what they learn with the parent who does not participate (“non-participating parent”). The SIBS intervention has shown satisfactory acceptability and feasibility with mean sibling and parent satisfaction scores of 3.6 on a 1–4 rating scale. Regarding group leaders’ adherence to the intervention manual, fidelity has been satisfactory (per intervention 85.6%). (Haukeland et al., 2020). The SIBS evaluation study has demonstrated significant improvement in parent-sibling communication quality, siblings’ emotional and behavioral problems, siblings’ adjustment to the disorder and siblings’ disorder knowledge from baseline to follow-up at 3 months and 6 months. The magnitude of the changes indicated small to medium effect sizes (Haukeland et al., 2020). Importantly, the evaluation study by Haukeland et al. (2020) found support for improvement in communication quality to be partly accountable for the improvement in sibling-perceived mental health symptoms. An additional study based on the baseline data collected in in the same study showed that siblings’ self-perceived relationship quality with parents before participating in SIBS was a significant predictor of sibling mental health and sibling adjustment (Fredriksen et al., 2023).

Theoretical Framework

The SIBS intervention is mainly grounded in family systems theory and existing empirical knowledge about important factors for siblings’ well-being and mental health (Vatne et al., 2019). Family systems theory attends to the understanding

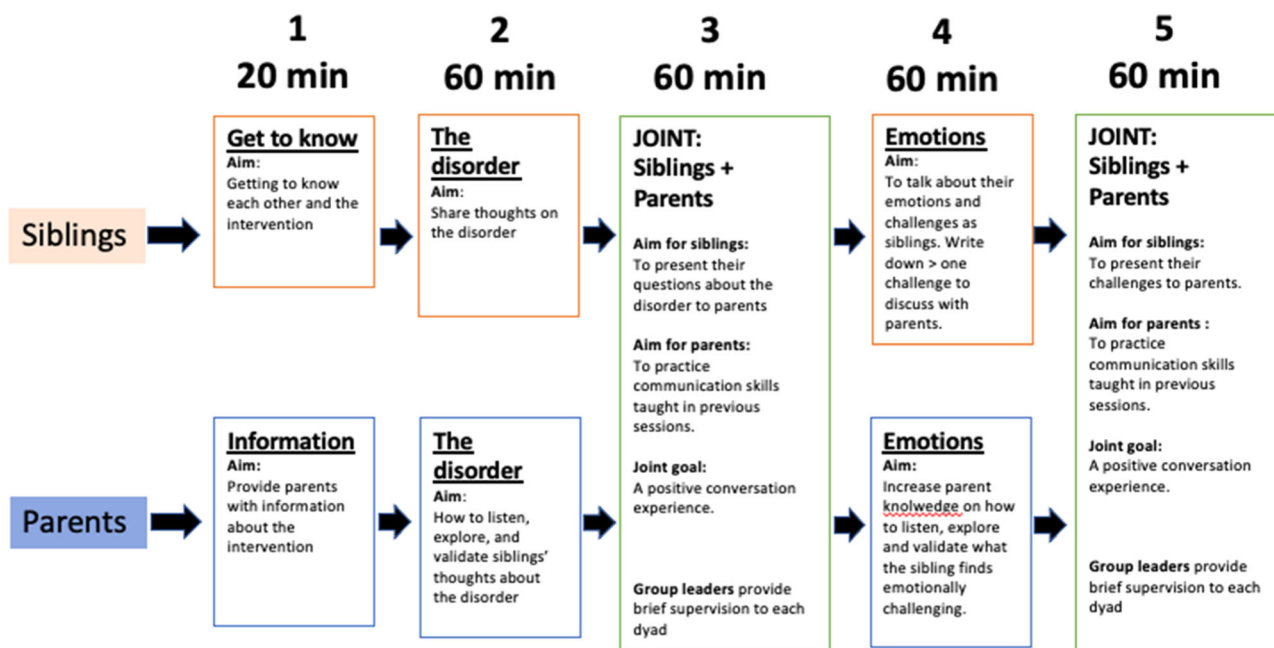


Fig. 1 SIBS Structure and Content

of the mutual reciprocity and dependency of the interaction between members of a family and that of the subsystems like the one between parents and parent—child as well as between siblings (Minuchin, 2018). The most common theoretical framework used to describe interpersonal relationship quality is attachment theory (Bretherton, 1992). Hence, the current study is also grounded in attachment theory. The quality of the parent-child relationship is crucial for children's social, emotional, and cognitive development (Ranson & Urichuk, 2008). According to attachment theory, there are two fundamental attachment dimensions: anxiety and avoidance (Ainsworth et al., 2015). The anxiety dimension represents the extent to which a child is concerned about the availability and responsiveness of the parent (the attachment figure). The avoidance dimension represents the extent to which the child is uncomfortable opening up to and using the attachment figure as a secure base. These dimensions are often assumed to be clearly separable and conceptually independent (Bartholomew, 1990). Children who display a *secure* attachment style typically score low on both the anxiety and avoidance dimension. Since secure attachment is considered the optimal basis for child development, examining anxiety and avoidance in child-parent relationships is important to identify children's needs (Bretherton, 1992; Feeney, 2000).

The Current Study

The current study provides a secondary data analysis on the open trial of SIBS (the evaluation study by Haukeland et al., 2020) and aims to examine whether siblings' perceived relationship quality with their parents changed from pre-intervention to after the SIBS intervention at 3 months and at 6 months after the intervention. We also examine whether the siblings perceive their relationship quality differently with the participating parent relative to the non-participating parent. Hence, sibling perceived relationship quality were examined separately for the participating and the non-participating parent. SIBS is a very brief intervention that aims to initiate an improvement in parental communication skills. To date, most of the studies on siblings of children with a CD have been based on parents' report (Kovshoff et al., 2017), despite clear evidence that there can be discrepancies between parent and child reports of family relationships (Tay et al., 2022; De Los Reyes et al., 2018). We therefore included sibling self-report in the current study. As this study has three measurement points, it allows us to study whether there is a change in both communication and relationship quality *over time* despite the short and compressed intervention design. Communication is crucial for the relationship quality (Galvin et al., 2015). In the open study by Haukeland et al. (2020), communication was a significant predictor of sibling mental health. Hence, communication is also included as a predictor in the current study.

Communication and the parent-child relationship are crucial elements in sibling interventions (Haukeland et al., 2020; Fredriksen et al., 2023; Lummer-Aikey & Goldstein, 2021). These two factors may also be seen as very important to identify the siblings that are most at risk and thus may need interventions (Pinquart, 2013). By focusing on the quality of the relationship between siblings and their parents in the current study, we aimed to better understand further outcomes, and to further explore communication as the potential change-making elements of the SIBS intervention, as indicated in Haukeland et al. (2020).

The current study examines the following three research questions:

- Does the sibling perceived relationship quality with the participating parent in SIBS improve over time?
- Does the sibling perceived relationship quality with the non-participating parent in SIBS improve over time?
- Does sibling perceived communication quality with their parent over time predict relationship quality over time?

