



# A Randomized Controlled Trial of a Parenting Program to Improve Sibling Relationships

John A. Pickering<sup>1,2</sup> · Margaret E. Crane<sup>3</sup> · Jinny Hong<sup>2</sup> · Ann-Kathrin Nickel<sup>1</sup> · Carys Chainey<sup>1</sup> · Matthew R. Sanders<sup>1</sup>

Accepted: 9 December 2022 / Published online: 17 March 2023  
© The Author(s) 2023

## Abstract

Although parents of siblings play a crucial role in the development of both the positive and negative aspects of their children's relationships, relatively few parenting programs specifically target sibling conflict alongside sibling warmth. To bridge this gap, the current study reports the outcomes of a randomized controlled trial evaluating a brief parenting intervention focusing on improving sibling relationships. A total of 74 parents reporting concerns about sibling conflict were randomized to either the Triple P brief discussion group intervention condition ( $n = 37$ ) or the waitlist control condition ( $n = 37$ ). Parents were predominately Caucasian, female, from a middle-income background. Parents completed a range of self-report measures examining the quality of the sibling relationship, parenting practices, family functioning, and child emotional and behavioral problems. Across treatment groups, participants showed improvements on almost all measures of sibling conflict, sibling warmth, child emotional and behavioral problems, parenting practices, and parenting confidence. Participants in the treatment group also experienced a greater reduction in the amount of help they wanted to manage sibling warmth, relative to participants in the control group. These results suggest that a low-intensity parenting intervention may only have a small effect on improving sibling relationships. Additional research is needed to determine how to broaden program efficacy for sibling conflict and parental adjustment, for families from diverse levels of income and family composition. Trial registration: ANZCTR 365567.

**Keywords** Randomized controlled trial · Sibling conflict · Parenting program · Triple P

## Highlights

- Sibling relationships that are more strongly positive than negative may support child, parent and family wellbeing.
- To date, no evidence-based parenting program has promoted positive sibling relationships while decreasing sibling conflict.
- A brief discussion group was developed within the Triple P system to target warmth and agonism in sibling relationships.
- A randomized control trial revealed an improvement in parent-reported warmth in the sibling relationship, but not agonism.
- Intervention effectiveness may be further explored with more diverse samples and multi-informant measures.

---

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1007/s10826-023-02539-7>.

✉ John A. Pickering  
john@evidn.com

<sup>1</sup> Parenting and Family Support Centre, The University of Queensland, St Lucia, QLD 4072, Australia

<sup>2</sup> Evidn, 315 Brunswick St, Fortitude Valley, QLD 4006, Australia

<sup>3</sup> Temple University, Weiss Hall, 1701 N. 13th Street, Philadelphia, PA 19122, USA

Sibling relationships are some of the first social connections in life, and are often the most enduring relationships across the life course (Caspi, 2010). Every sibling relationship has positive and negative aspects that exist concurrently with each other, including warmth, conflict, rivalry, sharing, and taking care of one another (Caspi, 2010). These positives and negatives each influence children's development and wellbeing. Prosocial sibling interactions and conflict management practice equip children with valuable life skills, including negotiating, perspective taking, patience, and

acceptance (Bedford et al., 2000; Shantz, 1987). Warmth in the sibling relationship can help children to develop resilience (Caspi, 2010; Dunn et al., 1994) and protect against the development of internalizing and externalizing problems (Buist et al., 2013; Caspi, 2010; Dunn et al., 1994). Conversely, children who experience a high level of sibling conflict may be at risk for peer victimization (Faith et al., 2015), antisocial behavior including criminal activity (Criss & Shaw, 2005), and externalizing and internalizing problems (Buist et al., 2013), which may have long-term impacts on health and wellbeing (Murray et al., 2020). As part of the family system, sibling relationship quality may both positively and negatively affect parents' wellbeing, the quality of parenting the children receive, the parent–child relationship, and family harmony (Caspi, 2010; Yu & Gamble, 2008). It is therefore important that children's sibling relationships be more strongly positive (e.g., warm) than negative (e.g., conflictual); in order to support the wellbeing of children, parents, and families.

## Influences on Sibling Relationship Quality

The quality of sibling relationships may, however, be affected by a wide range of factors. As young children are learning social skills and self-regulation, while cohabiting in close quarters and sharing possessions, conflict is common (McGuire et al., 2000). Individual differences in age, gender and personality may lead to more or less friction between siblings (Milevsky, 2021). Family dynamics may contribute to sibling relationship quality, where a warm and prosocial family can foster positive sibling relationships, while interparental hostility is linked with increased inter-sibling conflict (Brody et al., 1987; Yu & Gamble, 2008). Families in low socioeconomic contexts may be at increased risk for such conflict and dysfunction (Dhondt et al., 2019; O'Connor et al., 2020), including parental factors such as maternal depression and expressed negative emotions, which may contribute to poorer quality sibling relationships (Sanders et al., 2014; Mark et al., 2017). The way parents interact with their children also significantly predicts the quality of the sibling relationship (Brody, 1998; Smith & Ross, 2007). For example, stressful parenting and parents' differential treatment of siblings may increase sibling conflict (Jenkins et al., 2005), while maternal warmth has been shown to support positive aspects of sibling relationships such as teaching, empathy and involvement (Chen, 2020).

## Supporting Sibling Relationship Quality

As sibling relationship quality is central to child, parent and family wellbeing, it is important that the factors that

influence sibling relationships be explored as potential targets for intervention. A systematic review by Tucker and Finkelhor (2017) indicates that over the past three decades there have been two main types of interventions aiming to support sibling relationships: programs targeting children's social skills, and programs targeting parents' mediation techniques. As the central players within the sibling relationship, the children themselves may be an effective target to improve said relationship. Programs that work directly with children typically involve one or both siblings receiving weekly training in emotional regulation or social skills over 1–2 months, and demonstrate small to medium sized short-term effects on sibling rivalry, conflict, dispute resolution, and warmth (Tucker & Finkelhor, 2017). Such training requires children to be of sufficient age, maturity and compliance to engage in the program, and may therefore not be suitable for all children. In addition, while the skills learnt by the target child may be generalizable to their other relationships, the focus on individual children does not address the critical role of parents in the family system within which the sibling relationship exists.

Parents are essential change agents in their children's and family's functioning, and parental behavior may be effectively targeted through evidence-based intervention (Doyle et al., 2022). Although only a handful of evidence-based parenting interventions have specifically targeted sibling relationships, their effectiveness indicates potential for families to be further supported in this area. Much of the focus of parent training in the context of sibling relationships has been on reducing undesirable behaviors; teaching parents how to respond to existing conflictual sibling relationships rather than encouraging positive sibling interactions (Kramer & Radey, 1997). There is limited evidence available regarding these interventions, however, and the few studies conducted on their effectiveness have demonstrated no significant effects on sibling relationship quality (Tucker & Finkelhor, 2017). Independent of the body of work on decreasing negative behavior between siblings, a few studies have focused on the promotion of prosocial or positive behaviors. Tiedemann and Johnston (1992) found that a five-session parenting program was able to successfully increase sharing between young siblings. Although these results support the capacity for parents being the proximal targets of intervention for improving positive behaviors among siblings, the program is limited to the extent that it teaches children only one prosocial skill, and does not target the reduction of any problematic aspects of the sibling relationship. One program that has targeted both the positive and negative aspects of the sibling relationship is “SIBlings are Special” (SIBS), comprised of 12 weekly sessions involving siblings (without their parents), together with three family sessions involving children and parents together (Feinberg et al., 2013). The SIBS program has,

however, had limited efficacy in targeting negative aspects of the sibling relationship. A randomized controlled trial of the program, conducted with 174 families, found that it did not have any significant effects on reducing sibling conflict, collusion, or child externalizing problems; but did successfully enhance positive sibling relationships, parents' use of appropriate strategies for parenting siblings, and children's self-control, social competence, and academic performance, and reduce maternal depression and child internalizing problems (Feinberg et al., 2013).

