Siblings dealing with pediatric cancer: A family- and context-oriented approach

Marieke Van Schoors[1,2], Laura Sels[3], Liesbet Goubert[4] and Lesley L. Verhofstadt[4]

[1]Marieke Van Schoors, MD, PhD student & onco-psychologist at the Department of Experimental Clinical and Health Psychology, Faculty of Psychology and Educational Sciences, Ghent University, H. Dunantlaan 2, 9000 Ghent, Belgium - marieke.vanschoors@ugent.be

[2]Marieke Van Schoors will serve as the corresponding author

[3]Laura Sels, PhD, doctor assistant at the Department of Experimental Clinical and Health Psychology, Faculty of Psychology and Educational Sciences, Ghent University, H. Dunantlaan 2, 9000 Ghent, Belgium – laura.sels@ugent.be

[4]Liesbet Goubert and Lesley L. Verhofstadt, PhD, Professors at the Department of Experimental Clinical and Health Psychology, Faculty of Psychology and Educational Sciences, Ghent University, H. Dunantlaan 2, 9000 Ghent, Belgium - liesbet.goubert@ugent.be & lesley.verhofstadt@ugent.be

Abstract

Background: Pediatric cancer is a severe life-threatening disease that poses significant challenges to the life of the siblings. Based on the Social Ecology Model, the aim of the current study was to explore the association between intrafamilial (family functioning, family support) and contextual (network support) resources, and the individual adjustment of siblings facing cancer in their brother/sister.

Methods: Participants were 81 siblings of children with leukemia or non-Hodgkin lymphoma. The mean siblings' age was 10.32 years. Siblings completed the Family Environment Scale, the Social Support Questionnaire for Children, the Situation-Specific Emotional Reactions Questionnaire and the Pediatric Quality of Life Inventory. Data was analyzed using a multi-level approach.

Results: Family functioning, family support and network support proved to be related to siblings' cancer-related emotional reactions post-diagnosis. In addition, the present study suggest to take into account the gender of the ill child and the age of the siblings.

Discussion: Our findings led to the conclusion that resources at both the intrafamilial level and the contextual level are important for explaining sibling adjustment post-diagnosis. Interventions targeting the sibling, the family and the external network are warranted to enhance sibling adjustment.

Introduction

Pediatric cancer is a severe life-threatening disease with every year 300,000 new diagnoses worldwide (Steliarova-Foucher et al., 2017). Given the highly interdependent nature of family relationships, all family members, including siblings, are impacted by the illness (Van Schoors et al., 2019b). Previous studies showed that siblings of children with cancer often suffer from the absence of their parents and their ill brother/sister at home, changes in their day-to-day routines (e.g., grandparents taking over parental roles) and increasing household chores and responsibilities (Van Schoors et al., 2019a; Alderfer et al., 2010). Two systematic reviews, incorporating 168 empirical studies, documented the impact of childhood cancer on siblings' individual functioning (Alderfer et al., 2010; Long et al., 2018). Specifically, these studies indicated that while there is no evidence for elevated prevalence of psychiatric disorders (e.g., anxiety and depression) in siblings, they often suffer from severe levels of post-traumatic stress symptoms, especially in the first months after diagnosis (Alderfer et al., 2010; Long et al., 2018). In addition, they often report poor quality of life in several domains (i.e., emotional, family and social; Alderfer et al., 2010), and negative emotional reactions (i.e., shock, fear, worry, sadness, anger and guilt) during cancer treatment. Finally, school-aged siblings often display more absenteeism and problems at school than peers (Alderfer et al., 2010; Long et al., 2018).

Because adjustment problems appear to occur only in a subset of the siblings studied, researchers started to focus on possible resources and tried to explain why some siblings adapt better than others. Resources that have been studied in the context of childhood cancer in general can be situated at three levels: the individual level, the intrafamilial level and the contextual level. For example, existing research on the individual adjustment of siblings when facing a cancer diagnosis in their brother/sister indicated that maintaining positive expectations regarding the illness (coping; individual resource; Houtzager, Grootenhuis,

Hoekstra-Weebrs & Last, 2005), lower levels of family conflict (family functioning; intrafamilial resource; Van Schoors et al., 2017) and more network support (contextual resource; Barrera, Fleming & Khan, 2004) is associated with better sibling adjustment.

