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It's Not All About the Healthy Sibling: Sibling Relationships from the Perspective of Children and Adolescents with Cystic Fibrosis

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Cover Page Footnote

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Abstract

Research on sibling relationships of chronically ill children has mostly focused on the healthy sibling. This study presents data on the quality of sibling relationships from the perspective of children and adolescents with cystic fibrosis (CF). Participants (N = 75, aged 10-18) with CF from German-speaking countries completed the “Students Life Satisfaction Scale” (SLSS) and the “Questions on Life Satisfaction for Adolescents and Adults with Cystic Fibrosis” (FLZ^{M}-CF). Participants who had one sibling (n = 50) were additionally given the “Sibling Relationship Questionnaire” (SRQ). SRQ scales *Warmth/Closeness* and *Rivalry* were significantly elevated compared to normative data. Most participants had a positive view of their sibling relationships. Compared to normative data, life satisfaction was significantly lower. Participants with and without siblings did not differ on SLSS and FLZ^{M}-CF.

It’s Not All About the Healthy Sibling: Sibling Relationships from the Perspective of Children and Adolescents with Cystic Fibrosis

Cystic fibrosis (CF) is a chronic genetic disorder that mainly affects the respiratory system. Its course is progressive, life expectancy is reduced and children and adolescents have to adhere to stressful and time-consuming treatments that may interfere with family routines (Ernst, Johnson, & Stark, 2010). Thus, all family members have to adjust to the medical and psychosocial demands of living with CF (Berge & Patterson, 2004; Quittner, Nicolais, Saez-Flores, & Bernstein, 2017).

The sibling relationship is considered the longest lasting relationship most people have in their life. Early sibling relations are characterized by intimacy and companionship, as well as conflict and intense expression of negative feelings. The quality of sibling relations is related to psychological adjustment of children (Dirks, Persram, Recchia, & Howe, 2015; Dunn, 2014; McHale, Updegraff, & Whiteman, 2012) and their parents (e.g. Foster, Bryon, & Eiser, 1998). In a meta-analysis Buist, Deković, and Prinzie (2013) found evidence that sibling conflict and differential treatment of siblings by parents increase the risk for both internalizing and externalizing problems, whereas sibling warmth has a protective effect. Children with hostile sibling relations, combining high conflict and low warmth, report more psychological symptoms and lower self-worth compared to children reporting above average warmth and conflict, and children high on warmth and low on conflict (Buist & Vermande, 2014).

For parents, managing sibling relations may be challenging (Feinberg, Solmeyer, & McHale, 2012). Sibling conflicts may be especially burdensome when added to the intense and long-lasting stress experienced by families caring for children with chronic illness. High levels of illness-related stress and exhaustion may interfere with the parental ability to foster conflict regulation strategies, to avoid differential treatment, and to maintain a positive family climate and a supportive and loving relationship with each child.

Whereas numerous studies have investigated the effects of chronic illness and disability on healthy siblings (see reviews by Bellin & Kovacs, 2006; van Riper, 2003; Williams, 1997), the quality of sibling relationships has rarely been studied (Blacher & Begum, 2011). A literature search in PubMed and Psycinfo databases (search word string: sibling* [Title/Abstract]) AND cystic fibrosis [Title/Abstract]; search date: 2018-09-21) revealed that there is still a dearth of research on sibling relations. The vast majority of the 308 retrieved references referred to medical (e.g. genetic) aspects of CF. Studies addressed the psychosocial adjustment of the healthy sibling (e.g. Havermans et al., 2011; O'Haver et al., 2010), of both siblings (Wennström, Berg, Kornfalt, & Ryden, 2005; Wennström, Isberg, Wirtberg, & Rydén, 2011), and differential treatment (Foster et al., 2001; Quittner & Opipari, 1994).

Only two studies were found that included the perspective of the child with CF. Zeltzer, Kellerman, Ellenberg, Dash, and Rigler (1980) asked 168 adolescents with chronic illness, including 23 with CF, to rate the impact of illness on various life domains and social relations. Disruption of sibling relations, measured by a single item, was not elevated compared to a control group. No specific data for the CF-subgroup is provided, and manifestations, causes, and correlates of disruption were not studied. In a small-sample ($N = 8$) qualitative study from a family systems perspective, Foster et al. (2001) interviewed children with CF, their mothers, and siblings. Some children with CF reported that they experienced differential discipline by parents not related to medical necessities, causing resentfulness of their siblings. In summary, we do not know much about the quality of sibling relations perceived by children and adolescents with CF.