To date, therefore, no evidence-based parenting program has successfully promoted positive sibling relationships while decreasing sibling conflict. This is an important gap to fill. It is critical that parents can access an effective means of addressing both the positive and negative aspects of sibling relationships concurrently, as these aspects co-exist within every sibling relationship and influence outcomes for children, parents, and families (Caspi, 2010). Although they are naturally intertwined, the positive and negative aspects of a sibling relationship are distinct from one another. As seen with previous studies in this area, it cannot be assumed that increasing the positives will naturally decrease the negatives, or vice versa. Both the positive aspects and negative aspects of the sibling relationship therefore warrant specific attention. Incorporating both aspects into a single brief program may be an effective approach, as parents often prefer brief interventions due to scheduling constraints (Morawska et al., 2011a, b), and a single comprehensive program is likely to cover topics of relevance to a wide range of families. Considering the widespread impact of sibling relationship quality, a brief parenting intervention that seeks to simultaneously reduce conflict and increase warmth in the sibling relationship may therefore be an effective method to support parents, children, and families alike.

## Adapting an Evidence-based Parenting Program to Focus on Sibling Relationship Quality

Tucker et al. (2013) have thus called for parenting programs to include a greater focus on improving sibling relationships. As a prominent parenting program with a comprehensive and rigorous evidence base, the Triple P – Positive Parenting Program (Triple P) provides a solid foundation on which to build research aiming to explore the utility of sibling conflict-focused parenting intervention. Triple P is a system of parenting support that seeks to increase parents' confidence and skill in raising their children, thereby enhancing children's developmental outcomes (Sanders, 2012). Triple P has been continuously evaluated across the past 30 years, and multiple meta-analyses have attested to its positive

effect on a range of child and parent outcomes (Sanders et al., 2014; Nowak & Heinrichs, 2008). Although Triple P has been shown to be effective at targeting some of the variables implicated in the onset and maintenance of sibling conflict, including maternal depression and positive family environments (Sanders et al., 2014), there is currently no variant of Triple P that specifically focuses on improving sibling relationships. The Triple P system includes a variety of intervention formats, including public health advertising campaigns, 90-minute seminars, 2-h discussion groups, and multi-week intensive programs conducted with groups or individuals (Sanders, 2012). Practitioners select a variant of the program based on the severity of child problems, the topics of relevance to a given family, and parents' preferences for how they would like to access the program information (Prinz, 2019). The Triple P system is designed to be delivered flexibly based on consumer needs (Mazzucchelli & Sanders 2010), and practitioners often do so, despite few studies examining the effectiveness of such adaptations. Adapting an established intervention accelerates the path to market by removing additional costs, time, and other barriers associated with creating, evaluating, and implementing an evidence-based intervention.

This study aims to examine the effectiveness of a new parenting program in improving sibling relationships. It utilizes a novel adaptation of an existing version of Triple P, tailored to support parents to improve the relationships between their children. We hypothesized that the intervention would significantly improve the sibling relationship, as measured by decreased levels of sibling conflict and increased levels of sibling warmth. We further hypothesized that the intervention would improve child emotional and behavioral adjustment, and parenting practices and family adjustment.

## Method

### Participants

Parents ( $N = 74$ ) were recruited through a media campaign, online advertisements, referrals from professionals, and advertisements at childcare centers and primary schools in diverse socioeconomic settings. Particular effort was taken to focus recruitment efforts in areas with populations with diverse sociodemographic characteristics, and recruitment materials were customized to encourage fathers to attend.

There were five study eligibility criteria, regarding child age, parent concern, sibling conflict, parental language, and internet access. The age criteria stipulated that parents had at least two children aged 3–10 years, no more than 4 years apart in age; because children outside of this age range have different sibling relationship dynamics to the target

age range (Milevsky, 2021), which may have confounding effects if included in the study. Parents had to express concern about sibling conflict, as parenting interventions are most effective when relevant to parent concerns (Koerting et al., 2013). Sibling conflict had to be present at least some of the time, as indicated by a score of at least 5 on the Parental Expectations and Perceptions of Children's Sibling Relationship Questionnaire, agonism frequency subscale (Kramer & Baron, 1995); so that the intervention was relevant to parents (Koerting et al., 2013) and the trial would not be subject to floor effects whereby already-low levels of conflict could not be made significantly lower (Andrade, 2021). English fluency was required as the intervention involved group discussions conducted in English, which would be difficult for parents to engage in if they were not fluent in English, and the survey measures were not validated for languages other than English (Muthukumar et al., 2021). Internet access was required so that participants could complete the pre- and post-intervention survey measures. Only a small amount of internet data was required, and participants could complete the surveys on their phone or using public internet if they did not have internet at home. The exclusion criteria pertained to developmental disability, professional help, intervention attendance, and survey completion. Parents were excluded from the trial if their target child had a developmental disability, because having a sibling with a developmental disability was likely to introduce other considerations into the parent-sibling relationship that might confound the study, as evidence suggests parents treat children with a developmental disability differently to how they treat children without developmental disability (Schuntermann, 2007). Parents were excluded if they were currently receiving professional help for the child's behavior difficulties, to avoid confounding the current trial's intervention effects with those of another co-occurring source of support. Potential participants who were unable to attend the intervention were excluded from the trial, as they would not be able to fulfill the requirements of the trial. Participants who did not complete at least 75% of the baseline (T1) questionnaire measures were excluded from the final analytic dataset, in order to reduce the bias to estimates from large amounts of missing data (Dong & Peng, 2013).

Of the 74 eligible participants included in the final analytic dataset, the mean parent age was 38.30 years ( $SD = 4.25$ ), with the majority being female ( $n = 69$ ; 96%). The child whose behavior parents were most concerned about was defined as the "target child," and the other child was defined as the "sibling." The mean target child age was 6.64 years ( $SD = 1.98$ ), and the mean sibling age was 5.30 years ( $SD = 1.80$ ). The majority of parents earned at least 60,000 AUD per year ( $n = 66$ ; 89%). Only 19 parents (26%)

reported that they recently attended a parenting program. See Supplementary Table 1 for a complete list of demographic characteristics.

## Measures

Parents completed three survey questionnaires (Time 1, Time 2, Time 3). The survey questionnaires all included measures of sibling relationship quality, parents' strategies for managing conflict, child emotional and behavioral problems, parental confidence, parenting practices, and family adjustment. The Time 1 questionnaire additionally included demographic characteristics, which were used to screen for eligibility, describe the sample, and determine whether the intervention and waitlist control groups were demographically comparable with one another. The measures were chosen based on psychometric properties and previous validation with parents, and to comprehensively assess the constructs of interest.

### Demographic characteristics

The Family Background Questionnaire was used to assess sociodemographic information, including income, occupation, parent education, ethnic background, single parenthood status, child disability, and age and gender of the parent and children. This questionnaire was adapted from the questionnaire developed by Zubrick et al. (1995) for use with Australian parents.

### Sibling relationship quality

The sibling relationship was measured using the Parental Expectations and Perceptions of Children's Sibling Relationship Questionnaire (PEPC-SRQ; Kramer & Baron, 1995), which includes 27 sibling behaviors across three domains: agonism (9 items), rivalry (3 items), and warmth (15 items). Agonism pertained to verbal and physical conflict (e.g., "angry feelings"). Rivalry relates to jealousy and competition (e.g., "jealousy"). Warmth refers to positive and prosocial interactions (e.g., "comforting one another"). Parents rated behaviors in four ways: (1) frequency of behavior (scale ranging from 1 "never" to 5 "always"); (2) severity of problem (scale ranging from 1 "it's not a problem" to 4 "it's a very big problem"); (3) how easy would it be to improve the problem (scale ranging from 1 "very difficult" to 5 "very easy"); and (4) amount of help needed with the problem (scale ranging from 1 "no help" to 3 "a lot of help"). Scores were averaged to produce 12 subscales (e.g., agonism frequency, agonism severity), whereby higher scores indicated a greater frequency, severity, ease of improvement, and need of help, respectively, for each of the sibling relationship domains. The PEPC-SRQ has

previously been found to have acceptable to good reliability,  $\alpha = 0.69\text{--}0.91$  and to positively predict child reports of sibling relationship quality (Howe et al., 2011). In this sample, Cronbach's alpha ranged from 0.73 to 0.92.