The present study

In the current study, we focused on resources situated at the intrafamilial and contextual level. In other words, a family- and context-oriented approach was applied to investigate siblings' adjustment to their brother'/sister's cancer diagnosis. This approach was deemed necessary, as every child (ill child, sibling) is embedded in a broader social context with mutual influences between the stressor (i.e., cancer diagnosis), the child, and his/her social context (e.g., family, external network; Social Ecology Model; Bronfenbrenner, 1997). More specifically, we focused on *family functioning* as a first *intrafamilial resource*. There is abundant empirical evidence that the way in which the family as a whole deals with and responds to childhood cancer ('family functioning') impacts the adjustment of the siblings (Long, Marsland & Alderfer, 2013; Van Schoors et al., 2017; 2019b). For example, families need to redefine their relationships, communicate effectively (i.e., "emotional closeness within the family") and flexibly renegotiate roles and responsibilities (i.e., "family structure") to accommodate the demands of cancer, and poorly functioning families who struggle with these demands may be at risk for adjustment problems in all family members, including siblings (Long et al., 2013; Van Schoors et al., 2017; 2019b).

As a second *intrafamilial resource,* we focused on *family support*. Family support refers to practical assistance, encouragement and caring within the family, as perceived by the sibling (Walsh, 1998). The family has been shown to be an important source of support for siblings facing childhood cancer, with the mother being identified as the most important source of support (Van Schoors et al., 2019a). In addition, based on a recent meta-analysis

(see Van Schoors et al., 2017 for an overview), more family support is associated with better adjustment (e.g., less anxiety, depression, post-traumatic stress symptoms) in siblings.

As a third and final resource, we focused on *network support* (contextual resource). Network support refers to emotional, practical and informative support and help from an individual outside the family (i.e., external network), as perceived by the sibling (Gordan, 2011). Due to the fatal character of the cancer diagnosis, parents primarily focus on the ill child, which is at the cost of time and attention allocated to the siblings (Prchal & Landolt, 2012). While parents accompany the diagnosed child to the hospital, others (like grandparents or neighbors) take care of the siblings and help them cope with the illness and its consequences (Van Schoors et al., 2018; 2019a), making these "others" important sources of sibling-support. In addition, in line with the developmental age of the siblings (Greenberg, Siegel & Leitch, 1983), friends and peers are important sources of sibling-support as well (Barrera et al., 2004).

To the best of our knowledge, there are no studies investigating family functioning, family support and network support together as predictors when facing childhood cancer. From a social-ecological perspective (Bronfenbrenner, 1977), however, adjustment cannot be understand by solely focus on the individual; adjustment is the product of a constellation of forces from the family and the external network. In other words, including intrafamilial (family functioning, family support) and contextual (network support) resources are needed to best understand sibling adaptation when facing childhood cancer, and to get insight in (the importance of) the social context siblings are living in. Therefore, the aim of the current paper is to investigate the association between *family functioning*, *family support, network support* and the *individual adjustment* (quality of life; cancer related emotions) of siblings facing cancer in their brother/sister. More specifically, we expected that better family functioning (more emotional closeness within the family and a more firm family structure), more family

support and more network support would be associated with better individual outcomes (i.e., less loneliness, less uncertainty, more emotional involvement in the illness process, more positive cancer-related emotions and better quality of life) in siblings.

Method

Participants

Details on the sample are listed in Table 1. Our sample consisted of 81 siblings of children with leukemia ($N = 67$) or non-Hodgkin lymphoma ($N = 14$). The mean ill child's age at diagnosis was 7.60 years (SD = 4.91; Range = 1-18). The mean siblings' age was 10.32 years (SD = 4.57; Range = 5-25). All siblings were Caucasian and living in the Flemish part of Belgium. Ethical approval from the University Hospitals of Ghent, Brussels, Antwerp and Louvain had been secured for the study. Written informed consent forms were obtained from all participating siblings above the age of 12. Parental (written) consent was obtained for all participating siblings under the age of 16.

