

Predictors of quality of life of cancer patients, their children, and partners

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Abstract

Objective: The objective of this study is to assess the quality of life (QOL) of cancer patients and their family members over 1-year period post therapy.

Methods: We evaluated QOL in cancer patients ($N=161$) (Short Form-8 Health Survey (SF-8), European Organization for Research and Treatment of Cancer 30- Item Core Quality of Life Questionnaire (EORTC QLQ-C30)), their partners ($N=110$) (SF-8), and their children ($N=115$) (KIDSCREEN-27) using a longitudinal design (t1: post therapy, t2: 6 months after t1, t3: 12 months after t1). Multiple regression models were employed to examine factors related to QOL.

Results: After cancer therapy, impairments in the patients' QOL were found primarily in emotional and social areas and also in role functions. We found the highest symptom burden in fatigue ($M=45.21$), sleep disturbances ($M=41.04$), and financial difficulties ($M=39.2$). Partners had lower mental QOL compared with the general population at each assessment point ($p < 0.05$). No significant difference was found in physical QOL between partners and the general population ($p > 0.05$). Social support, full-time employment, tumor stage 0–2, time since diagnosis < 1 year, and lower levels of anxiety and depression were associated with better QOL in patients. Full-time employment, social support, and lower levels of anxiety and depression had a significant impact on the partners' QOL. Higher levels of anxiety and depression in patients ($p=0.006$) adversely influenced children's QOL.

Conclusions: Family members' QOL is overall stable over time indicating the need for professional psychosocial support for those family members with low QOL. For the children, new measures are needed to better examine the experience with parental cancer.

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Background

Many studies document that cancer presents a crisis event for family members with comparable mental and somatic implications [1–5]. So far, most psychosocial research has focused on the impact that cancer has on the quality of life (QOL) of the patient, the partner, and the couple [6–8]. Consequently, little is known about how parental cancer affects the psychosocial situation and QOL of children below legal age [9].

Most research examining the QOL of cancer patients, partners, and children is retrospective and/or cross-sectional [5]. However, adjustment to cancer involves a process, not a single event in time [10]. Therefore, studies with longitudinal designs are needed.

Quality of life of patients, partners, and children

Health-related QOL is a multidimensional concept that includes domains related to physical, mental, emotional, and social functioning. The following factors have been described in the literature as risk factors for low QOL and high psychological

distress in *cancer patients*: female gender, younger age, weak family cohesion and quality of couple's relationship, and dissatisfaction with social support [6,7,11,12].

Studies with *children of cancer patients* showed indications of emotional problems in about 50% of the cases [13]. Especially younger children and adolescent girls appear vulnerable [14]. Empirical studies support the assumption that objective illness-related factors such as the duration or severity of parental cancer only have a minor influence on the emotional effects on their children [13,14]. Unfavorable for the children, however, are emotional factors such as parental depression or dysfunctional affective relationships among family members [15].

Considering the QOL of the *partners of cancer patients*, the results remain inconsistent [16,17]. Several studies indicated associations between a better QOL in partners and male gender, older age, higher family income, better social support, and more open communication [18,19]. Studies also have reported that the levels of psychological distress among partners of cancer patients are equal to, or sometimes even greater than, those of the patients [16,20].

Parenthood and cancer

Parents with cancer who have children below legal age consider themselves insecure in their role as a parent or are additionally distressed by the idea that their children could suffer from this situation [17]. Patients with children compared with those without children had a five times higher risk of developing a stress disorder in the course of the disease. Children have also been identified as a risk factor for the development of anxiety disorders [21]. In addition, several studies conclude that being young and female are risk factors for a lower QOL in cancer patients [6]. This finding is particularly relevant as younger female cancer patients have an increased probability of having children under 18 years.

Findings on the impact of parenthood on the QOL of cancer patients, their partners, and children are inconsistent [22,23]. This might be due to the fact that cancer patients are often older persons with adult children; children under 18 years are the exception.

Therefore, the first aim of this study was to examine the QOL of cancer patients, their partners, and their children in a longitudinal design. The second aim was to investigate the impact of sociodemographic and psychosocial factors on the QOL of cancer patients, their children, and partners.

Our work centered on the following questions:

1. What is the health related QOL of
 - a) cancer patients, b) their partners, and c) children over time?
2. Which factors are associated with QOL of
 - a) cancer patients, b) their partners, and c) children?