### **Child emotional and behavioral problems, and parenting confidence**

Parents completed the Child Adjustment and Parent Efficacy Scale (CAPES; Morawska et al., 2014) for both the target child and sibling. The CAPES assesses child emotional and behavioral problems, and parental confidence. Parents rated how accurately 27 statements described their child's emotional and behavioral problems in the past 4 weeks (e.g., "My child misbehaves at mealtimes"), on a 4-point scale from 0 (not at all) to 3 (very much). For 24 of the problems, parents also indicated how confident they were in managing their child's behavior on a 10-point scale from 1 (certain I can't do it) to 10 (certain I can do it). Scores were averaged to produce two mean subscale scores, wherein higher scores indicate greater levels of child emotional or behavioral problems, and greater levels of parent efficacy, respectively. In a previous sample of Australian parents, the CAPES has demonstrated strong reliability and validity, with the problems subscale  $\alpha = 0.90$  and the confidence subscale  $\alpha = 0.96$  (Morawska et al., 2014). In this sample, Cronbach's alpha was 0.76–0.87 for the problems subscales and 0.91–0.95 for the confidence subscales.

### **Parenting practices (dysfunctional parenting) and family adjustment**

The Parenting and Family Adjustment Scale (PAFAS; Pickering, Morawska et al., 2014) was used to measure dysfunctional parenting practices (parenting practices subscale) and family adjustment (parental adjustment, family relationship, and parental teamwork subscales). The parenting practices measure (18 items) captures the behaviors parents may undertake towards their children (i.e., the target child and the sibling), such as inducing guilt and shame, arguing, and using corporal punishment (e.g., "I shout or get angry with my child when they misbehave"). Parental adjustment (5 items) refers to difficulties with parental mood or adjustment (e.g., "I feel happy"). The family relationships subscale (4 items) measures the quality of relationships between family members including support, harmony, criticism, and hostility (e.g., "Our family members criticize or put each other down"). Parental teamwork (3 items) indicates the level of partner support and parent teamwork among parents who report they have a partner (e.g., "I disagree with my partner about parenting"). Parents rated the degree to which each statement applied to them in the past 4 weeks on a 4-point scale ranging from 0 (not at

all) to 4 (very much). Parents completed the PAFAS for both the target child and sibling. Responses on the family adjustment subscales for the target child and sibling were averaged. For all scales, positively-valenced items were reversed, and scores were averaged to provide subscale scores where higher scores indicate more dysfunction in the given domain. In previous samples of Australian parents, the PAFAS has demonstrated strong reliability and validity,  $\alpha = 0.70\text{--}0.87$  (Morawska et al., 2014). In the current sample, Cronbach's alpha ranged from 0.75 to 0.89 for the PAFAS subscales.

### **Parenting practices (conflict management)**

We used the How Do You Manage Children's Conflict questionnaire (HMCC; Kramer & Washo, 1999) to measure parents' strategies for managing sibling conflict. First, parents rated the frequency of verbal and physical sibling conflicts (e.g., "How often have your children gotten into a conflict that involves some type of physical aggression such as pushing, kicking, hitting, shoving, or slapping each other, in a typical weekend day?") on a 5-point scale ranging from 1 (none) to 5 (10 times or more). They next rated the intensity of those conflicts (e.g., "In general, how heated or intense do your children's physical conflicts get in a typical weekday?") on a 7-point scale ranging from 1 (very mild) to 7 (very heated). In the final section, parents evaluated 26 parenting strategies for managing verbal and physical conflict that mapped onto three types of parental involvement: child-centered involvement (CCS; e.g., "Comforted the child who was upset"), parental control (PC; e.g., "Separated the children from each other"), and passive non-intervention (PNI; e.g., "Ignored the conflict - kept on doing what I was doing"). They rated how frequently they used the strategy in the past 2 weeks (scale ranging from 1 (never) to 3 (often)), and how effective each strategy was in resolving the conflict (scale ranging from 1 (very ineffective) to 3 (very effective)). Parents' ratings for verbal and physical conflicts were averaged to create six subscales: frequency and efficacy of the strategy for CCS, PC, and PNI, whereby higher scores reflected higher frequency and efficacy respectively. A modified version of the HMCC has previously been validated for use with parents,  $\alpha = 0.62\text{--}0.88$  (Perozynski & Kramer, 1999). In the current sample,  $\alpha$  ranged from 0.83 to 0.88.

### **Participant satisfaction**

Parents in the intervention group described their program satisfaction using the Client Satisfaction Questionnaire (CSQ; Sanders et al., 2000). Parents rated 13 items on the quality of the service provision; the extent to which the intervention met their needs, increased their skills, and

decreased their children's problem behaviors; and whether they would recommend the intervention to other people. Items are rated on various 7-point scales, with higher composite scores indicating greater program satisfaction. The CSQ has previously been found to have high reliability with Australian parents,  $\alpha = 0.96$  (Sanders et al., 2000). In the current sample, internal consistency for the CSQ was  $\alpha = 0.95$ .

### Intervention quality and fidelity

Standardized checklists were created for the study to measure content fidelity and process quality, which were used by trained fidelity monitors during the intervention sessions. The content fidelity checklist included a list of content that should be covered by the facilitator during the intervention session (e.g., "Asking parents to provide examples of their own children's sibling relationship issues"). The process quality checklist included items for rating the facilitator on the presence of characteristics such as explaining the purpose of the session, tailoring the session content to the needs of parents, and use of good communication techniques. The monitors gave a "yes" (scored as 1) or "no" (scored as 0) response for each item on the checklists to indicate whether that content or quality characteristic were observed during the intervention. Total scores were summed and converted to a percentage for each measure, with a higher percentage indicating greater intervention content fidelity and process quality, respectively.

### Intervention

Drawing on prior research by Sanders and Pickering (2013, 2015a), a decision was made to adapt and tailor an existing Triple P program to specifically target sibling relationships. The intervention selected for adaptation was a single session, 2-h in-person parenting program, Triple P Brief Discussion Group for Managing Fighting and Aggression (Sanders & Turner, 2011; Sanders & Pickering, 2015b). Both the existing and the new discussion groups are 2 h in duration, designed to be facilitated by an accredited practitioner who has received training in how to deliver the intervention using a combination of video segments, workbook exercises, and discussion with group members. They are both designed to facilitate active discussion around a central topic, support parents to develop a personalized prevention and management plan to address the central topic, and teach parents about parenting strategies that enable them to implement their plans appropriately. While the existing discussion group focuses solely on managing fighting and aggression without a specific focus on sibling relationships, the goal of the new intervention was to increase positive, prosocial interactions among siblings,

while simultaneously reducing the prevalence of conflictual behaviors between siblings. The intervention content was developed following an extensive review of the extant literature on the risk and protective factors for sibling relationship quality, and the findings from a survey of 409 parents of siblings who were experiencing difficulties with sibling behavior (Sanders & Pickering, 2015a). The first author adapted and tailored the content of the discussion group to focus specifically on reducing sibling fighting and increasing sibling warmth, by using examples of sibling conflict, asking parents to provide examples of their own children's sibling relationship issues, and tailoring all language around sibling-related themes. The first author delivered all parenting groups as part of the current study. Prior to the study, the facilitator was accredited as a Triple P practitioner. He had a bachelor's degree in psychology and held a long-term position within the research center that develops program materials and resources for the Triple P system. The facilitator undertook regular supervision and mentoring sessions with a senior clinical psychologist, the last author of this paper.