[insert Table 1 here]

Procedure

The present study is part of a larger study examining the impact of pediatric cancer on families, that is the 'UGhent Families and Childhood Cancer study'. For this large-scale project, families of children with leukemia or non-Hodgkin lymphoma aged zero to 18 years were invited to take part in a longitudinal questionnaire study. All family members aged five years and above (patient, siblings, mother, father) were asked to complete a set of questionnaires at 5 different time points (diagnosis – 2.5 years post-diagnosis). Exclusion criteria were not speaking Dutch, expression of a developmental disorder in the diagnosed child, and cancer relapse. For the present study, only the repeated measurements of the sibling data were used (see Data Analytic Strategy for more details). Collection of the data was

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conducted between June 2014 and January 2020. During this timeframe, 212 families received a pediatric leukemia or non-Hodgkin lymphoma diagnosis and all were invited to participate. One hundred and seven families agreed (response rate = 65%), including 81 siblings. The most frequent reasons for non-participation were being too overwhelmed by the diagnosis and lack of time.

Measures

Due to a minimum age limit for the questionnaires, some younger siblings did not complete all questionnaires. For each questionnaire, the minimum age and the number of siblings *excluded* for the questionnaire based on the minimum age ("N_{age}") are reported.

Family Functioning. The Dutch version of the Family Environment Scale (FES; Moos & Moos, 1994; Jansma & De Coole, 1995) was used to measure family functioning. The questionnaire contains 77 'yes–no' items, across seven subscales: (1) cohesion (e.g., *At home we do everything together the entire weekend*), (2) expressiveness (e.g., *We have many spontaneous conversations in our family*), (3) conflict (e.g*., We argue a lot at home*), (4) organization (e.g., *When we do something we always prepare well*), (5) control (e.g., *We make sure that everyone in the family keeps to the agreements*), (6) norms and values (e.g., *We believe in competition and believe that the best must win*) and (7) social orientation (e.g., *We think it is important to be aware of politics*). From these subscales, two composite scores were calculated by summing the relevant item scores: the family relation index (FRI; cohesion + expressiveness – conflict) and the family structure index (FSI = organization + control), reflecting the affective nature of the family relationships ('emotional closeness within the family") and the extent to which the family is structured ("family structure") , respectively. Higher FES composite scores reflect more emotional closeness within the family (FRI; more cohesion and expressiveness and less conflict) and a more firm family structure (FSI; more control and organization). These composite scores were included in the analyses as indicators

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for family functioning. The FES is applicable for children aged 11 and above (N_{age} = 48), and has good reliability and validity (Jansma & De Coole, 1995). In the present study, the Cronbach's alpha reliabilities were .76 for the FRI and .77 for the FSI.

Family and network support. The Social Support Questionnaire for Children (Gordon, 2011) assesses the amount of social support as perceived by the sibling. The questionnaire has five factors representing distinct sources of support: parents (e.g., *A parent makes sure I have what I need*), relatives (e.g., uncle,, grandparent; *I have a relative who gives me good advice*), non-relative adults (e.g., coach, teacher; *An adult cares about my feelings*), siblings (e.g., *I have a sibling I can trust to keep a secret*), and peers (e.g., classmate, close friend; *A peer comforts me when I am upset*) and consists of 50 items. All items were rated on a 4-point Likert scale from *never true* to *always true.* Two composite scores were calculated by summing the different item scores, reflecting the total amount of perceived family support (i.e., support from *parents* and *siblings)* and network support (i.e., support from *relatives, non-relative adults and peers)*. These composite scores were included in the analyses as indicators for family and network support, with higher scores reflecting higher levels of perceived social support from the family and the external network, respectively. The questionnaire is applicable from the age of 7 (N_{age} = 15) and has satisfactory to good validity and reliability (Gordon, 2011). In the present study, Cronbach's alpha coefficients were .94 (family support) and .96 (network support).