Sibling relations have been studied more extensively in the context of disability. Although results are far from conclusive, it is noteworthy that some studies found positive effects. Stoneman (2005) concludes that “most relationships between children with disabilities and their siblings are positive, nurturant, and satisfying” (p. 341). The quality of sibling relationships was found to have a positive impact on behavior problems and social competence in children with intellectual disability (Floyd, Purcell, Richardson, & Kupersmidt, 2009). According to these results, even severe intellectual, physical, and sensory disabilities do not necessarily endanger the quality of sibling relations. Children and adolescents with CF do not show comparable impairments in cognition, communication, and mobility that may interfere with age-adequate sibling relations. Thus, we assume that the quality of sibling relations need not be compromised.

Considering the dearth of research, our study firstly aimed at assessing the quality of sibling relations as perceived by children and adolescents with CF. We will consider the four dimensions of sibling relations outlined by Furman and Buhrmester (1985). Warmth/Closeness includes positive aspects like intimacy, companionship, affection, and admiration. Conflict comprises quarreling, competitive and antagonistic behaviors. Relative Status/Power refers to nurturance and dominance, which may be more or less symmetrical. Rivalry is conceptualized as parental partiality.

The second purpose of the study was to gain a more specific insight into sibling relations concerning illness-related issues. So far, little is known about how children with CF perceive their siblings concerning support, emotional connectedness, and illness-related communication about CF. These aspects are not considered in general conceptualizations and measurement of sibling relations. Anecdotal evidence indicates that we might expect mutual avoidance of talking about CF (Bluebond-Langner, 1989).

A final purpose of our study was to assess the impact of sibling relations and relationship quality on general and illness-related life satisfaction and to compare life satisfaction of children and adolescents with CF with and without siblings. Life satisfaction can be defined as the individual cognitive evaluation of life as a whole and is considered a key indicator of mental health (Proctor, Linley, & Maltby, 2017) and an important outcome variable in research on the psychological effects of chronic illness (Wallander & Koot, 2016).

Methods

Participants

Participants aged 10 to 18 years were recruited via social networks (e.g. German Facebook groups for people with CF), professional mailing lists, the German advocacy group Mukoviszidose e. V., and hospitals specializing in CF in southern Germany. All participants indicated that they had been formally diagnosed with CF. One participant had a lung transplantation, eight participants (11%) were listed for transplantations (lung, liver), 11% received oxygen, and 20% reported diabetes (see Table 1 for further information on participant characteristics). Participation was limited to children and adolescents with either one sibling or none to avoid collecting multiple data sets from the same participants, and to limit participant burden. Alternatively, we could have focused on the sibling closest in age to gain a more heterogeneous sample (see Marciniak, 2017, for limitations of this approach). The current study was approved by the Institutional Review Board of Ludwigsburg University of Education.

Table 1

Demographic Characteristics of Study Participants

	With sibling	No sibling
n	50	25
Gender		
Male	39 (78%)	12 (52%)
Female	11 (2%)	13 (48%)
Age		
Mean	14.6	14.8
SD	2.3	2.7
Range	10-18	10-18
Sibling status		
n first born	26 (52%)	
n second born	24 (48%)	
n same gender	26 (52%)	
n different gender	24 (48%)	
% of predicted FEV_1		
Mean	80.6	84.2
SD	18.9	27.0
Schooling		
Primary schools	2 (4%)	0 (0%)
Lower secondary level	3 (6%)	0 (0%)
Intermediate secondary level	15 (30%)	13 (52%)
Higher secondary level	21 (42%)	9 (36%)
Comprehensive secondary level	9 (18%)	2 (8%)
Other	0 (0%)	1 (4%)

Note. FEV_1 = forced expiratory volume in 1 second.