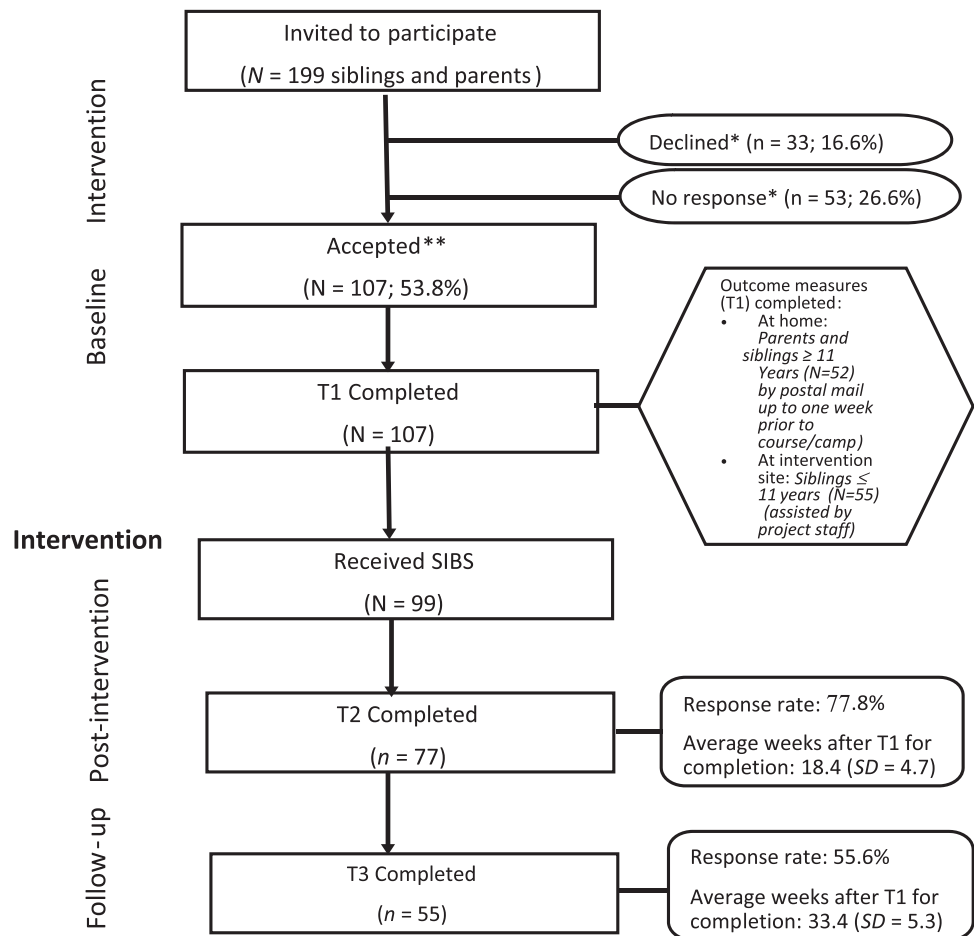
We hypothesized that sibling-perceived relationship quality would improve after participating in the intervention for both the participating and the non-participating parent. Further, we hypothesized that sibling-perceived communication with their parents over time would predict change in relationship quality over time. The last hypothesis is based on the intervention's focus on parental communication skills and the conceptually and empirically established relatedness of these concepts (Haukeland et al., 2020; Huizinga et al., 2005).

Methods

Study Design and Procedures

The current study presents secondary data analysis with longitudinal data collected during the SIBS open trial (2014–2017) in Norway. The SIBS open trial was a clinical study in which participants signed up based on adverts and information leaflets and were screened for eligibility according to pre-defined criteria (being the sibling aged between 8 and 16 years of a child with a CD). There was no control arm in the trial, and the participants were familiar with the one condition of the trial. Hence, the design is non-experimental and correlational. The data collected before the intervention (T1) included demographic variables and baseline measures on various outcomes (e.g., sibling-perceived communication and relationship quality). Time 2 (T2 at 3 months after SIBS) and Time 3 data (T3 at 6 months after SIBS) included repeated measures of outcomes. Siblings and parents were recruited from two specialist centers (for rare disorders and autism, respectively) and user associations for autism, cerebral palsy,

Fig. 2 Study flowchart. * In six cases (3.0%), it was not registered whether the families did not respond or actively declined. ** Eight of these families were not offered SIBS because the intervention was canceled due to too few accepting families (<3) for that course or camp. Haukeland et al.(2020)



congenital heart disease, or Down syndrome. The families were all participating at camps with a duration of two to five overnight stays. The camps were focused on the child with the disorder (i.e., they were not sibling camps). The camps comprised lectures for parents about CD-related topics and recreational activities for all family members. There were no other specific activities targeting siblings except for the SIBS intervention. Prior to the camps, families with at least one typically developing sibling aged 8–16 years received information by regular mail and were invited to take part in the intervention study at the camp. Families in which siblings and/or a parent also had a CD, were excluded. Written informed consent was obtained from parents, and the participants were informed that participation was voluntary. No financial incentives were offered for participation. The study was approved by and conducted in accordance with the Regional Committees for Medical and Health Research Ethics.

We invited 199 siblings and their parents. See Fig. 2 for participant flow. Parents and siblings aged ≥11 years who consented received questionnaires and instructions by postal mail 1 week prior to the camp (T1), and at two follow-up time points: 3 months (T2) and 6 months (T3) after the SIBS intervention. Siblings aged ≤11 years completed the T1

questionnaires at the camp site, with the assistance of a project assistant if needed. At T2 and T3, all parents and siblings received the questionnaires by postal mail. Even though parents and assistants were encouraged to let the siblings complete the questionnaires by themselves, there was no inspection of how much support or influence they gave the children while filling out the questionnaires. To reduce drop-out, SMS reminders were sent before the follow-up time points.

A total of 22 intervention groups were conducted with three to seven siblings and parents in each group. The age range within each sibling group was set to a maximum of 3 years. All groups were led by two group leaders (i.e., three clinical psychologists, one special educator, seven advanced clinical psychology students). Families decided which parent should participate in the SIBS intervention. When two siblings from the same family participated (n = 13), both parents were encouraged to participate but had to remain in the same parent-sibling dyads throughout the intervention. The initial planned sample size n = 120 (total participants), based on a power analysis (G*Power) of the main outcome (The Strengths and Difficulties Questionnaire; Haukeland et al., 2020) showing we needed 100 participants to show medium effects on the main outcome. We reached 83% of

Table 1 Diagnosis of child with a Chronic Disorders

	Percent
RD mainly involving intellectual impairment	29.3
Autism spectrum disorder	25.3
RD mainly involving physical impairment	23.2
Congenital heart disease	12.1
Down syndrome	7.1
Cerebral palsy	3.0

CD chronic disorder, *RD* rare disorder, including: Angelman syndrome, Becker muscular dystrophy, Bethlem myopathy, Chromosome 5q deletion syndrome, Congenital muscular dystrophy, Cri-du-chat syndrome, Duchenne muscular dystrophy, Fragile X syndrome, Friedreich's ataxia, Hereditary ataxia, Humoral immune deficiency, Klinefelter syndrome, Neurodegenerative disease, Neurofibromas type 1, Noonan syndrome, Osteogenesis imperfecta, Prader-Willi syndrome, Smith-Magenis syndrome, Spinal muscular atrophy, Velocardiofacial syndrome

the intended sample size with 99 participating families by the end of the project period (3 years).

Participants

The sample included 99 siblings of children with CD and their parents who were part of the SIBS open trial. The siblings were aged 8–16 years ($M = 11.5$ years; $SD = 2.0$; 54% girls, 46% boys). About half of the children with a CD (54%) had a rare diagnosis (e.g., Angelman syndrome, Becker muscular dystrophy, Bethlem myopathy, Klinefelter syndrome, Noonan syndrome, Spinal Muscular Atrophy). Other children with a CD had autism spectrum disorder (25%), congenital heart diseases (11%), Down syndrome (7%) or cerebral palsy (4%) See Table 1 for overview of the diagnoses. The mean parental age was 40.9 years for mothers ($n = 65$, $SD = 4.9$; $range = 31$ to 53) and 43.8 years for fathers ($n = 34$, $SD = 5.5$; $range = 34$ to 59). One parent per family participated in the intervention (63.3% mothers) however data were collected from both parents. Throughout the SIBS intervention, 33.9% of the participating parents were fathers, 62.8% were mothers, 2.0% were stepmothers and 1.3% missed information about who participated. None of the parents switched from participating to non-participating or the other way around during the intervention. See Table 2 for sample demographics.