Methods

Study design

The following article is based on a longitudinal design and studies the QOL of cancer patients, their partners, and children. The results presented come from the multi-site research project 'Psychosocial Services for Children of Parents with Cancer' conducted Germany-wide in 2009–2012 and supported by the German Cancer Aid (Deutsche Krebshilfe, grant no. 108303). The study participants were surveyed at three assessment points by mail (t1: post therapy, t2: 6 months after t1, t3: 12 months after t1). An overview of the persons surveyed at the corresponding points in time is shown in Table 1.

Ethics statement

All study participants were informed about the study and about the possibility of ending participation in the study

Table 1. Sample characteristic

| | N | % |
|-------------------------------------|--------------------|------|
| Patient | 161 | 100 |
| Gender | | |
| Female | 124 | 77 |
| Male | 37 | 23 |
| Age, mean (min–max) | 40.4 years (23–55) | |
| Children <18 years in the household | | |
| 0 | 8 | 5.1 |
| 1 | 94 | 59.4 |
| 2 and 3 | 59 | 35.5 |
| Diagnosis | | |
| Breast cancer | 95 | 56.9 |
| Head and neck cancer | 13 | 7.8 |
| Gynecological tumor | 18 | 10.8 |
| Other | 35 | 24.5 |
| Time since diagnosis (t1) | | |
| <1 year | 108 | 67.1 |
| ≥1 year | 53 | 32.9 |
| Children | 110 | 100 |
| Gender | | |
| Female | 50 | 45.4 |
| Male | 60 | 54.5 |
| Age, mean (min–max) | 14.3 years (11–18) | |
| Age category | | |
| 11–14 years | 58 | 52.7 |
| 15–18 years | 52 | 47.3 |
| Partner | 115 | 100 |
| Gender | | |
| Female | 34 | 29.6 |
| Male | 81 | 70.4 |
| Age, mean (min–max) | 40.7 years (24–61) | |
| Relationship to the child | | |
| Biological father or mother | 95 | 82.6 |
| Other relationship to the child | 20 | 17.4 |

at any time without any adverse consequences. The signature on the consent form by all study participants declared the voluntary nature of their participation. The children of cancer patients were surveyed when both the parents and the children gave their written informed consent for study participation. There is a positive statement from the ethics committee of the University of Leipzig indicating the approval of the research.

Study participants

Patients

A total of 218 cancer patients with children in the participating institutions (University Hospital of Leipzig and cooperating hospitals in the Leipzig region) were approached and asked to participate in the study before release from hospital or when attending a follow-up visit. Inclusion criteria were a cancer diagnosis, children under 18 years old, no palliative treatment situation present, and the informed consent for the study. For that, a medical staff member asked the patient if she or he had children under 18 years. Of the patients approached, 26.1% ($n=57$) rejected participation, mainly based on rational

reasons (e.g., no interest). Of the 218 patients (73.9%), 161 met the inclusion criteria (assessment point t1) (75% women and 25% men). Those rejecting participation did not vary significantly in gender and age from participants ($p > 0.05$). At t2, 124 patients could be surveyed (77% based on t1). Five of the 37 nonparticipants had died, and the rest did not return the questionnaire and did not respond to corresponding reminders. At t3, 121 patients were still included, which corresponds to a failure rate of 2.4% (based on t2). In the following analysis, a patient was included if he had at least one child from 11 to 17 years who participated in the study.

Partners

The portion of the 161 surveyed patients who live with a partner amounts to 88.9% ($n=143$). Of the potential questionnaires for partners at t1, $n=115$ were filled out (80.4%). Of these partners, 29.6% were female, and 70.4% were male. At t2 and t3, 80 (failure quota of 30%) and 81, respectively, filled out the questionnaire. Partners were included in the following analysis when both the patient and the child (11–17 years) participated in the study.

Comparison group

Data obtained on the family caregivers' QOL were compared with German normative data from a representative survey. In 2004, the Short Form-8 Health Survey (SF-8) was applied in a nationwide omnibus survey in Germany. Representative normative data of the SF-8 ($N=2552$) were reported for the German population. Reference data for sex groups are available [24].