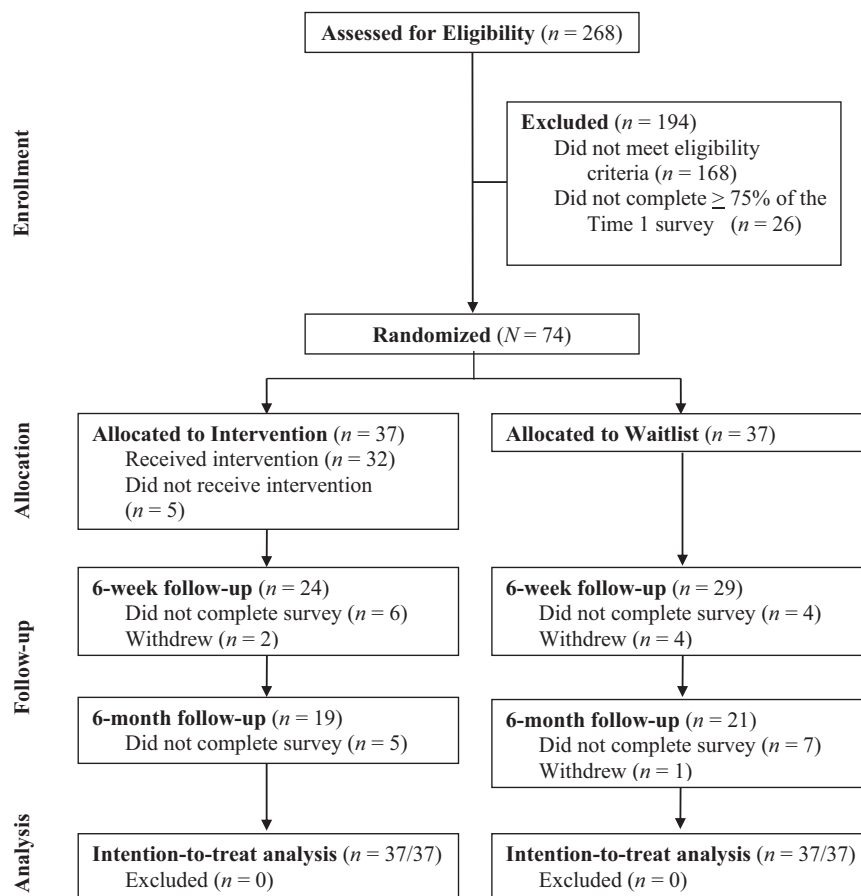
### Protocol adherence

To ensure intervention integrity, the facilitator followed a standardized manual. Parents were provided with a workbook and all sessions were strictly enforced to run for the 2-h period. Independent observers coded the facilitator during the sessions using the content fidelity and process quality measures, to assess whether the intervention was delivered with fidelity to the manual and process. Two observers received training from the facilitator on how to use the fidelity measures, including practice sessions that were checked and determined to reflect the observers were adequately trained to judge the fidelity of the intervention sessions. The observers coded the sessions independently from each other, and each coded different sessions.

### Randomization

The trial utilized a waitlist control design, wherein half of participants received the intervention, half of the participants did not receive the intervention; and all participants completed the same set of measurements. This design was selected in order to provide a comparator for the intervention that allowed the researchers to determine whether the intervention provided additional benefit over and above the effects of time. Using block randomization with sets of 10 participants, the third author randomized parents to either the intervention or waitlist control conditions using a random number generator. Neither the participant nor the researchers were blinded to condition. Research assistants notified parents of their condition and invited parents in the

**Fig. 1** CONSORT flow diagram describing the flow of participants through the study



intervention group to attend the next available parenting group. A total 268 participants were assessed for eligibility in the trial. Of these, 194 participants were not eligible due to failing to meet or complete the screening criteria, leaving a total of 74 participants to be randomized (37 per condition). A total of 19 participants in the intervention group (51.4%), and 21 participants in the control group (56.8%) completed all measures through to T3; for a total attrition rate of 45.9%. Figure 1 depicts the CONSORT diagram for the study.

## Procedure

The University of Queensland's ethical review committee approved this procedure. Participants were recruited from June 2014 to July 2015. All questionnaires were administered online using Qualtrics software. After providing informed consent, prospective participants completed the T1 questionnaire, which included items used for screening participants for eligibility for the study, the demographic questionnaire, the PEPC-SRQ, the HMCC, the CAPES, and the PAFAS. Parents nominated a target child and sibling in the T1 questionnaire. Following randomization, parents were notified of their trial

condition, and parents in the intervention group were invited to attend the next available intervention session.

The parenting groups were held at either The University of Queensland or at a primary school in Brisbane. Accessibility was enhanced through strategies including: holding the sessions in a location easily accessible by public transport; parking was made available to participants; parents were welcome to bring children to the intervention sessions; and sessions were held at various times, including during and outside of working hours. Groups took place when at least five parents were able to attend, but group size ranged from two to nine parents due to late cancellations. Approximately 6 weeks after parents completed the T1 survey, parents were asked to complete the time 2 (T2) survey, which included the PEPC-SRQ, the HMCC, the CAPES, and the PAFAS. Participants completed this survey an average of 17.82 weeks after the T1 survey ( $SD = 14.32$ ). Approximately 6 months after parents completed the T1 survey, they were sent the T3 survey, which consisted of the PEPC-SRQ, the HMCC, the CAPES, the PAFAS, and for parents in the intervention condition, the CSQ. Parents completed the T3 survey an average of 38.95 weeks after they completed the T1 survey ( $SD = 13.82$ ), from January

2015 to February 2016. Participants in the waitlist condition were invited to attend the parenting discussion group after they completed the T3 survey.

## Data Analysis

Missing values analyses were conducted on the study variables, using Little's missing completely at random test (Little, 1988), and missing values were imputed using expectation-maximization (Dempster et al., 1977). Descriptive statistics were calculated to describe the demographic characteristics of the sample. We examined differences between the intervention and waitlist groups at baseline on all demographics and study measures, using independent samples *t*-tests and  $\chi^2$  tests with a Bonferroni correction (48 comparisons, critical  $p = 0.001$ ).

To address the focal hypotheses of the study, we conducted an intent-to-treat analysis on the outcome variables, whereby all randomized participants were included in analyses, regardless of whether they attended the intervention. This was possible because T1 data was collected prior to randomization and prior to the intervention. An a priori power analysis was conducted using G\*Power 3.1 (Faul et al., 2007) to gauge the number of participants needed to detect a small (0.2), medium (0.5), and large (0.8) effect for repeated-measures multiple analysis of variance (power = 0.80;  $\alpha = 0.05$ ). Sample sizes were calculated to be 967, 158, and 64, respectively. Thus, the final sample ( $N = 74$ ) reflected power to detect medium to large effect size. We performed six  $2$  (group)  $\times$   $3$  (time) repeated-measures multiple analysis of variance (MANOVA) on sets of conceptually and theoretically related variables: (1) sibling conflict (PEPC-SRQ frequency and problem subscales for agonism and rivalry); (2) sibling warmth (PEPC-SRQ frequency and problem subscales for warmth); (3) child behavior problems (CAPES emotional and behavioral subscales for target child and the sibling); (4) parenting practices (HMCC frequency subscales for CCS, PC, and PNI; PAFAS parenting subscale for target child and sibling); (5) parenting confidence (PEPC-SRQ ease of fix and help wanted subscales for agonism, rivalry, and warmth; HMCC efficacy subscales for CCS, PC, and PNI; CAPES, confidence subscale for target child and sibling); and (6) family adjustment (PAFAS adjustment, relationship and teamwork subscales).

If the omnibus *F* statistic was significant for a given set of variables, we conducted post hoc pairwise comparisons between T1 and T2, and between T2 and T3 for each subscale. These analyses were protected with a Scheffé adjusted critical value ( $F^* = 3.97$  for contrasts probing the main effect of group;  $F^* = 6.24$  for contrasts probing the main effect of time and the interaction effect of group and time).

## Results

### Missing Values Analysis

There were no differences between groups on the number of participants who completed the T2 and T3 surveys,  $\chi^2(2, N = 74) = 1.98, p = 0.37$ , on T2 length,  $t(51) = 1.57, p = 0.12$ , or on T3 length,  $t(38) = 1.44, p = 0.16$ . The data were found to be missing completely at random using Little's missing completely at random test,  $\chi^2(58,188) = 210.16, p = 1.000$ ; 30% of data were missing. Missing values were subsequently imputed using expectation-maximization (Dempster et al., 1977). Missing data analyses could not be conducted on the CSQ due to an insufficient response rate.