Measures

Participants completed an Internet-based questionnaire, hosted on the survey administration website *www.socscisurvey.de*, on their personal, psychosocial, and medical background. The latter included reporting the latest Forced expiratory volume (FEV_1% predicted; e.g. Miller et al., 2005). FEV_1% is considered a reliable indicator of pulmonary function and disease progression and has been widely used in research on CF. Additionally, the following standardized instruments were used:

- The Sibling Relationship Questionnaire (SRQ; Furman & Buhrmester, 1985; German version by Bojanowski, Riestock, Nisslein, Weschenfelder-Stachwitz, & Lehmkuhl, 2015; Bojanowski, Riestock, & Nisslein, 2019). The SRQ is a well-established and validated instrument for the assessment of sibling relationships. The SRQ consists of 48 items that measure four factors: *Relative Status/Power*, *Warmth/Closeness*, *Conflict* and *Rivalry*. Higher numbers indicate parental partiality in favor of the respondent on *Rivalry*, and a greater degree of the respective construct on the other scales. German gender- and age-appropriate norms were computed by determining percentiles for each raw score and transforming percentiles to area-normalized standard scores (T scores) with a mean of 50 (*SD* = 10) in each norm group (see Thorndike, 2008, for details on this procedure). In our study raw scores were transformed to standard scores on basis of the norm tables.

- The Students Life Satisfaction Scale (SLSS; Huebner, 1991; German adaptation and validation by Weber, Ruch, & Huebner, 2013). The SLSS is an internationally used and well-validated 7-item unidimensional questionnaire measuring global life satisfaction. The scale utilizes a 6-point answer format (from 1 = *strongly disagree* to 6 = *strongly agree*). Higher numbers indicate higher satisfaction with life.

- The Questions on Life Satisfaction for Adolescents and Adults with Cystic Fibrosis (FLZ^{M}-CF; Goldbeck, Schmitz, Henrich, & Herschbach, 2003). The FLZ^{M}-CF was developed and validated in Germany and comprises nine questions addressing CF-specific topics, e.g. breathing difficulties/cough, abdominal pain/digestive trouble, integration of therapy into daily routine, and disadvantages experienced because of CF. Respondents rate both the subjective importance of and their present satisfaction with each item on a 5-point scale (from 1 = *not important* / *dissatisfied* to 5 = *extremely important* / *very satisfied*). Importance and satisfaction are integrated in a weighted score, calculated by the formula: weighted satisfaction = (importance rating - 1) x [(2 x satisfaction rating) -5].

Participants without siblings did not complete the SRQ. SLSS, FLZ^{M}-CF, and SRQ were scored as described in the original publications.

To address specific aspects of sibling relationships in children and adolescents with CF, various newly devised questions were incorporated in the questionnaire (see Table 3 for item wordings). All items were developed by the authors and addressed important themes from the literature on sibling relations and chronic illness.

The scale *Emotional Connectedness* (3 items) addresses empathy, consolation being concerned in regard to cystic fibrosis. Sibling relations characterized by warmth contribute to positive psychological adjustment (Buist et al., 2013). Family cohesion (Olson, 2000) or emotional connectedness is generally considered an important protective resource in families (Garwick & Millar, 1996).

Communication comprises 6 items asking for the intensity of CF-related communication, e. g. talking about worries, as perceived by the respondent. Communication is an important dimension of family functioning (Epstein, Ryan, Bishop, Miller, & Keitner, 2003; Olson, 2000). Communicating about illness and illness-related stress has been linked to illness outcomes (Martire & Helgeson, 2017).

Siblings can be a valuable source of support (Dunn, 2002), and the highly demanding treatments of CF require social and practical support (Barker, Driscoll, Modi, Light, and Quittner, 2012). The two items of the scale *Support* capture support by siblings related to CF-specific therapies.

Communication avoidance is considered a common phenomenon in families with seriously ill family members and may be due to psychological distress or mutual protection (Wittenberg-Lyles, Goldsmith, & Shaunfield, 2015). The scale *Avoidance* (2 items) addresses active avoidance of illness-related topics and the wish of the child with CF that his/her sibling is not concerned about him or her.

One item, referring to feelings of envy, was not assigned to a priori scales. All items utilize a 4-point answer format (1 = *disagree*, 2 = *somewhat disagree*, 3 = *somewhat agree*, 4 = *agree*). For each scale the total score is computed as the mean of the item scores.

Data Analysis

Data analysis was performed with SPSS 22 statistical software. One-sample *t*-tests were used to compare ratings with normative data provided by the authors of the German adaptations of the SRQ and SLSS. Independent sample *t*-tests were used to test for mean differences between participants with and without a sibling and between same-sex and different-sex sibling pairs. Reliability of scales was estimated by Cronbach's α. The strength of association between SRQ, CF-specific scales, measures of life satisfaction (SLSS, FLZ^M-CF), and sibling age was determined by correlational analyses. As some variables showed a skewed distribution Spearman rank correlations were computed. Moderator analyses were carried out using the macro PROCESS (Hayes, 2013) to test whether disease progression as measured by $FEV_1\%$ moderates the relation between the quality of sibling relationships and life satisfaction. The distribution of gender in the groups with and without siblings was compared by chi-square test.