Children 11–17 years (self-rating)

In the context of our study, children aged 11–18 years were surveyed with a self-rating questionnaire at all three times if the parents and the children consented. At t1, there were 110 completed surveys, and in 44 cases, two or more children per family were surveyed. At t2, 80 children could be included in the study (failure rate 27.3%); at t3, we contacted 85 children.

Instruments

The QOL of *cancer patients* and their *partners* was measured with the SF-8 [25]. The instrument serves to measure the subjective health condition related to physical, emotional, and social aspects. Each item represents one of the eight scales of subjective health, which relate to various aspects of daily life. In addition to the evaluation of the subscales, it is possible to create two superordinate dimensions, the physical and the mental summary score.

The patients additionally answered the European Organization for Research and Treatment of Cancer Quality of

Life Questionnaire – Core Questionnaire (EORTC QLQ-C30) [26]. The EORTC QLQ-C30 is a multidimensional module of the 'European Organization for Research and Treatment of Cancer' for evaluating health-related QOL. It is a 30-item Likert-scaled self-report instrument, comprised of five function scales, a scale for global QOL and nine symptom scales.

Psychological distress was assessed with the Hospital Anxiety and Depression Scale (HADS), which measures anxiety and depression in adults with physical illness [27]. For each scale, a cumulative score (0–21) can be generated reflecting the severity of problems: 0–7 (low), 8–10 (moderate), and ≥ 11 (high). The HAD total scale, used as a measure for psychological distress, has a theoretical score range between zero and 42 with a cutoff of ≥ 15 indicating severe psychological distress.

We used the Oslo three-item social support scale (OSS) to measure social support [28]. The three items cover different fields of social support and were put together into a composite index of social support by summarizing the scores for each item. A score of 3–8 represents 'poor support', 9–11 'moderate support', and 12–14 'strong support'.

The QOL of *children* was measured with the KIDSCREEN-27, a QOL instrument for children and young people [29]. The KIDSCREEN-27 provides a detailed profile that allows an interpretation of the results on five QOL dimensions (school environment, social support and peers, autonomy and parent relation, psychological well-being, and physical well-being). Children can complete the questionnaires independently (self-rating).

Depressive symptomatology of the children was measured with the Center for Epidemiological Studies Depression Scale for Children (CES-DC) [30]. This instrument was developed especially for the age range of 6–17 years and includes 20 items. A sum score is calculated; values > 15 represent a relevant depressive symptomatology.

Data analysis

All statistical analyses were performed using SPSS 20 (IBM Corp., Armonk, NY, USA). For bivariate comparisons, we used χ^2 -tests (Pearson and Fisher's exact tests) or Student's *t*-tests. Multiple regression models (method: enter) were employed to examine factors related to QOL in patients, children, and partner for every measurement time point.

Sample

In Table 1, we present an overview of the sample characteristics of the patients, the partners, and the children. The patients were 75% female and aged mid-40s; about 2/3 had one child, and 1/3 had two or more children. The most common diagnosis was breast cancer, and in 70% of the surveyed patients, the diagnosis occurred within the 12 months prior to the first assessment point. Eight

patients were interviewed who did not live with their children in a household, as they mainly lived with the other parent because of divorce. Among the surveyed children, the gender distribution was even (45.4% female), and the average age was 14.4 years. The partners were mainly male (71%) and aged mid-40s.

Results

Quality of life over 1-year period post therapy

Patients

After cancer therapy (t1), we found impairments in the patients' QOL in many areas, primarily in emotional and social areas and also in role functions (Figure 1). We found the highest symptom burden in fatigue ($M=45.21$) and sleep disturbances ($M=41.04$).

In the 1-year period after diagnosis, patients' QOL significantly improved on all function scales (with all $p < 0.001$, except cognitive function $p=0.627$) and in the global scale of QOL ($p=0.003$). Concerning the symptom scales, the greatest symptom expression was observed on the first measure. A significant decrease in the symptoms fatigue ($p=0.005$), nausea/vomiting ($p=0.001$), and appetite loss ($p=0.004$) was demonstrated. Financial difficulties were also reduced significantly ($p < 0.001$). Yet, even at t1, the symptom burden was very high in the areas of sleep disturbances ($M=38.1$) and fatigue ($M=37.3$).