Cancer-Related Emotions. The Situation-Specific Emotional Reactions Questionnaire - Siblings (SSERQ-S; Houtzager et al., 2004) is developed to assess emotional reactions in siblings after facing a pediatric cancer diagnosis in their brother/sister. The questionnaire consists of 26 items, divided in four subscales: (1) loneliness (e.g., *I feel alone*), (2) uncertainty (e.g., *I worry about the future*), (3) emotional involvement (e.g., *I regret that my parents have to go through all this)* and (4) positive cancer-related feelings (e.g., *I am*

proud that I can keep up with it). All items are rated on a 4-point Likert scale from *almost never* to *almost always*. Higher sum scores represent more emotional reactions. The questionnaire is applicable from the age of 7 ($N_{age} = 9$) and has satisfactory to good validity and reliability (Houtzager et al., 2004). In the present study, Cronbach's alpha coefficients were .79 (loneliness), .87 (uncertainty), .88 (emotional involvement), and .68 (positive feelings).

Quality of Life (QoL). The Pediatric Quality of Life Inventory (Varni, Seid & Rode, 1999) measures children's health-related quality of life. Different versions of the questionnaire are available, for example the PedsQL™ 3.0 Cancer Module (children with cancer) and PedsQL™ Generic Core Scales (healthy children). In this study, the PedsQL™ Generic Core Scales measured the siblings' quality of life. The questionnaire is composed of 23 items comprising 4 dimensions: (1) physical functioning (e.g., *It's hard for me to lift big things*), (2) emotional functioning (e.g., *I feel sad*), (3) social functioning (e.g., *Other kids tease me*) and (4) school functioning (e.g., *It is hard to pay attention at school*). All items are scored on a five-point Likert-scale from *never* to *almost always*, reversed and rescaled to a 0-100 scale: a score of 100 represents the best quality of life possible, a score of 0 represents the worst quality of life possible. Scale scores, as well as the sum score, are computed by adding together the different item scores and dividing this obtained score by the number of items answered. Only the sum score (i.e., general quality of life) was included in the analysis. The questionnaire is applicable from the age of 5 ($N_{age} = 0$) and has sufficient to good validity and reliability (Varni, Seid & Kurtin, 2001). In the present study, the Cronbach's alpha coefficient was .87 for the sum-score.

Data Analytic Strategy

We investigated the associations between family functioning (emotional closeness within the family and family structure), family support, and network support, and siblings'

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individual adjustment. We modeled the effects of family functioning, family support, and network support on five adjustment indicators: quality of life, and the cancer-related emotions loneliness, uncertainty, emotional involvement and positive feelings. Because our data were clustered, with measurement occasions (level 1, which ranged from 1 to 5 for each participant) that are nested within siblings (level 2), and siblings nested within families (level 3), we first investigated dependencies between observations by empty three-level models (in accordance with Hoffman & Stawski, 2009). Specifically, between-person and between-family variances were estimated for quality of life and cancer-related emotions. Because the between-family variances were negligible in most models (e.g., the total proportion of variance in quality of life between families was .002 %) and the inclusion of this level led to estimation problems, we decided to omit this third level from the main analyses. In the reported two-level models, we allowed a random intercept, which varied for each sibling within each family, and indicated that observations were repeated across time. To account for missing data, efficient estimates were obtained through maximum likelihood estimation procedures. Analyses were carried out with Statistical Package for the Social Sciences version 11.5 (SPSS Inc., 2003).

Given high correlations between our key predictors of interest (see Table 2), we modeled the effects of emotional closeness (i.e. family functioning), family structure (i.e. family functioning), family support and network support on adjustment separately, controlling for covariates. The covariates time since diagnosis, number of children in the family, age of the ill child, gender of the sibling, gender of the ill child and age of the sibling were considered in preliminary models, but only the latter two were correlated with our outcome variables, and thus integrated in the final models. All continuous predictors were grand-mean centered.

Results

Table 2 shows the descriptive statistics and correlations of the variables in our study.

[insert Table 2 here]

The final models for the associations between family functioning, family support, network support, quality of life and cancer-related emotions are shown in Table 3.

[insert Table 3 here]

Quality of Life. None of the predictor variables (emotional closeness within the family, family structure, family support, network support and gender ill child, age sibling) were significantly associated with quality of life (all $p > .05$).

Cancer-Related Emotions.