Measures

The Experiences in Close Relationships—Relationship Structures Questionnaire (ECR-RS)

The ECR-RS (Norwegian version) was used to measure the quality of siblings' relationship with fathers and mothers, i.e., reported for each parent (Fraley et al., 2000). The 9-item ECR-RS is a self-report instrument designed to

Table 2 Background Information of Participants and CD Diagnosis

	Percent %	Mean	SD	Range
Age of Sibling		11.5	2.0	8–16
Age of Child with CD		10.5	4.2	3–21
Age of Mother		40.9	4.9	31–53
Age of Father		43.8	5.5	34–59
Number of children per family		3.1	1.0	2–6
Siblings Girls	54.5			
Siblings Boys	45.5			
Participating parent mother	63.3			
Participating parent father	33.3			
Sibling relationship order				
Siblings older than child with CD	54.2			
Family structure				
Parents of siblings living together	73.8			
Shared custody	20.6			
Single-parent household	5.6			
Parental education (%with ≥ 4 years of higher education)				
Paternal education	27.2			
Maternal education	39.4			
Family economy				
“Good”	57.9			
“Neither good nor poor”	28.4			
“Poor”	7.8			
“Varying a lot”	1.9			

assess attachment patterns in a variety of close relationships. The scale was selected because it is based on attachment theory which is the most acknowledged theory regarding how relationships are established from early childhood and onwards (Fraley & Roisman, 2019). Siblings rated their relationship with parents on a 7-point scale from 1 (*correct*) to 7 (*incorrect*) (e.g., “It is easy for me to trust my mother/father”). Low scores indicate a good relationship (secure attachment style), while high scores indicate poor relationship quality (insecure attachment style). The questionnaire is divided into two subscales based on the two fundamental dimensions underlying attachment patterns: anxiety (six items) and avoidance (three items) (Fraley et al., 2000). Satisfactory reliability has been reported for the original version of the ECR-RS (Cronbach's $\alpha = 0.88$ – 0.92) (Fraley et al., 2011). Robust validation for the two-factor structure has been found (Feddern Donbaek & Elklit, 2014). The ECR-RS was developed based on a large population study with >20,000 adults recruited online (Fraley et al., 2011), but has also been used with adolescents in residential care (Costa et al., 2020) and non-clinical school-based child populations (Marci et al., 2019). In the current study, internal consistency (Cronbach's alpha) for the ECR-RS

two subscales was $\alpha = 0.79$ for ECR-RS anxiety about mothers and $\alpha = 0.79$ about fathers, $\alpha = 0.78$ for ECR-RS avoidance about mothers and $\alpha = 0.74$ about fathers.

The Parent-Child Communication Scale (PCCSc)

The PCCSc (Conduct Problems Prevention Research Group, 1994) (Norwegian version) was used to measure quality of parent-sibling communication. The 3-item child communication subscale was used in the present study. This subscale measures how children communicate feelings and problems to their parent. Siblings rated their communication with parents on a 5-point scale from 1 (almost never) to 5 (almost always) (“Do you discuss problems with your father/mother?”, “Do you think you can tell your father/mother how you really feel about something?” and “Can you let your father/mother know what’s bothering you?”). High scores on this subscale indicate good communication quality. The PCCSc child communication subscale was used in the current report because it is short and has shown better reliability than the subscale measuring children’s rating of how they experience parents’ communication (Orm et al., 2022) (e.g., “Does your father/mother try to understand what you think?”, “Can your father/mother tell how you are feeling without asking you?”). In the current study, internal consistency (Cronbach’s alpha) of the child communication subscale of the PCCSc was $\alpha = 0.78$ about mothers and $\alpha = 0.82$ about fathers.

The ECR-RS and the PCCSc were used in a Norwegian study on a similar population as in the current study (Haukland et al., 2021). Correlation between the responses on these questionnaires was significant but did differ. Hence, these correlations support that the two questionnaires are measuring quality aspects of the relationship and/or communication between parents and their children, that the questionnaires are intertwined but do not measure the same.

Data Analyses

As a preliminary analysis, we used General Linear Model ANOVAs to examine differences in sibling-perceived relationship quality between participating and non-participating parent considering sibling and parent gender at T1. We conducted this analysis to determine whether gender (sibling or parent) should be controlled for in the subsequent models. To answer the research questions, we then fitted several growth curve models with relationship quality (anxiety and avoidance) for the participating and the non-participating parent, respectively, as the dependent variables across T1, T2, and T3. These models were used to evaluate changes in mean scores at the group level over time (i.e., trajectories) (Gelman & Hill, 2006). This

approach also enables inclusion of participants with partial data (Heck & Thomas, 2020). We examined separate growth curve models for each of the four outcome variables, i.e., ECR-RS anxiety and avoidance for the participating and non-participating parent. To ease interpretability of our findings and disentangle the roles of the variation at T1 (intercept), time (i.e., slope), communication quality, and parent gender, we conducted the growth curve analyses in several stages. All models included random intercept and slopes to control for between-subject variance at baseline and over time. We report five models with increased complexity per outcome, with the following fixed effects: The baseline model (Model 1) only included an intercept. In Model 2 we added a linear effect of time. In Model 3 we added the time varying variable *sibling-reported parent-child communication* as a predictor. In the models for the relationship with the participating parent, we used communication with the participating parent, and in the models for the relationship with the non-participating parent, we used communication with the non-participating parent. In Model 4 we added the gender of the participating parent as a control variable to investigate a possible effect of the parent being the mother or the father on the communication variable. In Model 5 we added an interaction effect between time and the gender of the participating parent to examine whether parent gender also played a role over time. The variable “time” was coded in accordance with the three equally distanced measurement points (0 = T1; 1 = T2; 2 = T3). We used the Akaike Information Criterion (AIC) to determine which model provided best model fit, with lower numbers indicating better fit (Cavanaugh & Neath, 2019). All analyses were conducted using R version 4.1.2R (R Core Team, 2021) and version 1.1–27.1 of the lme4 mixed models’ package (Bates et al., 2015).

We calculated the effect sizes between T1 and T2 and T3 for all the outcome variables using Cohen’s *d* with the following indicators for small ($d = 0.20$), medium ($d = 0.50$), and large ($d = 0.80$) effect sizes (Cohen, 1988). Little’s (1986) missing-completely-at-random (MCAR) test indicated that the data were missing completely at random. Further analysis showed that 44.4% of participating families were lost to final follow-up T3 for unknown reasons. Examination of selective attrition showed no significant differences in socio-economic status or baseline scores for the four outcome measures.