Partners

The partners' QOL was compared with a representative comparison group from the German general population [24]. The development of the partners' QOL based on gender is presented in Figure 2. At the first and second

assessment point, partners had significantly lower values in the emotional areas of QOL than the general population (mental sum scale: general population: $M=53.25$, t1: $M=48.82/p < 0.001$, t2: $M=49.86/p=0.001$). It was the female partners above all who indicated clearly reduced values at the first data collection time point in the mental sum scale (general population: $M=52.3$, t1: $M=45.6/p < 0.001$). In the physical area, there was no difference from the comparison group (physical sum scale: general population: $M=50.30$, t1: $M=50.99/p=0.320$, t2: $M=50.42/p=0.907$, t3: $M=51.23/p=0.283$).

Children

With children, all areas of QOL showed small improvements over time (Figure 3). The changes, however, were not statistically significant.

Predictors of quality of life

Patients and partners

Because of the factors described in the literature, we examined the following factors to see how they relate to the QOL of the patients and their partners: gender, age (≤ 40 years/ >40 years), time since diagnosis (≤ 1 year/ >1 year, only patient), social support (OSS cutoff), psychological distress (HADS cutoff), employed full-time (yes/no), and tumor stage (0–2/3–4/unknown, only patient).

In Table 2, the results of the multiple regression models are shown for every measurement time point separately for mental (MCS) and physical QOL (PCS).

The examined factors gender and age did not relevantly influence the QOL of the patients and their partners (except male patients (t3: Beta=0.154, $p=0.039$) and older

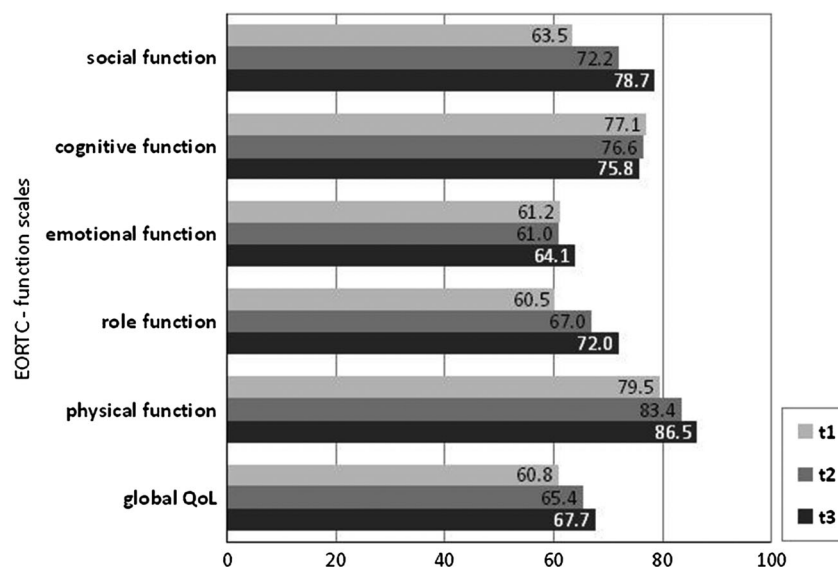


Figure 1. Quality of life (QOL) of cancer patients, European Organization for Research and Treatment of Cancer (EORTC) – Functional Scales, range = 0–100, higher values = better QOL, t1: post therapy, t2: 6 month post t1, t3: 12 month post t1, $N=121$