As measure of effect size Cohens *d* was calculated. Effects were classified as either small ($0.2 \geq d < 0.5$; $0.1 \geq r < 0.30$), medium ($0.50 \geq d < 0.80$; $0.30 \geq r < 0.50$) or large ($d \geq 0.80$; $r \geq 0.50$).

As SLSS raw scores showed an age effect (Weber et al., 2013) they were converted to T-scores ($M = 50$, $SD = 10$), based on age-specific data provided by the authors. For analyses involving age raw scores were used.

Sibling pairs were classified as same-sex (male/male, female/female) or different-sex (female/male). Sibling spacing (age gap) was calculated as difference between the reported age of participants and siblings.

Results

Preliminary Analyses

Cronbach's α was .85 for SLSS and .82 for FLZ^{M}-CF. For the SRQ the following internal consistencies were found: *Status* .74, *Conflict* .89, *Rivalry* .70, *Warmth/Closeness* .94. Reliability for these measures was thus comparable to the data reported in the German validation studies.

For the newly devised CF-specific scales Cronbach's α was .80 for *CF-Emotional Connectedness*, .82 for *CF-Communication*, and .83 for *CF-Support*. Due to very low reliability (.47) *CF-Avoidance* was omitted from further analyses. The following scale intercorrelations were found: *CF-Emotional Connectedness*/*CF-Communication*, $r = .62$, $p < .01$, *CF-Emotional*

Connectedness/*CF-Support,* $r = .62$, $p < .01$, *CF-Communication*/*CF-Support*, $r = .65$, $p < .01$ (all large effects).

Participants with and without a sibling did not differ on $FEV_1\%$ ($t(61) = 0.62$, $p = .52$) and age ($t(73) = -0.93$, $p = .37$). Gender was not evenly distributed ($\chi^2(1) = 6{,}89$, $p = .01$) with a higher proportion of female participants in the sibling group.

Life Satisfaction

Age-normed SLSS ratings ($M = 43.4$, $SD = 12.1$) differed significantly from normative data ($t(74) = -4.76$, $p < .01$, $d = -0.55$). FLZ^M-CF total score ($M = 50.97$, $SD = 43.11$) was comparable to data provided by Goldbeck et al. (2003) from adolescents and adults with CF ($t(74) = -0.93$, $p = .36$).

SLSS and FLZ^M-CF correlated significantly ($r = .56$, $p < .01$). SLSS was not related to $FEV_1\%$ ($r = .15$, $p = .25$), whereas FLZ^M-CF showed a small but significant correlation ($r = .27$, $p = .04$).

SLSS ($t(73) = -0.80$, $p = .65$) and FLZ^M-CF ($t(73) = -0.94$, $p = .35$) did not show significant differences between participants with and without siblings.

Sibling Relationships

Descriptive data and comparisons with normative data for the SRQ are presented in Table 2. Two significant effects were found: *Rivalry* and *Warmth/Closeness* were elevated (small effects), indicating that participants perceived higher parental partiality in favor of themselves and relatively more warmth and closeness in their sibling relationship. Same-sex ($n = 26$) sibling pairs scored higher on *Warmth/Closeness* ($t = 2.54$, $p = .01$, $d = 0.72$) and lower on *Conflict* ($t = -2.08$, $p = .04$, $d = 0.59$) than different-sex sibling pairs ($n = 24$).

Table 2

Sibling Relationship Questionnaire (SRQ): Descriptive Results, and Comparison with Normative Data

Scale	Mean (SD)	Range	Comparison with normative data		
			t	*p*	*d*
Status	49.2 (8.5)	26-68	-0.64	.53	
Conflict	49.0 (8.7)	28-62	-0.84	.40	
Rivalry	52.9 (8.6)	33-69	2.35	.02	0.34
Warmth/Closeness	53.2 (9.3)	36-74	2.56	.02	0.35

Note. Means are T-values ($M = 50$, $SD = 10$).

The following questions on CF-specific aspects of sibling relations were endorsed most frequently as “true” or “somewhat true”: “My sibling is concerned about me” (88%), “I do not want my sibling to be concerned about me” (78%), “My sibling empathizes when I am in pain” (74%), and “My sibling listens when I talk about CF” (70%). Age of the sibling was significantly related to 3 out of 6 items and the total value of the *CF-Communication* scale, indicating that communication is more intense with older siblings (see Table 3 for detailed results).