Loneliness. A significant negative association between emotional closeness within the family and the siblings' feelings of loneliness was found ($p = .02$): more emotional closeness within the family (more cohesion and expressiveness, less conflict) was related to less feelings of loneliness in the siblings. In addition, more perceived social support from the family ($p = .047$) and the external network ($p = .02$) was associated with less feelings of loneliness in the siblings. None of the other predictor variables (family structure, gender ill child, age sibling) were significantly associated with loneliness (all $p > .05$).

Uncertainty. None of the predictor variables (emotional closeness within the family, family structure, family support, network support and gender ill child, age sibling) were significantly associated with uncertainty (all $p > .05$).

Emotional involvement. A significant positive association between family functioning, both the emotional closeness within the family ($p = .01$) and the family structure ($p = .03$), and the siblings' reported emotional involvement in the illness process was found: More emotional closeness within the family (more cohesion and expressiveness, less conflict)

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and a more firm family structure (more clear family organization and more parental control) was related to more siblings' emotional involvement in the illness process.

In addition, there was a significant positive association between the amount of perceived social support from the family ($p < .001$) and the external network ($p < .001$), and the siblings' emotional involvement in the illness process: the more perceived support (both from the family and the external network), the more emotional involvement the siblings reported in the illness process. Furthermore, across the models[1], there was a positive association between the gender of the ill child and emotional involvement (all $p < .05$): brothers and sisters of a girl with leukemia or non-Hodgkin lymphoma reported more emotional involvement in the illness process as compared to brothers and sisters of an ill boy. The predictor variable age sibling was not significantly associated with emotional involvement (all $p < .05$)

Positive cancer-related feelings. A significant positive association between the family functioning, both the emotional closeness within the family ($p = .01$) and the family structure ($p = .03$) and, and the siblings' reported positive feelings was found: more emotional closeness within the family (more cohesion and expressiveness, less conflict) and a more firm family structure (more clear family organization and more parental control) was related to more positive feelings in the siblings. In addition, there was a significant positive association between the amount of perceived social support from the family ($p = .004$) and the external network ($p = .009$), and the siblings' positive feelings: the more support (both from the family and the network), the more positive feelings the siblings reported. Furthermore, in the network support model, the older the sibling, the less positive feelings s/he reported ($p < .003$). The predictor variable gender ill child was not significantly associated with positive feelings (all $p < .05$).

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[1] This significant positive association between gender ill child and emotional involvement was *not* found in the model of network support and emotional involvement (p = .08); see Table 3.

Bonferroni correction. Because five different outcome variables were modelled, a Bonferroni corrected threshold for significance of $p = .01$ can be applied. When taking into account this Bonferroni corrected threshold, only the associations between emotional closeness, social support (from the family and external network), the ill child's gender and emotional involvement in the illness process; and between emotional closeness, the sibling's age and positive feelings were preserved (see Table 3). Caution is warranted when interpreting the other associations ($.05 < p < .01$) and further research is needed to confirm these findings.

Discussion

Based on the Social Ecology Model (Bronfenbrenner, 1977) and using a multi-level approach (Hoffman & Stawski, 2009), the present study sought to examine whether intrafamilial resources (family functioning, family support) and contextual resources (network support) were related to the individual adjustment (quality of life and cancer-related emotions) of siblings facing cancer in their brother/sister.

Summary of results

Our findings indicate that both family functioning (emotional closeness & family structure), family support and network support matter for bon-adjustment in siblings being confronted with childhood cancer. This is in line with our prediction and with previous studies on family functioning (Van Schoors, 2017; 2019b) and support (Brown, Madan-Swain & Lambert, 2003; Dolgin et al., 1997) in the context of childhood cancer.

More specifically, we found that more **emotional closeness** within the family (more cohesion and expressivity, less conflict) was associated with lower levels of loneliness and higher levels of positive cancer-related feelings. In other words, when a sibling perceived his/her family as warm and loving (cohesion), open to talk about experiences and emotions (expressivity) and there were little conflicts, s/he reported to feel less lonely and more positive

regarding the illness and its consequences. These findings are in line with the idea that family functioning is important for the adjustment of children when facing childhood cancer (see Van Schoors et al., 2017 for an overview). In addition, more emotional closeness within the family was associated with higher levels of emotional involvement in the illness process: The better the family bounds, the more the sibling was worried about and committed to his/her ill brother/sister and parents. This association makes sense: a stable characteristic of the family (emotional closeness) is reflected in the involvement with the illness and the ill child/parents at one specific moment measured. In other words, it is the translation of a family characteristic into family members' interactional behavior and involvement in times of stress.