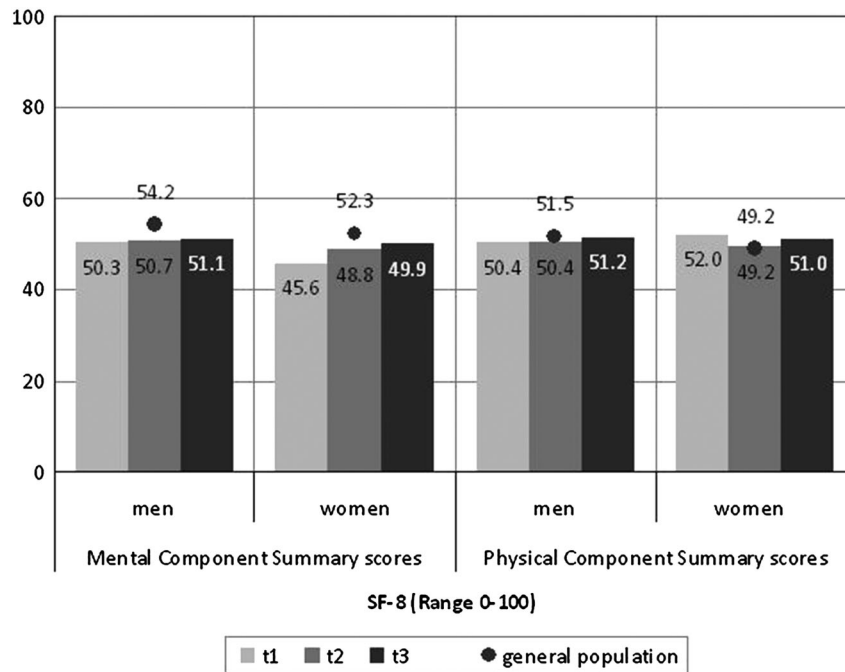


Figure 2. Quality of life (QOL) of partners of cancer patients in comparison with normative data of the German population, Short Form-8 Health Survey: mental and physical component summary score, t1: post therapy, t2: 6 month post t1, t3: 12 month post t1, N = 79 (partner)/ N = 2552 (general population)

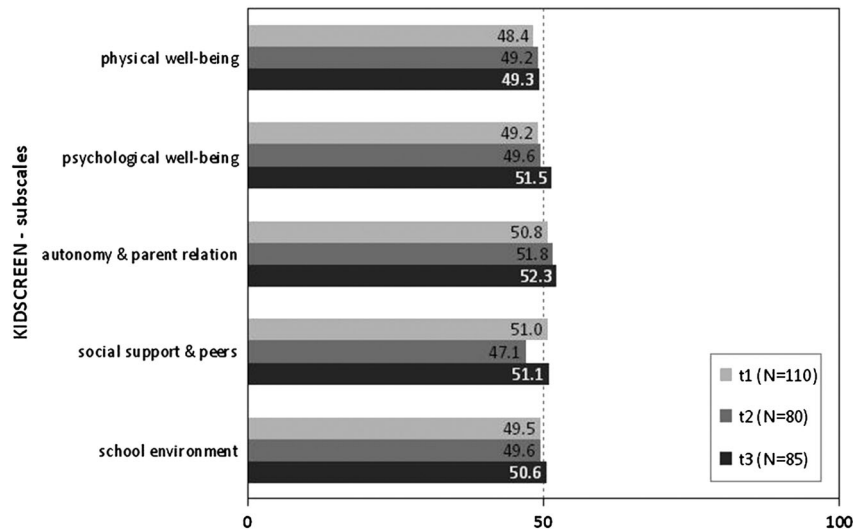


Figure 3. Quality of life of the children, KIDSCREEN – subscales, range = 0–100, higher values = better quality of life, t1: post therapy, t2: 6 month post t1, t3: 12 month post t1, N = 85

partners (t1: Beta=0.158, $p=0.029$) had a better mental QOL). Patients whose time of diagnosis was more than a year in the past showed lower physical (t2: Beta=−0.192, $p=0.028$; t3: Beta=−0.199, $p=0.030$) and mental (t3: −0.148, $p=0.046$) QOL. Patients with insufficient social support had a lower mental (t1: Beta=0.138, $p=0.034$; t2: Beta=0.238, $p=0.002$) and physical (t2: Beta=0.227, $p=0.013$) QOL. After acute therapy, patients with tumor stage 0–2 had a better mental QOL than patients with a higher tumor stage (Beta=−0.168, $p=0.010$). Patients,

who were employed full-time, showed a better physical QOL at each assessment point than patients who were unemployed or worked part-time (Beta=0.197–0.283, $p=0.023$ –0.002). In all surveys, there was a significant association between high levels of QOL and low levels of anxiety and depressive symptoms in patients and partners (except partners’ physical QOL at t2 and t3). Full-time employment also had a positive impact on mental (t2: Beta=0.315, $p=0.009$) and physical (t3: Beta=0.320, $p=0.011$) QOL of the partners. The explained variations