Results

To examine if any of the independent variables (sibling gender, parent gender, participating or non-participating parent) were significantly associated with the dependent variables at baseline (ECR-RS Relationship quality: Anxiety

Table 3 Examination at T1 of Mean Anxiety Scores of Siblings' Perception of Quality of the Relationship with Parents based on Parent Participation, Parent Gender and Child Gender measured by ECR-RS (The Experiences in Close Relationships—Relationship Structures Questionnaire)

Sibling Gender	Model 1a. Participating Parent		Model 1b. Non-Participating Parent	
	Mother	Father	Mother	Father
GIRL	Mean = 1.94	Mean = 1.86	Mean = 1.93	Mean = 1.90
	SD = 1.30	SD = 1.39	SD = 1.51	SD = 1.65
BOY	Mean = 1.63	Mean = 2.11	Mean = 1.75	Mean = 2.07
	SD = 1.09	SD = 1.76	SD = 2.13	SD = 1.13

Analyses with General Linear Model GLM ANOVA. Providing information on differences in Siblings' ECR-RS Anxiety Scores at T1 dependent on sibling gender, parent gender and participating or non-participating parent. Model 1a: $F(df = 3) = 0.498$, $p = 0.695$. Model 1b: $F(df = 3) = 0.144$

SD standard deviation

$p = 0.933$

and avoidance dimensions) we used General Linear Model ANOVAs. The analysis provided information about the siblings' report about their perceived relationship quality with their participating and non-participating parent at baseline (T1) while considering the siblings' gender and their parent's gender. The overall multiple comparison models showed no significant determinants. See Tables 3 and 4.

Growth Curve Models

See Table 5 for parameter estimates from the models predicting the four outcomes, i.e., anxiety and avoidance for the participating and the non-participating parent, respectively. Across all outcomes, the variances in intercept were significant for the anxiety and avoidance variables for both the participating and the non-participating parent. This means that the families' starting point before the intervention were significantly different for both the anxiety and the avoidance subscales (Model 1). In terms of the effects of time (i.e., models for slope with no other predictors – Model 2), there was a significant improvement in the sibling-perceived ECR-RS anxiety subscale both for the participating and non-participating parent. The effect sizes varied from $d = 0.12$ – 0.41 . See Table 6 for all effect size values. There was no time effect for the ECR-RS avoidance subscale, neither for the participating nor for the non-participating parent.

When PCCS over time was added as a predictor, the effect of time alone on the ECR-RS anxiety subscale remained significant for the participating parent but was no longer significant for the non-participating parent. This means that enhanced communication over time explained variance in the ECR-RS anxiety subscale over time for both

Table 4 Examination at T1 of Mean Avoidance Scores of Siblings' Perception of Quality of the Relationship with Parents based on Parent Participation, Parent Gender and Child Gender measured by ECR (The Experiences in Close Relationships—Relationship Structures Questionnaire)

Sibling Gender	Model 2a. Participating Parent		Model 2b. Non-Participating Parent	
	Mother	Father	Mother	Father
GIRL	Mean = 2.40	Mean = 2.54	Mean = 3.02	Mean = 2.27
	SD = 1.04	SD = 1.34	SD = 1.40	SD = 1.49
BOY	Mean = 2.65	Mean = 2.00	Mean = 2.99	Mean = 2.15
	SD = 1.09	SD = 0.82	SD = 1.15	SD = 1.07

Analyses with General Linear Model GLM ANOVA. Providing information on differences in Siblings' ECR-RS Avoidance Scores at T1 dependent on sibling gender, parent gender, and participating or non-participating parent. Model 1a: $F(df = 3) = 1.263$, $p = 0.292$. Model 1b: $F(df = 3) = 2.520$

SD standard deviation

$p = 0.063$

the participating and the non-participating parent. For the participating parent, however, the separate effect of time remained significant when communication was added. In other words, whereas both communication and time predicted ECR-RS anxiety subscale change for the participating parent, only communication (and not time) predicted this for the non-participating parent. Parent-child communication was also a significant predictor of the ECR-RS avoidance subscale over time for both the participating and the non-participating parent.

In the final models, mother as participating parent was added as a control variable. Firstly, because two thirds of the participating parents were mothers and secondly, because studies have found different relationship quality between mothers and fathers (mothers as “safe haven figures” and fathers as facilitators of children's exploration system) (Dumont & Paquette, 2013; Yaffe, 2023). With one exception, mother participation was not a significant predictor and did not improve model fit. The exception was the model for the ECR-RS avoidance slope for the non-participating parent, in which mother as participating parent was a significant predictor. However, the interaction with time predictor (Mother*Time) was not significant. This indicates that the sibling perceived avoidance score remained worse with the non-participating parent when the participating parent was the mother across the time points. In other words, the sibling perceived avoidance with fathers is higher than with mothers throughout the measurement period.

Using the AIC to determine model fit, the summarizing overall findings per outcome was as follows: For the ECR-RS anxiety dimension for the participating parent, the model with the best fit showed that both time and enhanced sibling perceived communication with that parent was associated with a

Table 5 Growth Curve Models of the Relationship Measure for Participating and Non-participating Parent Across Time

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Est	95% CI	Est	95% CI	Est	95% CI	Est	95% CI	Est	95% CI
Sibling ECR-Anxiety Dimension with Participating Parent										
Fixed effects										
Intercept	1.70	1.47, 1.93	1.88	1.61, 2.14	2.64	1.95, 3.35	2.64	1.85, 3.44	2.85	2.03, 3.68
Time			-0.26	-0.40, -0.13	-0.21	-0.37, -0.06	-0.21	-0.37, -0.07	-0.37	-0.61, -0.13
PCCS-pp					-0.20	-0.38, -0.03	-0.20	-0.38, -0.03	-0.22	-0.40, -0.04
Mother							0.00	-0.51, 0.51	-0.21	-0.78, 0.34
Mother*Time									0.24	-0.05, 0.53
Model fit	649.6		636.3		594.3**		597.2		598.7	
AIC										
Sibling ECR-Anxiety Dimension with Non-Participating Parent										
Fixed effects										
Intercept	1.71	1.48, 1.94	1.85	1.55, 2.15	2.78	2.02, 3.53	2.69	1.85, 3.52	2.93	2.02, 3.84
Time			-0.27	-0.51, -0.04	-0.23	-0.48, 0.02	-0.23	-0.49, 0.02	-0.45	-0.90, -0.03
PCCS-npp					-0.25	-0.43, -0.06	-0.24	-0.43, -0.05	-0.25	-0.43, -0.06
Mother							0.11	-0.32, 0.53	-0.23	-0.90, 0.43
Mother*Time									0.34	-0.17, 0.87
Model fit	695.2		679.9		616.2**		619.2		620.4	
AIC										
Sibling ECR-Avoidance Dimension with Participating Parent										
Fixed effects										
Intercept	2.41	2.21, 2.61	2.42	2.22, 2.63	3.68	3.09, 4.28	3.50	2.84, 4.16	3.67	2.98, 4.39
Time			-0.02	-0.14, 0.09	0.06	-0.07, 0.19	0.06	-0.07, 0.18	-0.08	-0.29, 0.13
PCCS-pp					-0.34	-0.50, -0.19	-0.34	-0.49, -0.19	-0.36	-0.51, -0.21
Mother							0.24	-0.16, 0.65	0.09	-0.35, 0.53
Mother*Time									0.21	-0.05, 0.47
Model fit	606.4		615.3		543.4**		545.4		547.2	
AIC										
Sibling ECR-Avoidance Dimension with Non-Participating										
Fixed effects										
Intercept	2.67	2.42, 2.92	2.70	2.43, 2.96	4.60	3.88, 5.32	4.15	3.35, 4.97	4.07	3.25, 4.91
Time			-0.04	-0.20, 0.11	0.08	-0.10, 0.24	0.07	-0.15, 0.23	0.17	-0.13, 0.47
PCCS-npp					-0.52	-0.71, -0.34	-0.50	-0.69, -0.31	-0.49	-0.68, -0.31
Mother							0.55	0.08, 1.02	0.64	0.13, 1.14
Mother*Time									-0.15	-0.50, 0.22
Model fit	647.1		647.5		567.1		564.9**		567.9	
AIC										