### Bivariate Associations between Study Variables

There were no significant differences between the intervention and waitlist control groups on demographic characteristics,  $t_s \leq 1.00, p_s > 0.05$  and  $\chi^2_s \leq 5.36, p_s > 0.0499$ , or on T1 scores on study measures,  $t_s \leq 2.14, p_s \geq 0.04$ . Results of the comparisons on demographic characteristics are in Supplementary Table 1. The means and standard deviations for the sibling relationship, child emotional and behavior, parenting practices, and family adjustment measures appear in Supplementary Table 2.

### Does the Intervention Improve the Sibling Relationship?

The results of the six MANOVAs are in Table 1. There was a significant interaction between group and time between T1 and T2 for PEPC, help wanted, warmth,  $F(1, 72) = 6.71, p < 0.05, d = 0.65$ , such that the decrease in amount of help wanted for sibling warmth was greater in the intervention group than in the control group. There also were significant improvements from T1 to T2, regardless of group, on sibling conflict (PEPC, frequency and problem for agonism and rivalry), and sibling warmth (PEPC, frequency and problem for warmth). These results mostly do not support the hypothesis that participants in the intervention group would experience significantly greater improvements than the waitlist control group on sibling relationship quality; but do suggest an improvement over time, regardless of treatment condition.

### Does the Intervention Improve Child Emotional and Behavioral Adjustment, Parenting Practices, and Family Adjustment?

There were no significant interactions between group and time between T1 and T2 for child emotional and behavioral



**Table 1** MANOVA results of treatment effects

	Interaction effect					Main effect of time					Main effect of group				
	<i>F</i>	<i>df</i> <sub>hyp</sub>	<i>df</i> <sub>res</sub>	<i>p</i>	$\eta_p^2$	<i>F</i>	<i>df</i> <sub>hyp</sub>	<i>df</i> <sub>res</sub>	<i>p</i>	$\eta_p^2$	<i>F</i>	<i>df</i> <sub>hyp</sub>	<i>df</i> <sub>res</sub>	<i>p</i>	$\eta_p^2$
Sibling conflict	1.36	8	282	0.21	0.04	9.18	8	282	<0.001*	0.21	2.14	4	69	0.09	0.11
Sibling warmth	9.06	4	286	0.04*	0.04	8.61	4	286	<0.001*	0.11	0.09	2	71	0.91	0.003
Child behavior problems	0.78	8	282	0.62	0.02	7.64	8	282	<0.001*	0.18	2.34	4	69	0.06	0.12
Parenting practices	1.40	10	280	0.18	0.05	5.44	10	280	<0.001*	0.16	1.16	5	68	0.34	0.08
Parenting confidence	1.61	22	268	0.04*	0.12	6.40	22	268	<0.001*	0.34	1.70	11	62	0.09	0.23
Family adjustment	1.22	6	284	0.30	0.03	1.70	6	284	0.12	0.04	0.17	3	70	0.92	0.01

This table displays the results of six 2 (group)  $\times$  3 (time) repeated-measures multiple analysis of variance (MANOVA): (1) sibling conflict (PEPC-SRQ frequency and problem subscales for agonism and rivalry); (2) sibling warmth (PEPC-SRQ frequency and problem subscales for warmth); (3) child behavior problems (CAPES emotional and behavioral subscales for target child and the sibling); (4) parenting practices (HMCC frequency subscales for CCS, PC, and PNI; PAFAS parenting subscale for target child and sibling); (5) parenting confidence (PEPC-SRQ ease of fix and help wanted subscales for agonism, rivalry, and warmth; HMCC efficacy subscales for CCS, PC, and PNI; CAPES, confidence subscale for target child and sibling); and (6) family adjustment (PAFAS adjustment, relationship and teamwork subscales)

*df*<sub>hyp</sub>, hypothesized degrees of freedom, *df*<sub>res</sub>, residual degrees of freedom

\**p* < 0.05

adjustment, and parenting practices and adjustment outcomes. There were, however, significant improvements from T1 to T2, regardless of group, on child behavior problems (CAPES, behavior problems for both the target child and sibling), some parenting practices (only on the HMCC, frequency, PC and the PAFAS, parenting practices for the target child), and parenting confidence,  $F(1, 67) \geq 6.71$ ,  $ps < 0.05$ . Finally, there was a significant improvement from T2 to T3, regardless of group, for child emotional problems of the sibling (CAPES, emotional, sibling), parenting practices for the sibling (PAFAS, parenting practices for the sibling), and parenting confidence for passive non-intervention strategies (HMCC, efficacy, PNI),  $F(1, 67) \geq 7.18$ ,  $p < 0.05$ . All other pairwise comparisons were not significant using a Scheffé adjustment. These results mostly do not support the hypothesis that participants in the intervention group would experience significantly greater improvements than the waitlist control group on child outcomes, parenting practices, family functioning, and parenting confidence. Instead, the results suggest an improvement over time, regardless of treatment condition.

### Participant Satisfaction

Only 13 participants in the intervention group responded to all questions on the CSQ. These participants rated the program neither favorably nor unfavorably ( $M = 58.92$ ,  $SD = 14.72$ ), indicating a mean item score of 4.51 on a 7-point scale across all items.

### Treatment Fidelity and Feasibility

Independent observers coded the facilitator as having completed 100% of items assessing intervention content

fidelity, and displayed an average of 97% of process quality characteristics across all intervention sessions.

## Discussion

Using a randomized control trial, we found that a brief discussion group tailored to focus on sibling relationships was associated with an improvement in parent-reported levels of warmth in the sibling relationship and the emotional problems of the sibling. Additionally, participants in both the intervention and control groups reported significant improvements in sibling conflict, sibling warmth, child behavior problems, some measures of parenting practices, and parenting confidence. These findings provide partial, but promising, support for the utility of a brief variant of a parenting program to improve sibling relationships.

### Does the Intervention Improve the Sibling Relationship?

The findings provide partial support for previous research that has demonstrated a parenting program can improve sibling relationship functioning (Feinberg et al., 2013; Ross & Lazinski, 2014). Like Feinberg et al. (2013), we detected a significant improvement only in prosocial sibling behaviors, and not in levels of sibling conflict following the program. This study therefore provides additional support for the potential utility of parenting programs in improving relationships among siblings (Tucker et al., 2013; Wolke et al., 2015).

In support of Kramer's (2010) argument and the findings from Tiedemann and Johnson (1992), the data emerging

from this trial indicate how a parenting program can potentially help improve the sibling relationship by seeking to increase positive interactions among siblings, rather than solely focusing on reducing conflict. The findings add further insight into the potential utility of topic-specific parenting discussion groups towards improving child behavior on a specific issue (Joachim et al., 2010; Morawska et al., 2011a, b; Tully & Hunt, 2016). The results highlight the importance of parents' role in managing their children's relationships, and add weight to the body of research that shows that the extent to which parents involve themselves in their children's disputes is likely to influence their children's sibling relationships (Brody 1998; Smith & Ross, 2007). Interventions that aim to support parents to foster positive sibling relationships between their children may therefore be beneficial, particularly in developing warmth in the sibling relationship.

The lack of significant intervention effects on sibling conflict indicates, however, that the intervention might not be an effective method for improving sibling relationships outside of increasing the level of warmth. In contrast, previous studies have reported significant reductions in sibling conflict following parent intervention focused solely on reducing conflict (Kramer & Radey, 1997). The dual foci of the new intervention, towards both the positive and negative aspects of the sibling relationship, may have therefore diluted its effectiveness. As another sibling-focused parenting intervention to have a similarly-split focus, "Siblings are Special," also failed to significantly reduce sibling conflict (Feinberg et al., 2013), it may be that the positive and negative aspects of the sibling relationship require independent attention.

### **Does the Intervention Improve Child Emotional and Behavioral Adjustment, Parenting Practices, and Family Adjustment?**

The failure to detect any significant intervention effects on child emotional and behavioral problems, and parenting practices, is largely inconsistent with the large body of evidence supporting Triple P (Sanders et al., 2014) and the evidence specifically pertaining to brief format interventions (Tully & Hunt, 2016); which have displayed strong positive change in child and parent outcomes following intervention. Moreover, the failure to detect improvements in parenting practices towards the management of sibling relationships is also inconsistent with previous research which found that targeting negative and positive aspects of the sibling relationship led to significant improvements in parents' use of appropriate strategies for parenting siblings (Feinberg et al., 2013). Both the intervention and the control groups were, however, shown to display improvements over time across child, parent, and family outcomes. This may indicate

natural fluctuations in functioning over time, or regression to the mean wherein both groups report less-extreme scores over time.