Table 2. Predictors of quality of life in patients and partners; criterion: SF-8: mental component summary score/physical component summary score (multiple regression models, separate for every measurement time point)

| Predictors | Mental quality of life (MCS) | | | | | | Physical quality of life (PCS) | | | | | |
|--------------------------------------|------------------------------|------------------|---------------|------------------|---------------|------------------|--------------------------------|--------------|---------------|--------------|---------------|--------------|
| | t1 (N = 150) | | t2 (N = 112) | | t3 (N = 112) | | t1 (N = 150) | | t2 (N = 112) | | t3 (N = 112) | |
| Patient | Beta | p | Beta | p | Beta | p | Beta | p | Beta | p | Beta | p |
| Gender (female/male) | 0.073 | 0.243 | 0.138 | 0.059 | 0.154 | 0.039 | -0.003 | 0.964 | -0.018 | 0.837 | 0.105 | 0.249 |
| Age (18–40/≥41 years) | 0.062 | 0.327 | 0.004 | 0.956 | 0.003 | 0.961 | -0.010 | 0.899 | 0.010 | 0.903 | -0.090 | 0.309 |
| Time since diagnosis (<1/≥1 year) | 0.005 | 0.932 | -0.031 | 0.674 | -0.148 | 0.046 | 0.060 | 0.450 | -0.192 | 0.028 | -0.199 | 0.030 |
| Social support (OSS cutoff) | 0.138 | 0.034 | 0.238 | 0.002 | 0.092 | 0.255 | 0.116 | 0.149 | 0.227 | 0.013 | 0.023 | 0.815 |
| Psychological distress (HADS cutoff) | -0.628 | <0.001 | -0.565 | <0.001 | -0.595 | <0.001 | -0.264 | 0.001 | -0.258 | 0.004 | -0.214 | 0.027 |
| Employed full-time (yes/no) | 0.075 | 0.246 | 0.104 | 0.150 | 0.078 | 0.294 | 0.221 | 0.007 | 0.197 | 0.023 | 0.283 | 0.002 |
| Tumor stage (0–2/3–4/unknown) | -0.168 | 0.010 | 0.029 | 0.680 | -0.039 | 0.600 | -0.058 | 0.471 | -0.063 | 0.450 | -0.035 | 0.695 |
| Adj. R ² | 0.430 | | 0.465 | | 0.455 | | 0.116 | | 0.251 | | 0.175 | |
| Partner | t1 (N = 114) | | t2 (N = 74) | | t3 (N = 74) | | t1 (N = 114) | | t2 (N = 74) | | t3 (N = 74) | |
| Gender (female/male) | -0.080 | 0.311 | -0.159 | 0.190 | 0.042 | 0.702 | -0.110 | 0.283 | -0.225 | 0.163 | -0.106 | 0.403 |
| Age (18–40/≥41 years) | 0.158 | 0.029 | 0.057 | 0.546 | -0.024 | 0.811 | -0.131 | 0.163 | -0.047 | 0.708 | -0.191 | 0.095 |
| Social support (OSS cutoff) | 0.078 | 0.289 | 0.245 | 0.011 | 0.114 | 0.240 | 0.123 | 0.199 | 0.081 | 0.518 | 0.034 | 0.760 |
| Psychological distress (HADS cutoff) | -0.654 | <0.001 | -0.496 | <0.001 | -0.581 | <0.001 | -0.245 | 0.013 | -0.144 | 0.271 | -0.216 | 0.056 |
| Employed full-time (yes/no) | 0.137 | 0.074 | 0.315 | 0.009 | 0.052 | 0.629 | 0.091 | 0.357 | 0.185 | 0.242 | 0.320 | 0.011 |
| Adj. R ² | 0.465 | | 0.440 | | 0.344 | | 0.093 | | 0.007 | | 0.145 | |

Significant results at $p < 0.05$ were highlighted in bold font.

HADS, Hospital Anxiety and Depression Scale; OSS, Oslo three-item social support scale; MCS, mental component summary; PCS, physical component summary.

Beta = standardized regression coefficient, p = significance, HADS: cutoff $< \geq 15$, OSS: 3–8 (poor support), 9–11 (moderate support), 12–14 (strong support).

of the multiple regression models for the mental QOL of patients and partners were in the middle range (between 34% and 47%). The explained variations for the physical QOL were low overall (between 7% and 25%).

Children

To study the connection between sociodemographic and illness-related variables and the QOL of children below legal age with a parent with cancer, we investigated the relationship between the summary score of the KIDSCREEN and the following independent control variables: gender, age (11–14 years/15–18 years), siblings (yes/no), psychological distress (CES cutoff $\leq / > 15$), and psychological distress of the cancer parent (HADS cutoff $< / \geq 15$).