Significant estimates in bold. ** = Best model fit. Negative numbers indicate reduction in the dependent variables i.e., improvement

Est estimates, CI confidence intervals (with lower and upper bound), ECR The Experiences in Close Relationships—Relationship Structures Questionnaire, pp participating parent, npp non-participating parent, PCCS The Parent-Child Communication Scale (child-rated child communication subscale)

Table 6 Effect Sizes between T1 and T3 and T3 for all Outcome Variables

	T2	T3
Relationship anxiety with participating parent from T1	0.34	0.41
Relationship anxiety with non-participating parent from T1	0.12	0.04
Relationship avoidance with participating parent from T1	0.35	0.33
Relationship avoidance with non-participating parent from T1	0.21	0.12

Effect sizes measured by Cohen's *d*. Changes in the relationship quality between siblings and parents at three measure points: T1 = before the intervention, T2 = 3 months, and T3 = 6 months after the intervention

reduced anxiety slope. For the ECR-RS anxiety dimension for the non-participating parent, the model with the best fit showed that only enhanced sibling perceived communication with that parent (and not time) was associated with a reduced anxiety slope. For the ECR-RS avoidance dimension for the participating parent, the model with the best fit showed that only enhanced sibling perceived communication with that parent (and not time) was associated with a reduced avoidance slope. For the ECR-RS avoidance dimension for the non-participating parent, the model with the best fit showed that enhanced sibling perceived communication with that parent was associated with a reduced avoidance slope, and that avoidance remained higher with the non-participating parent (i.e., the father) over time. Hence, the overall pattern of results was that the ECR-RS anxiety dimension was reduced over time. This effect was demonstrated above and beyond the effect of communication enhancement for the participating parent, but not for the non-participating parent. There was no improvement over time on the ECR-RS avoidance dimension, but enhanced communication over time influenced ECR-RS avoidance, and sibling perceived avoidance with the father remained higher than with the mother when mothers participated in SIBS.

Discussion

This study investigated changes in sibling-perceived relationship quality with their parents over time after participating in the SIBS intervention. The intervention was carried out on camps for families of children with a CD. The first study question explored whether sibling-perceived relationship quality with the participating parent improved over time after participating in the SIBS intervention. As expected, our analyses showed that siblings' perceptions of their relationship with their participating parents significantly improved over time (from T1 baseline, to T2 and T3 at 3 month and 6 months after SIBS) but only on the anxiety dimension. This means that siblings' perceived

anxiety with their participating parents was reduced over time. Contrary to what was expected, siblings' perceptions of avoidance with their participating parent did not improve over time (meaning, siblings' perceived avoidance or discomfort in their relationship with the participating parent had not changed over time). Hence, our first hypothesis was partly supported.

We also examined if the sibling-perceived relationship with the non-participating parent changed over time after the SIBS intervention. This was important to examine, although we had no way of knowing how much information the participating parent gave to the non-participating parent during and after the intervention. As anticipated, we found a positive change. However, as for the participating parent, there was an improvement of the anxiety dimension of the relationship with the non-participating parent but not of the avoidance dimension. Hence, the same pattern of change in the relationship quality with the parent was thus found independently of whether the parent had participated in the SIBS intervention or not.

The anxiety dimension represents worry about attachment-related concerns, such as the availability and responsiveness of the attachment figure. The avoidance dimension represents discomfort concerning opening up to and depending on others (Fraleley et al., 2011). A change in the anxiety dimension implies that participation in SIBS may affect the siblings' experience of their parents being available and responsive, rather than how they feel about opening up to others. A plausible interpretation is that the finding of a change in the anxiety dimension reflects the emphasis on the communication training element of the SIBS intervention and a following improvement of the parents' communication skills. The lack of significant change in the avoidance dimension may be understood in light of findings from other sibling studies. Previous studies have shown that siblings tend to adapt to the situation of having a child with a CD in the family by coping with emotional experiences alone to protect their parents from added burden (Deavin et al., 2018; Fullerton et al., 2017; Haukeland et al., 2015). Together with the study of Murphy et al. (2017) on communication patterns in families of children with a CD (e.g., communicate less and characterized by less openness and warmth), these results might indicate that a more comprehensive or prolonged intervention than SIBS is required to promote communication and relationship quality in the families of children with CD.

We also examined if sibling perceived communication predicted change in the relationship quality. Our hypothesis was largely supported, as the results showed that sibling perceived communication with parents over time explained variance in the amount of change in relationship quality on all the outcomes. In fact, there was only one model in which the effect of time remained significant while controlling for

communication change, i.e., the improved ECR-RS anxiety in relation to the participating parent. Overall, this indicates that parent-child communication explains much variance in parent-child relationship quality.

Before intervention participation, no differences were found in the perceived relationship quality dependent on sibling gender or parent gender. However, the results showed that when the mother participated in the intervention, the sibling perceived relationship quality on the avoidance dimension did not improve in relation to the non-participating parent. On the contrary, the participation of the mother indicated that the relationship worsened with the non-participating parent (father). Both theory and empirical findings support a disparity in mothers' and fathers' relationship quality or parenting styles (mothers as "safe haven figures" and fathers as facilitators of children's exploration system) (Dumont & Paquette, 2013; Yaffe, 2023). Hence, a possible understanding of the worsening of the sibling perceived relationship with the non-participating parent, may be explained by the qualitative difference in parenting styles. However, support for this explanation was not supported by the results of the GLM Anova analysis of the assessment before the intervention, as no significant differences in relationship quality were shown dependent on parent gender in this study. As mothers are usually perceived to be more accepting, responsive, and supportive towards their children, this might be the explanation of why the sibling perceived relationship quality was rated as worse (on the avoidance dimension) to the non-participating parent (the father). The result may also reflect that the closest or most confident parent chose to participate in the intervention.

This study draws on attachment theory and the idea that emotional bonds between the child and the primary caregivers is established in early developmental years. Attachment theory entails that early relational experiences are fundamental for how comfortable individuals are with closeness, attitudes towards relations and how well individuals are able to communicate their needs and feelings in close relationships (Ainsworth et al. 2015). Together with Mary Ainsworth, John Bowlby introduced the concept of "working models". Working models are seen as mental structures established in early developmental years. These are mental representations of individuals' relationship with their primary caregiver that becomes a template for future relationships (Bretherton & Munholland, 2008). Hence, it is reasonable to assume that relationship quality can be seen as a more profound and unalterable psychological construct than communication. SIBS is a brief and intensive intervention tailored to the needs of families of children with a CD. The fact that we found a change in relationship with the non-participating as well as the participating parent is promising. Bearing in mind that the lack of a control condition

means we know nothing about causality, it may mean that a short and concentrated intervention could be sufficient to influence parent-child relationship quality. Conceptually, the result of a quality change in more than one relationship is supported by the understanding in family systems theory that SIBS builds on. Family systems theory posits that relationships in a family are not isolated constructs but mutually influence each other (Minuchin, 2018). The results from the growth curve analyses suggest that sibling perceived relationship quality on the anxiety dimension improved significantly over time to both the participating and the non-participating parent and that improved parent-child communication may be a driving force for this change for the participating parent. Hence, understood in the frames of family systems theory, a change in one relationship may lead to changes in another relationship. Even though there were no other sibling-focused activities at the camps where SIBS was delivered, the changes found in this study must be seen in the light of the potential impact of other elements of camp participation on communication and relationship within the family.