Furthermore, **family structure** was positively associated with the level of emotional involvement in the illness process and positive cancer-related feelings in the siblings: The more clear family rules, the more predictability in the household (organization), and the more parental control, the higher the emotional involvement in the illness process and the more positive cancer-related emotions the siblings reported. Possible explanations are twofold. When facing childhood cancer, the family's world is turned upside-down. The family's focus is allocated to the health of the ill child, at the cost of time and attention for the family as a whole and the siblings (Van Schoors, 2018). The sibling is often left to his/her lot and feels lost (Prchal & Landolt, 2012). As a consequence, the more siblings have the idea that their parents are still in control, and the more rules and predictability they have in the organization of their "new" life, the more siblings might feel comfortable and positive regarding the illness. Second, the age of the siblings should be taken into account. Ninety-one percent of the included siblings were younger than 16, and all included siblings were living together with their ill brother/sister and parents. For most of these siblings, a more firm family structure, with parents taking the mean family decisions, is conform the principles of the family life

cycle (Minuchin et al., 1998): The younger the child, the more the parent takes the lead; the older the child, the more there is a balanced hierarchy between parent and child.

Furthermore, we found that siblings receiving more **support** from their family and the external network reported lower levels of loneliness, and higher levels of emotional involvement in the illness process and positive cancer-related feelings. This is in line with previous studies illustrating that social support can buffer maladjustment after a childhood cancer diagnosis (Van Schoors, 2017). Moreover, this study shows that both social support from the family *and* the external network are needed to best help siblings: when parents are emotionally unavailable due to their own intense emotions or focus on the diagnosed child, the external network can provide sibling support; and vice versa.

Finally, the results of the present study suggest to take into account the **gender of the ill child** and the **age of the siblings**. First, siblings of an ill girl were more emotionally involved in the illness process than siblings of an ill brother. This is in line with the cultural idea that men/boys are perceived as "stronger" than women/girls, and thus that ill men need less help/care. In addition, the study of Bendelow (1997) showed that the pain expression of girls is higher than those of boys. In other words, girls show more pain than boys, and thus ill girls may attract more help/concerns in the other family members, as compared to ill boys. Second, older siblings reported less positive cancer-related feelings than younger siblings. This is in line with the idea that most cancer-related medical details are not shared with younger siblings, nor by the parents, nor by the medical team. As a consequence, older siblings may be more aware of the life threatening character of the illness, and the possibility their brother/sister could die from it. Moreover, a fully understanding of the concept "death" is only reached at age 10 (Cox, Garrett & Graham, 2005).

Surprisingly, none of the predictors of interest (family functioning, family support, network support) were significantly associated with quality of life. Possible explanations are

twofold. First, the current study is characterized by a small sample (N =85), and thus small

power. It is possible that associations with smaller effect sizes were not detected. Second,

whereas the SSERQ is a cancer specific questionnaire assessing cancer-related emotional

reactions, the PedsQL is a population based questionnaire assessing general quality of life. In

line with Alderfer et al. (2008) and Hildenbrand et al. (under review), we might question

whether population based instruments are applicable in the context of chronic pediatric

illnesses. Indeed, making use of population based measurements might ignore the

understanding that what is dysfunctional in general population might be functional when

facing a chronic child illness.

Strengths and Limitations

A first strength of the present study is the focus on siblings of children with leukemia

or non-Hodgkin lymphoma. Up till now, most studies focused on the ill child or his/her

parents (Alderfer et al., 2010). Second, in line with the Social Ecology Model

(Bronfenbrenner, 1997), a family- and context-oriented approach was applied in the present

study, including resources at the intrafamilial (family functioning, family support) and the

contextual (network support) level. As previous research mostly focused on resources situated

at only one level (individual, intrafamilial, contextual level) rather than combining these

resources, they only provided a fragmented explanation of the processes underlying post-

diagnostic sibling adjustment. In contrast, we were able to present a broader picture of the

social context that might foster sibling adjustment when facing pediatric cancer. Third, by

making use of multi-level analyses, we were able to take into account the nested structure of

the data.