Table 3

CF-specific Aspects of Sibling Relations: Descriptive Data and Correlations with Age of Sibling

Scale	Mean (SD)	% (somewhat) true	% (somewhat) not true	Correlation with sibling age
CF-Emotional connectedness	3.2 (0.7)			.07
My sib. is concerned about me	3.4 (0.7)	88%	12%	.14
My sib. empathizes when I am in pain	3.1 (0.9)	74%	26%	.03
My sib. consoles me when I am in bad health	3.1 (0.9)	72%	28%	-.00
CF-Communication	2.4 (0.7)			.38**
I talk about CF with my sib.	2.6 (1.0)	44%	56%	.25
My sib. listens when I talk about CF	3.0 (1.1)	70%	30%	.47**
I show my sib. when I am in bad health	2.3 (0.9)	34%	66%	.11
I talk with my sib. about my worries	1.8 (1.0)	30%	70%	.25
I talk with my sib. when therapies bother me	2.0 (1.0)	30%	70%	.34*
My sib. asks about my health	2.7 (1.0)	56%	44%	.35*
CF-Support	2.5 (0.9)			.03
My sib. motivates me for therapies	2.6 (1.0)	58%	42%	.08
My sib. supports me in therapies	2.3 (1.0)	48%	52%	-.04
Other				
My sib. avoids talking about CF	1.6 (0.9)	18%	82%	.08
I do not want my sib. to be concerned about me	3.3 (0.9)	78%	22%	.20
I envy my sib. because he/she is healthy	2.5 (1.2)	20%	80%	-.18

Note. Scale means are adjusted for number of items. * $p < .05$, ** $p < .01$.

It was not related to the age gap when controlling for sibling age. *CF-Emotional Connectedness* was higher for same-sex sibling pairs (t = 2.65, p = .01, d = 0.75) than for different-sex sibling pairs.

SLSS and FLZ^{M}-CF were significantly related to *Warmth/Closeness* (small effects), but not to the other scales of the SRQ. *Warmth/Closeness* correlated positively with all CF-specific scales (large effects). CF-specific scales were not related to general life satisfaction, only *CF-Support* correlated positively with FLZ^{M}-CF (Tables 4 & 5). Results remained significant when controlling for FEV$_1$%. Additional analyses showed that FEV$_1$% did not moderate the relation between sibling variables (SRQ and CF-specific scales) and life satisfaction.

Table 4

Correlations of SRQ and CF-specific Sibling Relations Scales

Scale	SRQ			
	Status	Conflict	Rivalry	Warmth/ Closeness
CF-specific scales				
CF-Emotional connectedness	.03	-.25	.28	.72**
CF-Support	.01	-.25	.16	.58**
CF-Communication	.03	-.28*	.08	.63**

Note. * p <.05. ** p <.01.

Table 5

Correlations of Life Satisfaction Scales and Sibling Relations

Scale	SLSS	FLZ^{M}-CF
SRQ		
Status	-.04	.06
Conflict	.14	.07
Rivalry	.14	.03
Warmth/Closeness	.33*	.30*
CF-specific scales		
Emotional connectedness	.22	.24
Support	.19	.37**
Communication	.04	.09

Note. * *p* <.05. ** *p* <.01. SLSS = Students Life Satisfaction Scale. FLZ^{M}-CF = Questions on Life Satisfaction for Adolescents and Adults with Cystic Fibrosis.

Discussion

This study focused on children and adolescents with CF, a condition that poses significant medical and psychological challenges. Social support and positive family interactions are crucial factors for coping with chronic illness. Nevertheless, sibling relations of children with chronic illness have largely been neglected in research. In most research, chronic illness is regarded as a risk factor for the psychological adjustment of the healthy sibling. We wanted to gain more insight in the sibling relations as perceived by the children and adolescents with a life-threatening chronic condition.

Important dimensions of sibling relations were not negatively affected by CF in our sample. On the contrary, we found a tendency (small effect) for higher scores on the *Warmth/Closeness* dimension of the SRQ. *Warmth/Closeness* is the only dimension of the SRQ that correlates positively with all CF-specific scales (large effects).