### **Understanding the Absence of Intervention Effects on Sibling Conflict**

There are several contributory factors that should be considered in interpreting the null findings of the current study. As with the change over time for the secondary outcomes, the null results for sibling conflict may be due to regression to the mean, wherein participants reported less-extreme conflict scores over time. This may be a particular risk for the conflict scores because participants were selected into the trial based on elevated conflict scores, which may be prone to regression towards the mean (Barnett et al., 2005). The absence of a significant intervention effect on child behavior and parenting practices may alternatively be due to the mere measurement effect. The mere measurement effect is evident when the process of measuring participants through questionnaires prompts them into the potential solution and they modify their behavior accordingly (McCambridge, 2015). For the current study, the items included within one of the primary measures, the HMCC, are very specific and could be interpreted as a list of parenting strategies that parents could implement (e.g., "Asked the children to explain their sides of the conflict and worked with them to reach a solution that they both agreed on"). Thus, participants in the waitlist control condition were effectively presented with instructions relating to how to modify their parenting practices. Parents who were motivated to participate in this study may have tried implementing these strategies, even without participating in the intervention. It may therefore be that if the intervention did have a true effect, it was diluted by the mere measurement effect, and was thus not detected by the study analysis, which were powered only to detect large effects due to the study's small sample size.

### **Limitations of the Study**

The main limitation of this study surrounds the sample. Despite aiming to recruit a sample designed to capture a medium effect size, and based on equivalent studies involving parenting programs (e.g., Joachim et al., 2010), the final sample was small and not highly representative: it had low representation of fathers and of low-income, less educated parents. The observed results therefore are more accurately generalizable to higher-income, higher-educated mothers than to the general population. This may provide some insights to potential reasons for the null results obtained in this study. As family conflict and dysfunction

are more prevalent within socioeconomically disadvantaged households (Dhondt et al., 2019; O'Connor et al., 2020), the sample within this study may have had already relatively low levels of conflict and dysfunction at baseline, and thus derived limited benefit from the intervention (Shelleby & Shaw, 2014). The small and non-representative sample occurred despite efforts to not only recruit more parents than what ultimately enrolled, but also to employ specific strategies to recruit fathers and families from low socioeconomic backgrounds.

The sample inclusion and exclusion criteria regarding developmental disability, internet access and English fluency were implemented to ensure participants could appropriately engage with the intervention and the study, however may have disproportionately excluded families from low socioeconomic backgrounds and culturally and linguistically diverse communities (Khatri & Assefa, 2022; Okoli et al., 2022). These limitations may be addressed in future studies that amend the intervention to be more applicable to parents of children with developmental disability; employ translators or develop and implement the intervention in multiple languages; and provide families with the ability to complete questionnaires via hard copy or on a provided internet connection. Future research with more diverse samples will add to the current findings by demonstrating how more socio-demographically diverse samples respond to the intervention.

A second limitation of the study is its reliance on parental report. Funding restrictions precluded observational measures completion. Future studies should consider alternate sources of data collection, including child report and observational sessions. It should be noted that sibling relationship problems can occur more in specific settings (i.e., home or school), and primarily in front of parents. Accordingly, independent teacher or parent ratings of behavior may provide useful insights for future research.

A third limitation pertains to the unblinded nature of the study, wherein the researchers and participants were both aware of the intervention conditions. This may have led to biases that influenced results, such as where participants may have provided responses in the T2 and T3 (i.e., post-randomization) surveys that artificially aligned with what they expected the researchers would want to find; and the waitlist control group may have sought additional supports when they knew they would not be receiving support from the intervention until after the trial period (Forbes, 2013). Future trials of the intervention could undertake to employ blinding to conditions for researchers and participants, and may include an active control condition to assist with this (e.g., parents in the control condition could receive an intervention not targeting sibling relationships).

## Conclusion

The current study demonstrates that it is possible to adapt an existing parenting program to focus on the sibling relationship, as suggested by Tucker et al. (2013) and Bowes et al. (2014). Sibling relationships is an important topic for parents and their children, and it is critical that we increase the likelihood that parents engage with an evidence-based program to support sibling relationship quality. A brief, low-cost intervention on sibling conflict may be an effective form for such support (Sanders & Pickering, 2015a). While the current trial did not find significant intervention effects on sibling conflict, the warmth in sibling relationships, and the emotional problems of one of their children, were significantly improved among parents who attended the intervention. Research including more diverse samples with multi-informant measures will complement the current findings to determine the intervention's potential for further development and dissemination. It is critical that research be conducted into the ways in which parents may be supported to foster the positive aspects, and reduce the negative aspects, of their children's sibling relationships. Such supports have the potential to improve outcomes for children, parents, and families, both now and across their life course.

**Author Contributions** J.A.P. and M.R.S. contributed to the study conception and design. Material preparation and data collection were performed by J.A.P., J.H., and A.-K.N. Data analysis was performed by M.E.C. The first draft of the manuscript was written by J.A.P., M.E.C., and J.H. All authors contributed to the current version of the manuscript. All authors revised, read, and approved the final manuscript.

**Funding** Open Access funding enabled and organized by CAUL and its Member Institutions. J.A.P. received an internal doctoral funding grant from The University of Queensland to complete this project.

## Compliance with Ethical Standards

**Conflict of Interest** The Parenting and Family Support Centre is partly funded by royalties stemming from published resources of the Triple P – Positive Parenting Program, which is developed and owned by The University of Queensland (UQ). Royalties are also distributed to the Faculty of Health and Behavioural Sciences at UQ and contributory authors of published Triple P resources. Triple P International (TPI) Pty Ltd is a private company licensed by Uniquist Pty Ltd on behalf of UQ, to publish and disseminate Triple P worldwide. TPI had no involvement in the study design, collection, analysis or interpretation of data, or writing of this report. The authors of this report have no share or ownership of TPI. M.R.S. receives royalties and consultancy fees from TPI and is an employee at UQ. J.A.P., J.H., and M.E.C. were employees at the Parenting and Family Support Centre from the start of this trial until March 2016 (J.A.P., J.H.) and December 2016 (M.E.C.). During the trial period, A.-K.N. was a volunteer at UQ. C.C. is an employee at the Parenting and Family Support Centre, commencing after the trial period.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of The University of Queensland and with the 1964 Helsinki Declaration