The association between younger age of the children and better QOL after cancer therapy was statistically significant only in a bivariate analysis (KIDSCREEN-27 sum score/ t -test for independent samples: 11–14 years: $M = 76.2$ (SD = 13.8), > 14 years: $M = 70.2$ (SD = 14.5), $p = 0.030$). Also, the positive impact of having siblings on the children's QOL 1 year after cancer therapy of the patient (t3) was statistically significant only in a bivariate analysis (with siblings: $M = 75.3$ (SD = 12.3), no siblings: $M = 81.2$ (SD = 11.8), $p = 0.047$). In the bivariate analysis, the surveyed girls indicated a lower QOL than the boys at t1 (girls: $M = 70.0$ (SD = 14.5), boys: $M = 76.4$ (SD = 13.4), $p = 0.019$).

The results of the regression models are shown in Table 3 for all measurement time points.

The presence of depressive symptoms in the child had a negative influence on the QOL at all assessment points

Table 3. Predictors of quality of life in children; criterion: KIDSCREEN sum score (multiple regression models, separate for every measurement time point)

| Predictors | Quality of life – general (KIDSCREEN sum score) | | | | | |
|--|---|------------------|---------------|------------------|---------------|------------------|
| | t1 (N = 104) | | t2 (N = 69) | | t3 (N = 74) | |
| | Beta | p | Beta | p | Beta | p |
| Age (10–14/15–18 years) | -0.090 | 0.269 | 0.076 | 0.465 | -0.015 | 0.878 |
| Gender (female/male) | 0.110 | 0.172 | 0.038 | 0.710 | 0.015 | 0.874 |
| Siblings (yes/no) | -0.003 | 0.975 | 0.155 | 0.142 | 0.116 | 0.262 |
| Psychological distress (CES cutoff) | -0.480 | <0.001 | -0.578 | <0.001 | -0.601 | <0.001 |
| Psychological distress patient (HADS cutoff) | -0.230 | 0.006 | -0.027 | 0.791 | 0.018 | 0.870 |
| Adj. R ² | 0.358 | | 0.304 | | 0.355 | |

Significant results at $p < 0.05$ were highlighted in bold font.

CES, Center for Epidemiological Studies; HADS, Hospital Anxiety and Depression Scale.

Beta = standardized regression coefficient, p = significance, CES: cutoff $\leq / > 15$, HADS: cutoff $< / \geq 15$.

(Beta = -0.480 to -0.601, $p < 0.001$). Children of patients with high levels of anxiety and depressive symptoms had lower values in QOL after cancer therapy (Beta = -0.230, $p = 0.006$). None of the other factors studied revealed a significant relationship with the children's QOL. The explained variations of the multiple regression models for the children's QOL were in the middle range (between 30% and 36%).

Conclusion

The QOL of the surveyed cancer patients was limited for all subscales of the EORTC QLQ-C30 after cancer

therapy (t1). Over the course of time, cancer patients with children reported significantly improved scores for all life domains except for cognitive functioning. Even 1 year after cancer therapy, the symptom burden was very high in the areas of sleep disturbances and fatigue. This corresponds to findings from several other studies documenting a low QOL among cancer patients [31]. This finding is also consistent with previous research showing an improved QOL in cancer patients with children 1 and 2 years after diagnosis [31,32].

Consistent with the findings of Northouse *et al.*, at all three assessment points, the partners had significantly lower values in the emotional areas of QOL than the general population [20]. The lowest values in mental QOL indicated female partners after the cancer therapy of the patient. We validated the results of previous investigations that female partners had lower QOL and higher levels of psychological distress than male partners [2,18,19].

The QOL of the children did not change significantly over time. Our own findings on this issue also show a constantly high presence of depressive symptoms in children that go beyond patient treatment [33]. In a review of the psychosocial situation of children in the context of parental cancer, Osborn reports that the psychosocial problems of these children do not increase in general [5]. However, there is an increased risk for internalizing problems, which is difficult to detect with the QOL questionnaire we used. Other researchers like Lewis, Watson, and colleagues also point out that the impact of parental cancer on the child should not be pathologized and that new measures are needed to better examine the child's experience with parental cancer [14,22]. He underlines that 'children are affected by the interpersonal environment in their home, their peers, their own development, and the quality of the parenting relationship'.