When interpreting the other elevated sore, *Rivalry*, it should be noted that this scale addresses perceived partiality of parents in favor of the respondent only. It does not measure any behavioral or emotional aspects of sibling rivalry, like jealousy or the desire to outperform the sibling, and it was unrelated to *Conflict*. Perceived parental partiality may reflect differential treatment, which has been found to have a negative impact on sibling relations (Whiteman, McHale, & Soli, 2011). However, in our data it was not negatively related to any of the CF-specific scales. We can speculate that rivalry, as operationalized in the SRQ, need not interfere with positive sibling relations when children and adolescents perceive it as a legitimate or understandable reaction of parents to special situations (Blacher & Begum, 2011). To test this hypothesis, data on perceived parental partiality from the non-affected sibling would have been essential.

The ad-hoc constructed scales on CF-specific aspects of sibling relations showed adequate reliability, but they lack rigorous scale development. On a descriptive level most children with CF described their siblings as supportive, willing to listen and talk, empathize, and console. However, children with CF do not want their siblings to be overly concerned. It seems that most of them know that their siblings are prepared to communicate when needed, but they do not routinely initiate interactions on illness-related issues because they do not want to distress their siblings. This pattern has been interpreted as distorted communication (Bluebond-Langner, 1989), but could as well indicate mutual consideration and an option of maintaining normality while knowing that you may count on your sibling when necessary. From a family systems perspective (e. g. McHale & Sullivan, 2008; Patterson & Garwick, 1994) it could be hypothesized that responsible and supportive management of CF by a well-functioning parental subsystem and clear intergenerational boundaries may reduce the need to discuss illness-related issues in the sibling subsystem.

We did not succeed in constructing a reliable scale that captures avoidance. This may be due to the fact that the same behaviors – e.g. not talking about illness – may indicate avoidance motivated by anxiety, distrust, and resentfulness, or a helpful direction of attention to non-problematic aspects of life. Further research might address this issue by taking into account the motivation for supposedly avoidant behaviors.

Compared to normative data, general life satisfaction was significantly lower in our sample. This is in line with research that found a high prevalence of depression and anxiety in children and youth with CF (Quittner et al., 2014). Having a sibling per se did not have a notable effect on life satisfaction, but *Warmth/Closeness* was significantly related to general life satisfaction, and perceived support by siblings correlated with CF-specific life satisfaction. These effects were small and cannot be interpreted causally, although research on mental health indicates that sibling relations may have an independent effect on adjustment (Feinberg et al., 2012). We may assume that the effects of sibling relations on life satisfaction are embedded in the larger context of the family system (e.g. family climate, cohesiveness, resources, parenting practices; Stoneman, 2005; Szyndler, Towns, van Asperen, & McKay, 2005).

Before discussing implications for clinical practice some limitations of our study have to be addressed. Selection bias cannot be excluded due to the use of a convenience sample. As there is no central register for children and adolescents with CF in Germany, not all potential participants could be contacted, and among those we contacted, not all may have participated. Characteristics of non-respondents are unknown as the survey was conducted anonymously. We did not include children and adolescents with several siblings. Therefore, our results are not generalizable to more complex sibling systems. Quality of medical data may be compromised as it was based on self-report only. A methodological limitation was the use of normative data for group comparisons instead of a matched control group. Due to the cross-sectional design, causal inferences are not possible.

Our study did not cover relationship quality as perceived by the healthy sibling. We thus captured only a slice from a complex phenomenon. Future research should include and compare mutual perspectives in order to achieve a more comprehensive view of general and illness-related sibling relations.

It has been argued that healthy siblings should not be neglected in family care. We would suggest that this practice should also take into account the quality of sibling *relations*, acknowledge positive contributions of siblings to psychosocial adjustment of the child with CF, and include the sibling experience of children with chronic illness.

No evidence was found for the assumption that CF is a general risk factor for sibling relations. Our results thus question a deficit-oriented approach that focuses on negative effects of chronic illness on sibling relationships. However, if sibling relations are characterized by low warmth and closeness, this may affect life satisfaction of the child with CF, and perhaps other psychosocial outcomes as well. We therefore suggest that asking for the quality of sibling relations should be included in clinical practice, and families might be encouraged to discuss sibling issues. So far, psychological interventions have focused on supporting the well sibling (Hartling et al., 2014). We tentatively suggest that interventions to enhance the quality of the sibling relationships might offer a useful addition to existing support programs. Our findings on lower life satisfaction in children and adolescents with CF underscore the necessity to closely monitor their emotional development (see Quittner et al., 2016).

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