and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors. Informed consent was obtained from all individual participants included in the study.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Andrade, C. (2021). The ceiling effect, the floor effect, and the importance of active and placebo control arms in randomized controlled trials of an investigational drug. *Indian Journal of Psychological Medicine*, 43(4), 360–361. <https://doi.org/10.1177/02537176211021280>
- Barnett, A. G., van der Pols, J. C., & Dobson, A. J. (2005). Regression to the mean: what it is and how to deal with it. *International Journal of Epidemiology*, 34(1), 215–220. <https://doi.org/10.1093/ije/dyh299>
- Bedford, V. H., Volling, B. L., & Aviolo, P. S. (2000). Positive consequences of sibling conflict in childhood and adulthood. *International Journal of Ageing and Human Development*, 51(1), 53–69. <https://doi.org/10.2190/G6PR-CN8Q-5PVC-5GTV>
- Bowes, L., Wolke, D., Joinson, C., Lereya, S. T., & Lewis, G. (2014). Sibling bullying and the risk of depression, anxiety, and self-harm: A prospective cohort study. *Pediatrics*, 134(4), e1031–e1039. <https://doi.org/10.1542/peds.2014-0831>
- Brody, G. H. (1998). Sibling relationship quality: Its causes and consequences. *Annual Review of Psychology*, 49, 1–24. <https://doi.org/10.1146/annurev.psych.49.1.1>
- Brody, G. H., Stoneman, Z., & Burke, M. (1987). Family system and individual child correlates of sibling behavior. *American Journal of Orthopsychiatry*, 57(4), 561–569. <https://doi.org/10.1111/j.1939-0025.1987.tb03571.x>
- Buist, K. L., Deković, M., & Prinzie, P. (2013). Sibling relationship quality and psychopathology of children and adolescents: A meta-analysis. *Clinical Psychology Review*, 33(1), 97–106. <https://doi.org/10.1016/j.cpr.2012.10.007>
- Caspi, J. (2010). *Sibling development: Implications for mental health practitioners*. Springer Publishing. <https://ebookcentral-proquest-com.ezproxy.library.uq.edu.au/lib/uqj/detail.action?docID=616005>
- Chen, B.-B. (2020). The relationship between Chinese mothers' parenting stress and sibling relationships: a moderated mediation model of maternal warmth and co-parenting. *Early Child Development and Care*, 190(9), 1350–1358. <https://doi.org/10.1080/03004430.2018.1536048>
- Criss, M. M., & Shaw, D. S. (2005). Sibling relationships as contexts for delinquency training in low-income families. *Journal of Family Psychology*, 19(4), 592–600. <https://doi.org/10.1037/0893-3200.19.4.592>
- Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum Likelihood from Incomplete Data via the EM Algorithm. *Journal of the Royal Statistical Society, Series B (Methodological)*, 39(1), 1–38. <https://doi.org/10.2307/2984875>
- Dhondt, N., Healy, C., Clarke, M., & Cannon, M. (2019). Childhood adversity and adolescent psychopathology: Evidence for mediation in a national longitudinal cohort study. *British Journal of Psychiatry*, 215(3), 559–564. <https://doi.org/10.1192/bjp.2019.108>
- Dong, Y., & Peng, C. Y. (2013). Principled missing data methods for researchers. *Springerplus*, 2(1), 222. <https://doi.org/10.1186/2193-1801-2-222>
- Doyle, F. L., Morawska, A., Higgins, D. J., Havighurst, S. S., Mazzucchelli, T. G., Toumbourou, J. W., Middeldorp, C. M., Chainey, C., Cobham, V. E., Harnett, P., & Sanders, M. R. (2022). Policies are needed to increase the reach and impact of evidence-based parenting supports: A call for a population-based approach to supporting parents, children, and families. *Child Psychiatry and Human Development*, 1–14. <https://doi.org/10.1007/s10578-021-01309-0>
- Dunn, J., Slomkowski, C., Bardsall, L., & Rende, R. (1994). Adjustment in middle childhood and early adolescence: Links with earlier and contemporary sibling relationships. *Journal of Child Psychology and Psychiatry*, 35(3), 491–504. <https://doi.org/10.1111/j.1469-7610.1994.tb01736.x>
- Faith, M. A., Elledge, L. C., Newgent, R. A., & Cavell, T. A. (2015). Conflict and dominance between siblings as predictors of children's peer victimization. *Journal of Child and Family Studies*, 24(12), 3623–3635. <https://doi.org/10.1007/s10826-015-0171-1>
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175–191. <https://doi.org/10.3758/BF03193146>
- Feinberg, M. E., Solmeyer, A. R., Hostetler, M. L., Sakuma, K., Jones, D., & McHale, S. M. (2013). Siblings are special: Initial test of a new approach for parenting youth behaviour problems. *Journal of Adolescent Health*, 53(2), 166–173. <https://doi.org/10.1016/j.jadohealth.2012.10.004>
- Forbes, D. (2013). Blinding: An essential component in decreasing risk of bias in experimental designs. *Evidence-Based Nursing*, 16(3), 70–71. <https://doi.org/10.1136/eb-2013-101382>
- Howe, N., Karos, L. K., & Aquan-Assee, J. (2011). Sibling relationship quality in early adolescence: child and maternal perceptions and daily interactions. *Infant and Child Development*, 20(2), 227–245. <https://doi.org/10.1002/icd.694>
- Jenkins, J. M., Dunn, J., O'Connor, T. G., Rasbash, J., & Behnke, P. (2005). Change in maternal perception of sibling negativity: within- and between-family influences. *Journal of Family Psychology*, 19(4), 533–541. <https://doi.org/10.1037/0893-3200.19.4.533>
- Joachim, S., Pickering, J. A., & Turner, K. M. T. (2010). Reducing preschoolers' disruptive behaviour in public with a brief parent discussion group. *Child Psychiatry and Human Development*, 41(1), 47–60. <https://doi.org/10.1007/s10578-009-0151-z>
- Khatri, R. B., & Assefa, Y. (2022). Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: Issues and challenges. *BMC Public Health*, 22(1), 880. <https://doi.org/10.1186/s12889-022-13256-z>
- Koerting, J., Smith, E., Knowles, M. M., Latter, S., Elsey, H., McCann, D. C., Thompson, M., & Sonuga-Barke, E. J. (2013). Barriers to, and facilitators of, parenting programmes for childhood behaviour problems: a qualitative synthesis of studies of parents' and professionals' perceptions. *European Child and Adolescent Psychiatry*, 22(11), 653–670. <https://doi.org/10.1007/s00787-013-0401-2>