Implications

Despite the growing recognition of a family systems understanding of the effect of having a child with a CD on siblings (Mitchell et al., 2021; Tudor & Lerner, 2015), interventions directed towards families and relationships between family members are scarce (Kelada et al., 2022; Wolff et al., 2023). Most studies evaluating interventions for siblings have focused on psychoeducation (i.e., information about illness, diagnosis, and treatment) delivered directly to siblings in the context of therapeutic support groups or recreation camps, with limited effects on sibling outcomes (Hartling et al., 2014; Mitchell et al., 2021; Tudor & Lerner, 2015). The recent systematic review of sibling interventions that included parent- and child-focused intervention components found only six intervention studies (Mitchell et al., 2021). The results of the current study imply that interventions for siblings and their parents may have positive effects on both communication and relationship quality.

A review of recreation camps for families of children with CD found that camp attendance was related to positive parent and sibling psychosocial outcomes, but that it is not yet clear to what extent camp participation influences family-level outcomes (Rea et al., 2019). In this context, family level outcomes (e.g., relationship or communication quality) as opposed to individual (child or parent) level outcomes (e.g., mental, or physical health status), refer to conditions involving interactions between family members that affect more than a single individual in a family unit. The Rea et al. (2019) review further concluded that more

research should specifically assess family outcomes, including communication and family functioning and the impact of incorporating well-defined interventions into the traditional recreation camps. Hence, SIBS with its' intention to promote communication and its possible positive impact on relationship quality may be an appropriate intervention to implement also in recreational camps. The health legislation in the country of this study has recently been changed according to existing knowledge about the health risks of siblings of children with a CD and emphasizes health personnel's obligation to take care of siblings' needs. The result of the current study finds support for the SIBS intervention and thus that SIBS program may be an eligible option for siblings of children with a CD and their parents.

Strengths

The current study has several strengths. First, this study intended to get hold of sibling's own perceptions. Even though some siblings were assisted by parents or project assistants in the completion of the questionnaires and that the questionnaires were filled out at home, this approach is an important contribution, as previous studies have largely relied on parent reports (Wolff et al., 2023). The parents or assistants were encouraged to let the siblings fill out the questionnaires as independently as possible, but we do not have any control of how much their actual attendance influenced the siblings' answers. However, we considered this approach being a better option to obtain as complete data as possible over the risk of not receiving responses from the youngest siblings. Second, compared to other intervention studies of children with a CD (Hartling et al., 2014; Mitchell et al., 2021; Tudor & Lerner, 2015), we had an appropriate sample size based on power analysis. In the latest review on sibling intervention groups with 24 included studies, the sample which the current study is based on, has the largest number of participants (Wolff et al., 2023). Third, even though two thirds of the participants were mothers, we also included data from fathers, who were better represented than in comparable studies (e.g., Tudor & Lerner, 2015). Fourth, we applied a design with three measure points which provided information about changes of outcome over time and potentially different impact trajectories. Finally, the intervention is manual based, with satisfactory group leader adherence. This is a particularly important aspect of the intervention, as a frequent critique has been that sibling interventions are typically associated with methodological issues and are loosely described (Mitchell et al., 2021).

Study Limitations

A primary limitation of this study was the lack of a control group. Hence, although we identified a positive change in

the ECR anxiety dimension from baseline to 6-month post-intervention, we cannot claim to have identified an effect of the intervention. Furthermore, severity of the CD has been found to be a significant predictor of sibling mental health (Vermaes et al., 2012). The sample in the current study was heterogenous in terms of diagnoses and the severity were not assessed. The siblings included had a wide age range, and the sample comprised mainly parents with medium to high socio-economic status. Furthermore, the siblings' scores on the relationship- and communication measures did not indicate impaired family interactions. Hence, it is not clear how the intervention would affect other populations with poorer parent-child relationships. It is also important to notice that we do not know how much influence parents had on the siblings' responses as they filled out the questionnaires mostly at home. The families were partly recruited from camps at a specialist center and were already a selected group of people who actively were seeking support. Even though the camp in general focused on the child with a CD, it is not possible to disentangle the effect of participation in the SIBS intervention from a possible effect of mere attendance on the camp. Hence, it is important to be cautious about generalization of the results.

Conclusion and Recommendations for Future Research

The sibling-perceived anxiety in relation to their parents was reduced over time after the SIBS intervention. This finding applied both to the participating and the non-participating parent. Communication appears to influence the positive development of relationship quality. Our study provides tentative support for the SIBS intervention and its' brief and concentrated format. There is a need to identify what elements in interventions towards siblings of children with a CD are effective (Marquis et al., 2022). The findings from this study have clinical implications and highlight the importance of parental involvement. The study indicates potential value of focusing on communication and relationship quality in interventions towards siblings. The results support the relevance of applying family systems theory in understanding how a CD impacts siblings. The SIBS intervention is structured to directly target communication between parents and the siblings. In addition, the intervention is short and requires the participation of one parent only. Hence, on the background of the existing empirical findings from the SIBS studies, the SIBS intervention appears to be a feasible option to support families of children with chronic disorders. Some studies of siblings of children with heterogenous conditions including mixed groups of participants with chronic physical or psychiatric conditions report both negative and positive effects of having a sibling with a CD (Marquis et al., 2019; McKenzie

Smith et al., 2018). Hence, relationship and communication quality may be important indicators of which siblings are in need preventive interventions. However, there is a need to replicate this study with a similar population within the frame of a randomized controlled design before conclusions can be drawn. Further, more research on how to enhance family communication and relationship quality in families of children with CDs can be useful in the effort to promote siblings' mental health.

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Compliance with Ethical Standards

Conflict of interest We have no conflicts of interest to disclose. Authors Torun M. Vatne, Yngvild B. Haukeland, and Krister W. Fjermestad are developers of the SIBS intervention.