The current findings must be considered within the scope of some limitations. First,

with only 81 included siblings, we can only draw limited conclusions regarding the

association between family functioning, family support, network support and the siblings'

adjustment. Further research, with larger samples, is therefore needed to confirm our findings. Second, as the associations described in this study are correlational in nature, the temporal order of the variables under investigation could not be investigated. Longitudinal analyses were considered, but were ultimately not carried out because only 13 siblings provided longitudinal data, and such a small sample would have led to severe power issues. Third, only Caucasian, Dutch speaking siblings were included. Given the current multicultural society, research including different languages and ethnic populations is needed to increase the generalizability of the findings on sibling adjustment. In addition, we only focused on siblings of children diagnosed with leukemia and non-Hodgkin lymphoma. It is important to highlight that siblings of children with other cancer diagnoses may have different experiences. Fourth, as this study is part of a larger project including measurements of all family members, research assistants invited the ill child's parents to participate to the study. It is possible that families (including siblings) with severe adjustment problems declined for participation (i.e., most important reason for non-participation was being too overwhelmed by the diagnosis), or that more sibling-data could have been collected if the siblings themselves were asked to participate. Finally, given the criticism that a Bonferroni correction might be too conservative and may lead to reject results which actually are meaningful, this correction was addressed in the result section, but not in the discussion section. Overall, caution is warranted when interpreting associations with a p-value between .05 and .01, and further research is needed to confirm these findings.

Clinical Implications

Four clinical recommendations arise from the current study. First, the current results provide further empirical evidence for existing social ecological prevention and intervention models in child health, conform the clinical practice guidelines for families facing childhood cancer (Wiener, Viola, Koretski, Perper, & Patenaude, 2015). In line with these guidelines,

specific clinical attention for siblings is needed, as some siblings might adapt worse than others. Second, clinical interventions should be sensitive to some individual characteristics of siblings facing childhood cancer. For example, the age of the sibling, as less positive cancer-related feelings are reported when the sibling is older. Third, given the importance of a clearly structured family life (i.e., a clear family organization and more parental control) and family support post-diagnosis, psycho-education can be given to parents, patients and siblings. During this psycho-education, clinicians should invite the family as a whole, give the family members easy-to-follow advices and emphasize the importance of the *family* for the adaptation of the siblings, taking into consideration the current shift in parental focus to the ill child and the parental guilt that can accompany this shift (Van Schoors et al., 2018). Fourth, as network support is an important contextual resource, clinicians should map the existing social network of the sibling and help siblings to ask for (emotional or practical) help where needed.

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Table 1. Background Characteristics of the Study Sample

Demographic variable		
N siblings (*n* boys, *%*)		81 (39, 48%)
Age, siblings, mean *(SD)*		10.32 (4.57)
Age ill child at diagnosis, mean (*SD*)		7.60 (4.91)
Sex ill child, *n* boys *(%)*		45 (56%)
Diagnosis[1], n (%)	ALL	60 (74%)
	AML	5 (6%)
	CML	2 (3%)
	Non-Hodgkin Lymphoma	14 (17%)
Family status, *n (%)*	Married/Co-habiting	68 (84%)
	Single parent	8 (10%)
	Stepfamily	5 (6%)
Number of children in the family, *n (%)*	Two children	24 (30%)
	Three children	43 (53%)
	Four children	13 (16%)
	Five children	1 (1%)

Note. ALL = Acute Lymphatic Leukemia; AML = Acute Myeloid Leukemia; CML = Chronic Myeloid Leukemia