- Kramer, L. (2010). The essential ingredients of successful sibling relationships: An emerging framework for advancing theory and practice. *Child Development Perspectives*, 4(2), 80–86. <https://doi.org/10.1111/j.1750-8606.2010.00122.x>
- Kramer, L., & Baron, L. A. (1995). Parental perceptions of children's sibling relationships. *Family Relations: Journal of Applied Family and Child Studies*, 44(1), 95–103. <https://doi.org/10.2307/584746>
- Kramer, L., & Radey, C. (1997). Improving sibling relationships among young children: Social skills training model. *Family Relations*, 46(3), 237–246. <https://doi.org/10.2307/585121>
- Kramer, L., & Washo, C. (1999). *How do you manage children's conflicts questionnaire*. Urbana: University of Illinois
- Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 86(404), 1198–1202. <https://doi.org/10.2307/2290157>
- Mark, K. M., Pike, A., Latham, R. M., & Oliver, B. R. (2017). The maternal emotional climate predicts twin sibling relationship quality. *Twin Research and Human Genetics*, 20(2), 150–160. <https://doi.org/10.1017/thg.2017.8>
- Mazzucchelli, T. G., & Sanders, M. R. (2010). Facilitating practitioner flexibility within an empirically supported intervention: Lessons from a system of parenting support. *Clinical Psychology: Science and Practice*, 17(3), 238–252. <https://doi.org/10.1111/j.1468-2850.2010.01215.x>
- McCambridge, J. (2015). From question-behaviour effects in trials to the social psychology of research participation. *Psychology & Health*, 30(1), 72–84. <https://doi.org/10.1080/08870446.2014.953527>
- McGuire, S., Manke, B., Eftekhari, A., & Dunn, J. (2000). Children's perceptions of sibling conflict during middle childhood: Issues and sibling (dis)similarity. *Social Development*, 9(2), 173–190. <https://doi.org/10.1111/1467-9507.00118>
- Milevsky, A. (2021). Sibling relationships in adolescence across cultures: Predictors, transitions, and support. In A. Buchanan & A. Rotkirch (Eds.), *Brothers and sisters: Sibling relationships across the life course* (pp. 125–140). Springer International Publishing. [https://doi.org/10.1007/978-3-030-55985-4\\_7](https://doi.org/10.1007/978-3-030-55985-4_7)
- Morawska, A., Haslam, D., Milne, D., & Pickering, J. A. (2011a). Evaluation of a brief parenting discussion group for parents of young children. *Journal of Developmental & Behavioural Pediatrics*, 32(2), 136–145. <https://doi.org/10.1097/DBP.0b013e3181f17a28>
- Morawska, A., Pickering, J. A., Haslam, D. M., Filus, A., & Fletcher, R. (2014). Child Adjustment and Parent Efficacy Scale: Development and initial validation of a parent report measure. *Australian Psychologist*, 49(4), 241–252. <https://doi.org/10.1111/ap.12057>
- Morawska, A., Pickering, J. A., Goadby, E., Headley, C., Hodge, L., McAuliffe, C., Pope, S., & Anderson, E. (2011b). Is the Triple P-positive parenting program acceptable to parents from culturally diverse backgrounds. *Journal of Child and Family Studies*, 20(5), 614–622. <https://doi.org/10.1007/s10826-010-9436-x>
- Murray, A. L., Eisner, M., & Ribeaud, D. (2020). Within-person analysis of developmental cascades between externalising and internalising problems. *Journal of Child Psychology and Psychiatry*, 61(6), 681–688. <https://doi.org/10.1111/jcpp.13150>
- Muthukumar, A. V., Morrell, W., & Bierer, B. E. (2021). Evaluating the frequency of English language requirements in clinical trial eligibility criteria: A systematic analysis using ClinicalTrials.gov. *PLoS Medicine*, 18(9), e1003758 <https://doi.org/10.1371/journal.pmed.1003758>
- Nowak, C., & Heinrichs, N. (2008). A comprehensive meta-analysis of Triple P-Positive Parenting Program using hierarchical linear modelling: Effectiveness and moderating variables. *Clinical Child and Family Psychology Review*, 11(3), 114–144. <https://doi.org/10.1007/s10567-008-0033-0>
- O'Connor, M., Slopen, N., Becares, L., Burgner, D., Williams, D. R., & Priest, N. (2020). Inequalities in the distribution of childhood adversity from birth to 11 years. *Academic Pediatrics*, 20(5), 609–618. <https://doi.org/10.1016/j.acap.2019.12.004>
- Okoli, M. L., Ogbu, C. E., Enyi, C. O., Okoli, I. C., Wilson, R. E., & Kirby, R. S. (2022). Sociodemographic and socioeconomic correlates of learning disability in preterm children in the United States. *BMC Public Health*, 22(1), 212 <https://doi.org/10.1186/s12889-022-12592-4>
- Perozynski, L., & Kramer, L. (1999). Parental beliefs about managing sibling conflict. *Developmental Psychology*, 35(2), 489–499. <https://doi.org/10.1037/0012-1649.35.2.489>
- Pickering, J. A., & Turner, K. M. T. (2011). *Triple P Discussion Group Workbook: Managing fighting and aggression*. Milton, QLD: Triple P International
- Pickering, J. A., Markie-Dadds, C., Tully, L. A., & Bor, W. (2000). The Triple P-Positive Parenting Program: A comparison of enhanced, standard, and self-directed behavioral family intervention for parents of children with early onset conduct problems. *Journal of Consulting and Clinical Psychology*, 68(4), 624–640. <https://doi.org/10.1037/0022-006X.68.4.624>
- Prinz, R. J. (2019). A population approach to parenting support and prevention: The Triple P System. *The Future of Children*, 29(1), 123–143. <https://doi.org/10.1353/foc.2019.0005>
- Ross, H. S., & Lazinski, M. J. (2014). Parent mediation empowers sibling conflict resolution. *Early Education and Development*, 25(2), 259–275. <https://doi.org/10.1080/10409289.2013.788425>
- Sanders, M. R., & Pickering, J. A. (2015b). The Triple-Positive Parenting Program: An example of a public health approach to evidence-based parenting support. *Family Matters*, 96, 53–63
- Sanders, M. R. (2012). Development, evaluation, and multinational dissemination of the Triple P-Positive Parenting Program. *Annual Review of Clinical Psychology*, 8, 345–379. <https://doi.org/10.1146/annurev-clinpsy-032511-143104>
- Sanders, M. R., & Pickering, J. A. (2013). Enhancing communities through the design and development of positive parenting interventions. *Journal of Applied Research on Children: Informing Policy for Children at Risk*, 4(2), 18 <https://digitalcommons.libra.tmc.edu/childrenatrisk/vol4/iss2/18>
- Sanders, M. R., & Pickering, J. A. (2015). Integrating parents' views on sibling relationships to tailor an evidence-based parenting intervention for sibling conflict. *Family Process*, 56(1), 105–125. <https://doi.org/10.1111/famp.12173>
- Sanders, M. R., Markie-Dadds, C., Tully, L. A., & Bor, W. (2000). The Triple P-Positive Parenting Program: A comparison of enhanced, standard, and self-directed behavioral family intervention for parents of children with early onset conduct problems. *Journal of Consulting and Clinical Psychology*, 68(4), 624–640. <https://doi.org/10.1037/0022-006X.68.4.624>
- Sanders, M. R., Kirby, J. N., Tellegen, C. L., & Day, J. J. (2014). The Triple P-Positive Parenting Program: A systematic review and meta-analysis of a multi-level system of parenting support. *Clinical Psychology Review*, 32(4), 337–357. <https://doi.org/10.1016/j.cpr.2014.04.003>
- Sanders, M. R., Morawska, A., Haslam, D. M., Filus, A., & Fletcher, R. (2014). Parenting and Family Adjustment Scales (PAFAS): Validation of a brief parent-report measure for use in assessment of parenting skills and family relationships. *Child Psychiatry and Human Development*, 45(3), 255–272. <https://doi.org/10.1007/s10578-013-0397-3>
- Sanders, M. R., Morawska, A., Haslam, D. M., Filus, A., & Fletcher, R. (2014). Parenting and Family Adjustment Scale (PAFAS): Validation of a brief parent-report measure for use in assessment of parenting skills and family relationships. *Child Psychiatry and*

- Human Development*, 45(3), 255–272. <https://doi.org/10.1007/s10578-013-0397-3>
- Schuntermann, P. (2007). The Sibling Experience: Growing up with a child who has pervasive developmental disorder or mental retardation. *Harvard Review of Psychiatry*, 15(3), 93–108. <https://doi.org/10.1080/10673220701432188>
- Shantz, C. U. (1987). Conflicts between children. *Child Development*, 58(2), 283–305. <https://doi.org/10.2307/1130507>
- Shelleby, E. C., & Shaw, D. S. (2014). Outcomes of parenting interventions for child conduct problems: A review of differential effectiveness. *Child Psychiatry and Human Development*, 45(5), 628–645. <https://doi.org/10.1007/s10578-013-0431-5>
- Smith, J., & Ross, H. (2007). Training parents to mediate sibling disputes affects children’s negotiation and conflict understanding. *Child Development*, 78(3), 790–805. <https://doi.org/10.1111/j.1467-8624.2007.01033.x>
- Tiedemann, G. L., & Johnston, C. (1992). Evaluation of a parent training program to promote sharing between young siblings. *Behaviour Therapy*, 23(2), 299–318. [https://doi.org/10.1016/S0005-7894\(05\)80387-9](https://doi.org/10.1016/S0005-7894(05)80387-9)
- Tucker, C. J., & Finkelhor, D. (2017). The state of interventions for sibling conflict and aggression: A systematic review. *Trauma, Violence & Abuse*, 18(4), 396–406. <https://doi.org/10.1177/1524838015622438>
- Tucker, C. J., Finkelhor, D., Turner, H., & Shattuck, A. (2013). Association of sibling aggression with child and adolescent mental health. *Pediatrics*, 132(1), 79–84. <https://doi.org/10.1542/peds.2012-3801>
- Tully, L. A., & Hunt, C. (2016). Brief parenting interventions for children at risk of externalizing behaviour problems: A systematic review. *Journal of Child and Family Studies*, 25(3), 705–719. <https://doi.org/10.1007/s10826-015-0284-6>
- Wolke, D., Tippett, N., & Dantchev, S. (2015). Bullying in the family: Sibling bullying. *The Lancet Psychiatry*, 2(10), 917–929. [https://doi.org/10.1016/S2215-0366\(15\)00262-X](https://doi.org/10.1016/S2215-0366(15)00262-X)
- Yu, J. J., & Gamble, W. C. (2008). Pathways of influence: Marital relationships and their association with parenting styles and sibling relationship quality. *Journal of Child and Family Studies*, 17(6), 757–778. <https://doi.org/10.1007/s10826-008-9188-z>
- Zubrick, S. R., Silburn, S. R., Garton, A. F., Burton, P., Dalby, R., Carlton, J., & Lawrence, D. (1995). *Western Australian Child Health Survey: Developing health and well-being in the nineties*. Perth (WA): Australian Bureau of Statistics and the Institute for Child Health Research