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References

- Afzal, N., Ye, S., Page, A. C., Trickey, D., Lyttle, M. D., Hiller, R. M., & Halligan, S. L. (2023). A systematic literature review of the relationship between parenting responses and child post-traumatic stress symptoms. *European Journal of Psychotraumatology*, 14(1). <https://doi.org/10.1080/20008066.2022.2156053>.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. N. (2015). *Patterns of attachment: A psychological study of the strange situation*. Psychology Press. <https://doi.org/10.4324/9780203758045>.
- Bartholomew, K. (1990). Avoidance of intimacy: An attachment perspective. *Journal of Social and Personal Relationships*, 7(2), 147–178. <https://doi.org/10.1177/0265407590072001>.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48. <https://doi.org/10.18637/jss.v067.i01>.
- Bowen, M., & Kerr, M. E. (2009). *Family Evaluation*. W. W. Norton & Company.
- Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology*, 28(5), 759–775. <https://doi.org/10.1037/0012-1649.28.5.759>.
- Bretherton, I., & Munholland, K. A. (2008). Internal working models in attachment relationships: Elaborating a central construct in attachment theory. I *Handbook of attachment: Theory, research, and clinical applications*, (2nd ed., pp. 102–127). The Guilford Press.
- Brown, R. T., Wiener, L., Kupst, M. J., Brennan, T., Behrman, R., Compas, B. E., David Elkin, T., Fairclough, D. L., Frieberg, S., Katz, E., Kazak, A. E., Madan-Swain, A., Mansfield, N., Mullins, L. L., Noll, R., Patenaude, A. F., Phipps, S., Sahler, O. J., Sourkes, B., & Zeltzer, L. (2008). Single parents of children with chronic illness: An understudied phenomenon. *Journal of Pediatric Psychology*, 33(4), 408–421. <https://doi.org/10.1093/jpepsy/jsm079>.
- Cavanaugh, J. E., & Neath, A. A. (2019). The Akaike information criterion: Background, derivation, properties, application, interpretation, and refinements. *Wiley Interdisciplinary Reviews: Computational Statistics*, 11(3), e1460.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>.
- Cohn, L. N., Pechlivanoglou, P., Lee, Y., Mahant, S., Orkin, J., Marson, A., & Cohen, E. (2020). Health outcomes of parents of children with chronic illness: A systematic review and meta-analysis. *The Journal of Pediatrics*, 218, 166–177.e2. <https://doi.org/10.1016/j.jpeds.2019.10.068>.
- Conduct Problems Prevention Research Group. (1994). Parent-Child Communication, Child Report.
- Costa, M., Melim, B., Tagliabue, S., Mota, C. P., & Matos, P. M. (2020). Predictors of the quality of the relationship with caregivers in residential care. *Children and Youth Services Review*, 108, 104579. <https://doi.org/10.1016/j.childyouth.2019.104579>.
- Deavin, A., Greasley, P., & Dixon, C. (2018). Children's perspectives on living with a sibling with a chronic illness. *Pediatrics*, 142(2). <https://doi.org/10.1542/peds.2017-4151>.
- De Los Reyes, A., Ohannessian, S. M., & Racz, S. J. (2018). Discrepancies between adolescent and parent reports about family relationships. *Child Development Perspectives*, 13(1), 53–58. <https://doi.org/10.1111/cdep.12306>.
- Dumont, C., & Paquette, D. (2013). What about the child's tie to the father? A new insight into fathering, father-child attachment, children's socio-emotional development and the activation relationship theory. *Early Child Development and Care*, 183(3-4), 430–446.
- Fedderm Donbaek, D., & Elklit, A. (2014). A validation of the Experiences in Close Relationships-Relationship Structures scale (ECR-RS) in adolescents. *Attachment & human development*, 16(1), 58–76.
- Eccleston, C., Fisher, E., Law, E., Bartlett, J., & Palermo, T. M. (2015). Psychological interventions for parents of children and adolescents with chronic illness. *The Cochrane database of systematic reviews*, 4(4), CD009660. <https://doi.org/10.1002/14651858.CD009660.pub3>.
- Feeney, J. A. (2000). Implications of attachment style for patterns of health and illness. *Child: Care, Health and Development*, 26(4), 277–288. <https://doi.org/10.1046/j.1365-2214.2000.00146.x>.
- Feudtner, C., Nye, R. T., Boyden, J. Y., Schwartz, K. E., Korn, E. R., Dewitt, A. C., Waldman, A. T., Schwartz, L. A., Manocchia, M., Xiao, R., Lord, B. T. & Hill, D. L. (2021). Association between children with life-threatening conditions and their parents' and siblings' mental and physical health. *JAMA Netw Open*, 4(12), e2137250. <https://doi.org/10.1001/jamanetworkopen.2021.37250>.
- Fraley, R. C., & Roisman, G. I. (2019). The development of adult attachment styles: Four lessons. *Current Opinion in Psychology*, 25, 26–30.
- Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The experiences in close relationships—Relationship

- Structures Questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment*, 23(3), 615–625. <https://doi.org/10.1037/a0022898>.
- Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, 78(2), 350–365. <https://doi.org/10.1037/0022-3514.78.2.350>.
- Fredriksen, T., Marie Vatne, T., Bjartveit Haukeland, Y., Tudor, M., & Fjermestad, K. W. (2023). Siblings of children with chronic disorders: family and relational factors as predictors of mental health. *Journal of Child Health Care*, 27(1), 145–159.
- Fullerton, J. M., Totsika, V., Hain, R., & Hastings, R. P. (2017). Siblings of children with life-limiting conditions: Psychological adjustment and sibling relationships. *Child: Care, Health and Development*, 43(3), 393–400. <https://doi.org/10.1111/cch.12421>.
- Galvin, K. M., Braithwaite, D. O., & Bylund, C. L. (2015). *Family communication: Cohesion and change*. Routledge.
- Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press.
- Golfenshtein, N., Srulovici, E., & Medoff-Cooper, B. (2016). Investigating parenting stress across pediatric health conditions: a systematic review. *Comprehensive Child and Adolescent Nursing*, 39(1), 41–79.
- Hartling, L., Milne, A., Tjosvold, L., Wrightson, D., Gallivan, J., & Newton, A. S. (2014). A systematic review of interventions to support siblings of children with chronic illness or disability. *Journal of Paediatrics and Child Health*, 50(10), E26–E38. <https://doi.org/10.1111/j.1440-1754.2010.01771.x>.
- Haukeland, Y. B., Czajkowski, N. O., Fjermestad, K. W., Silverman, W. K., Mossige, S., & Vatne, T. M. (2020). Evaluation of “SIBS”, An intervention for siblings and parents of children with chronic disorders. *Journal of Child and Family Studies*, 29(8), 2201–2217. <https://doi.org/10.1007/s10826-020-01737-x>.
- Haukeland, Y. B., Fjermestad, K. W., Mossige, S., & Vatne, T. M. (2015). Emotional experiences among siblings of children with rare disorders. *Journal of Pediatric Psychology*, 40(7), 712–720. <https://doi.org/10.1093/jpepsy/jsv022>.
- Heck, R. H., & Thomas, S. L. (2020). *An introduction to multilevel modeling techniques: MLM and SEM Approaches* (4. utg.). Routledge. <https://doi.org/10.4324/9780429060274>.
- Helgeson, V. S., Becker, D., Escobar, O., & Siminerio, L. (2012). Families with children with diabetes: Implications of parent stress for parent and child health. *Journal of Pediatric Psychology*, 37(4), 467–478. <https://doi.org/10.1093/jpepsy/jsr110>.
- Huizinga, G. A., Visser, A., van der Graaf, W. T. A., Hoekstra, H. J., & Hoekstra-Weebers, J. E. H. M. (2005). The quality of communication between parents and adolescent children in the case of parental cancer. *Annals of Oncology*, 16(12), 1956–1961. <https://doi.org/10.1093/annonc/mdi395>.
- Kelada, L., Wakefield, C. E., Drew, D., Ooi, C. Y., Palmer, E. E., Bye, A., & Kennedy, S. (2022). Siblings of young people with chronic illness: Caring responsibilities and psychosocial functioning. *Journal of Child Health Care*, 26(4), 581–596.
- Kovshoff, H., Cebula, K., Tsai, H. W. J., & Hastings, R. P. (2017). Siblings of children with autism: The siblings embedded systems framework. *Current developmental disorders reports*, 4, 37–45.
- Little, R. J. A. (1986). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83, 1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>.
- Long, K. A., Pariseau, E. M., Muriel, A. C., Chu, A., Kazak, A. E., & Alderfer, M. A. (2018). Development of a psychosocial risk screener for siblings of children with cancer: Incorporating the perspectives of parents. *Journal of Pediatric Psychology*, 43(6), 693–701. <https://doi.org/10.1093/jpepsy/jsy021>.
- Lummer-Aikey, S., & Goldstein, S. (2021). Sibling adjustment to childhood chronic illness: an integrative review. *Journal of Family Nursing*, 27(2), 136–153.
- Luyten, P., Fonagy, P., Lowyck, B., & Vermote, R. (2012). Assessment of mentalization. I *Handbook of mentalizing in mental health practice* (p. 43–65). American Psychiatric Publishing, Inc
- Marci, T., Moscardino, U., & Altoè, G. (2019). The brief Experiences in Close Relationships Scale-Revised Child version (ECR-RC): Factor structure and invariance across middle childhood and early adolescence. *International Journal of Behavioral Development*, 43(5), 409–423. <https://doi.org/10.1177/0165025418785975>.
- Marquis, S., Hayes, M. V., & McGrail, K. (2019). Factors that may affect the health of siblings of children who have an intellectual/developmental disability. *Journal of Policy and Practice in Intellectual Disabilities*, 16(4), 273–286.
- Marquis, S., O’Leary, R., Hayden, N. K., & Baumbusch, J. (2022). A realist review of programs for siblings of children who have an intellectual/developmental disability. *Family Relations*, 72(4), 2083–2102.
- McKenzie Smith, M., Pinto Pereira, S., Chan, L., Rose, C., & Shafran, R. (2018). Impact of well-being interventions for siblings of children and young people with a chronic physical or mental health condition: A systematic review and meta-analysis. *Clinical Child and Family Psychology Review*, 21(2), 246–265. <https://doi.org/10.1007/s10567-018-0253-x>.
- Meirsschaut, M., Roeyers, H., & Warreyn, P. (2010). Parenting in families with a child with autism spectrum disorder and a typically developing child: mothers’ experiences and cognitions. *Research in Autism Spectrum Disorders*, 4(4), 661–669. <https://doi.org/10.1016/j.rasd.2010.01.002>.
- Minuchin, S. (2018). *Families and family therapy*. Routledge.
- Mitchell, A. E., Morawska, A., Vickers-Jones, R., & Bruce, K. (2021). A systematic review of parenting interventions to support siblings of children with a chronic health condition. *Clinical Child and Family Psychology Review*, 24(3), 651–667. <https://doi.org/10.1007/s10567-021-00357-1>.
- Murphy, L. K., Murray, C. B., & Compas, B. E. (2017). Topical review: Integrating findings on direct observation of family communication in studies comparing pediatric chronic illness and typically developing samples. *Journal of Pediatric Psychology*, 42(1), 85–94. <https://doi.org/10.1093/jpepsy/jsw051>.
- Nolte, T., Bolling, D., Hudac, C., Fonagy, P., Mayes, L., & Pelphrey, K. (2013). Brain mechanisms underlying the impact of attachment-related stress on social cognition. *Frontiers in Human Neuroscience*, 7. <https://www.frontiersin.org/article/10.3389/fnhum.2013.00816>.
- O’Brien, I., Duffy, A., & Nicholl, H. (2009). Impact of childhood chronic illnesses on siblings: A literature review. *British Journal of Nursing*, 18(22), 1358–1365. <https://doi.org/10.12968/bjon.2009.18.22.45562>.
- Orm, S., Haukeland, Y. B., Vatne, T., & Fjermestad, K. (2022). Measuring family communication in pediatric nursing: Psychometric properties of the Parent-Child Communication Scale—Child Report (PCCS-CR). *Journal of Pediatric Nursing: Nursing Care of Children and Families*, 62, 78–83. <https://doi.org/10.1016/j.pedn.2021.10.022>.
- Parker, R., Houghton, S., Bichard, E., & McKeever, S. (2020). Impact of congenital heart disease on siblings: A review. *Journal of Child Health Care*, 24(2), 297–316. <https://doi.org/10.1177/1367493520914738>.
- Pinquart, M. (2013). Do the parent-child relationship and parenting behaviors differ between families with a child with and without chronic illness? A meta-analysis. *Journal of pediatric psychology*, 38(7), 708–721.