Table 2. Descriptive statistics and correlations of the variables

	Range	*M (SD)*	*N*	1	2	3	4	5	6	7	8	9
1. Emotional closeness	11-30	22 (4.78)	65	-	.59**	.62**	.23	.31*	-.30*	.08	.38**	.41**
2. Family structure	3-20	13 (4.25)	65	-	-	.49**	.37**	.32**	-.18	-.04	.22	.42**
3. Family support	8-60	40.05 (11.90)	127	-	-	-	.56**	.11	-.09	.23**	.52**	.25**
4. Network support	8-60	36.56 (12.04)	127	-	-	-	-	.13	-.28*	-.13	.21*	.29**
5. Quality of life	34.69-97.50	73.63 (13.50)	172	-	-	-	-	-	-.50**	-.48**	-.23**	.002
6. Loneliness	3-21	15.77 (4.13)	148	-	-	-	-	-	-	.59**	.29**	-.003
7. Uncertainty	0-24	17.03 (5.56)	148	-	-	-	-	-	-	-	.57**	.05
8. Emotional involvement	0-20	8.12 (5.17)	148	-	-	-	-	-	-	-	-	.26**
9. Positive feelings	0-9	4.53 (2.41)	148	-	-	-	-	-	-	-	-	-

Note. *Correlation is significant at the .05 level; ** Correlation is significant at the .01 level.

Table 3. Final models for the associations between family functioning, family support, network support, quality of life and cancer-related emotions

	Quality of Life		Cancer-related emotions: loneliness		Cancer-related emotions: uncertainty		Cancer-related emotions: emotional involvement		Cancer-related emotions: positive feelings	
	B [CI]	p value	B [CI]	p value	B [CI]	p value	B [CI]	p value	B [CI]	p value
Predictors										
Family structure	.53 [-.25,1.32]	.18	-.12 [-.40, .16]	.40	-.06 [-.40, .28]	.72	.30 [.02, .58]	.03*	.15 [.01, .28]	.03*
Gender ill child	2.86 [-5.38, 11.11]	.49	-2.39 [-5.04, .26]	.08	2.16 [-1.12, 5.44]	.19	3.73 [1.33, 6.13)	.004*	-.19 [- 1.46, 1.08]	.76
Age sibling	-.05 [-1.01, .90]	.91	-.02 [-.34, .30]	.91	.08 [-.31, .48]	.67	.19 [-.11, .50]	.21	-.05 [-.20, .10]	.51
Emotional closeness	.57 [-.09,1.22]	.09	-.28 [-.51, -.05]	.02*	-.14 [-.42, .14]	.32	.30 [.07, .52]	.01**	.14 [.03, .25]	.01**
Gender ill child	2.41 [-5.58, 10.40]	.54	-2.02 [-4.54, .50]	.11	2.29 [-1.01, 5.59]	.17	3.48 [1.04, 5.91]	.007**	-.26 [-1.49, .96]	.67
Age sibling	-.22 [-1.13, .68]	.62	.03 [-.27, .32]	.86	.10 [-.28, .47]	.61	.09 [-.20, .38]	.541	-.10 [-..24, .05]	.18
Family support	.09 [-.11, .29]	.38	-.07 [-.13, -001]	.05*	.004 [-.07, .08]	.91	.19 [.12, .26]	.000***	.05 [.02, .09]	.004**
Gender ill child	-1.93 [-8.11, 4.26]	.54	-.32 [-2.18, 1.54]	.73	1.22 [-1.01, 3.44]	.28	1.75 [-.22, 3.73]	.08	.006 [-.89, .90]	.99
Age sibling	.36 [-.34, 1.06]	.31	-.07 [-..29, .15]	.53	.04 [-.22, .29]	.77	.11 [-.12, .34]	.34	-.18 [-.29, -.08]	.001***
Network support	-.01 [-.19, .21]	.92	-.08 [-.14, -.01]	.02*	-.004 [-.08, .07]	.93	.19 [.12, .26]	.000***	.05 [.01, .08]	.009**
Gender ill child	-1.68 [-7.89, 4.54]	.59	-.46 [-2.30, 1.37]	.62	1.23 [-.99, 3.45]	.27	2.21 [.19, 4.24]	.03*	.13 [-.77, 1.03]	.77
Age sibling	.41 [-.29, 1.10]	.25	-.08 [-.29, .13]	.46	.04 [-.21, .29]	.75	.14 [-.09, .38]	.23	-.16 [-.27, -.06]	.003**

*Note. *$p<.05$ **$p<.01$ ***p<.001