- Pinquart, M. (2018). Parenting stress in caregivers of children with chronic physical condition—A meta-analysis. *Stress and health, 34*(2), 197–207.
- Pinquart, M. (2023). Behavior Problems, self-Esteem, and prosocial Behavior in siblings of children with chronic physical health conditions: An updated meta-analysis. *Journal of Pediatric Psychology, 48*(1), 77–90.
- R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.
- Ranson, K. E., & Urchuk, L. J. (2008). The effect of parent–child attachment relationships on child biopsychosocial outcomes: A review. *Early Child Development and Care, 178*(2), 129–152. <https://doi.org/10.1080/03004430600685282>.
- Rea, K. E., Quast, L. F., Stolz, M. G., & Blount, R. L. (2019). A systematic review of therapeutic recreation camp impact on families of children with chronic health conditions. *Journal of Pediatric Psychology, 44*(5), 542–556.
- Schamong, A. S., Liebermann-Jordanidis, H., Brockmeier, K., Sticker, E., & Kalbe, E. (2022). Psychosocial well-being and quality of life in siblings of children with congenital heart disease: a systematic review. *Journal of Child Health Care, 26*(2), 319–337.
- Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annual Review of Psychology, 58*(1), 565–592. <https://doi.org/10.1146/annurev.psych.58.110405.085615>.
- Streisand, R., Swift, E., Wickmark, T., Chen, R., & Holmes, C. S. (2005). Pediatric parenting stress among parents of children with type 1 diabetes: The role of self-efficacy, responsibility, and fear. *Journal of Pediatric Psychology, 30*(6), 513–521. <https://doi.org/10.1093/jpepsy/jsi076>.
- Tay, J., Widger, K., & Stremmler, R. (2022). Self-reported experiences of siblings of children with life-threatening conditions: A scoping review. *Journal of Child Health Care, 4*, 517–530.
- The health personnel act, Norway (2017). <https://www.helseidirektora.tet.no/rundskriv/helsepersonelloven-med-kommentarer/krav-til-helsepersonells-yrkesutovelse#paragraf-10a-helsepersonells-plikt-til-a-bidra-til-a-ivareta-mindrearige-barn-som-parorende>.
- Tregidgo, C., & Elander, J. (2019). The invisible child: Sibling experiences of growing up with a brother with severe haemophilia—An interpretative phenomenological analysis. *Haemophilia, 25*(1), 84–91. <https://doi.org/10.1111/hae.13659>.
- Tudor, M. E., & Lerner, M. D. (2015). Intervention and Support for Siblings of Youth with Developmental Disabilities: A Systematic Review. *Clinical Child and Family Psychology Review, 18*(1), 1–23. <https://doi.org/10.1007/s10567-014-0175-1>.
- Vatne, T. M., Haukeland, Y. B., Mossige, S., & Fjermestad, K. W. (2019). The development of a joint parent-child intervention for siblings of children with chronic disorders. *Fokus på familien, 47*(1), 20–35. <https://doi.org/10.18261/issn.0807-7487-2019-01-03>.
- Vermaes, I. P., Van Susante, A. M., & van Bakel, H. J. (2012). Psychological functioning of siblings in families of children with chronic health conditions: A meta-analysis. *Journal of Pediatric Psychology, 37*(2), 166–184.
- Weijers, D., Van Steensel, F. J. A. & Bögels, S. M. (2018). Associations between psychopathology in mothers, fathers and their children: A structural modeling approach. *Journal of child and family studies, 27*, 1992–2003.
- Wolff, B., Magiati, I., Roberts, R., Skoss, R., & Glasson, E. J. (2023). Psychosocial interventions and support groups for siblings of individuals with neurodevelopmental conditions: A mixed methods systematic review of sibling self-reported mental health and wellbeing outcomes. *Clinical Child and Family Psychology Review, 26*(1), 143–189.
- Wolff, B., Magiati, I., Roberts, R., Pellicano, E., & Glasson, E. J. (2022). Risk and resilience factors impacting the mental health and wellbeing of siblings of individuals with neurodevelopmental conditions: A mixed methods systematic review. *Clinical Psychology Review, 98*, 102217.
- Yaffe, Y. (2023). Systematic review of the differences between mothers and fathers in parenting styles and practices. *Current Psychology, 42*(19), 16011–16024.