The calculated regression models did not show a relevant influence of patients' or partners' age on their QOL. This finding can be explained by the fact that the age of the study participants was relatively homogeneous between 23 and 55 years ($M=40$). In most studies, female gender has been associated with higher psychological distress, but other studies, including our own, have not identified such a gender difference [2,34]. As the recruitment was done in the hospitals, patients with tumor stage 3–4 and whose time of diagnosis was more than a year in the past were mostly patients with long-lasting disease and complex and lengthy treatments. This is again reflected in the lower QOL. Edwards and Clarke found that receiving surgery was significantly associated with higher levels of depression in cancer patients [2].

An important finding of the study was the role of social support, especially after cancer therapy and at the time of return to work. Those patients who reported higher social support also had a higher QOL than survivors with less support. This finding affirmed the importance of continuing social support for both cancer patients and their partners

and is consistent with other investigators' findings that those patients who reported more social support also reported a higher QOL [18,19].

Patients who were employed full-time showed a better physical QOL. Returning to work may positively impact the recovery and the psychological well-being in many ways [35]. Full-time employment also had a positive impact on the partners' QOL. Integration into an everyday working life, partners gain normalcy, structure, a sense of meaning, and support during the patient's time of disease and treatment. Also, financial worries were lower when the patient's partner was employed full-time. Low levels of anxiety and depression positively impacted mental and even physical QOL of the patients, their children, and partly their partners. This result demonstrates the enormous importance of psycho-oncological support during the acute treatment and aftercare for all family members.

Younger children showed a better QOL (t1) than older children, which is consistent with the hypothesis that younger children have a delayed comprehension of the existential difficulty represented by parental cancer. A study of Huizinga *et al.*, which assessed stress response symptoms in 220 adolescents (aged 11–18 years) whose parents had been diagnosed with cancer, found that older children reported fewer intrusive thoughts about their parents' cancer but reported more avoidance symptoms than younger children [36]. High levels of anxiety and depression in cancer patients had a negative influence on the children's QOL at all assessment points ($p < 0.001$). Previous studies have repeatedly reported connections between the emotional health of cancer patients and that of their children [37,38].

Limitations of the study

When evaluating the study results, one should consider that patients in a palliative situation were not included in the study. In addition, several studies have shown that nonparticipants in cancer research are characterized by more severe physical and psychosocial complaints [39]. Therefore, the patients studied here represent a 'positive' selection of the total patient group.

Because the studied groups were members of a family system, it can be assumed that there were complex correlations with regard to QOL. In the analysis, these existing correlations between the study groups were not taken into account, limiting the results' representativeness.

Implications and future research

Suitable ways of providing support for cancer patients and their family members are counseling and intervention programs like the child-centered counseling of families with a parent with cancer according to the Children of Somatically III Parents (COSIP) concept [40] or the enhancing connections program—a cognitive-behavioral intervention for

mothers and children affected by breast cancer [41]. Here, intervention goals are adjusted to the individual and familial burden factors and to coping strategies of those seeking advice.

The study focuses on predictors of QOL and its change over time. For further analysis, it would be interesting to study family relationships. Here, we could apply triadic data analysis using, for example, the Social Relation Model described in ‘Dyadic Data Analysis’ by Kenny and colleagues [42]. They underline that ‘from a family systems perspective, families have been understood as complex organizations in which socially and biologically prescribed role requirements and processes of positive and negative feedback have dramatic effects on family members’ behavior’.

References

- Baider L, Cooper CL, De-Nour AK (eds). 1996. *Cancer and the Family*. Wiley: New York.
- Edwards B, Clarke V. The psychological impact of a cancer diagnosis on families: the influence of family functioning and patients’ illness characteristics on depression and anxiety. *Psycho-Oncology* 2003;**13**:562–576.
- Hagedoorn M, Sanderman R, Bolks HN, Tuinstra J, Coyne JC. Distress in couples coping with cancer: a meta-analysis and critical review of role and gender effects. *Psychol Bull* 2008;**134**:1–30.
- Compas BE, Worsham NL, Epping-Jordan JE et al. When mom or dad has cancer: markers of psychological distress in cancer patients, spouses, and children. *Health Psychol* 1994;**13**:507–515.
- Osborn T. The psychosocial impact of parental cancer on children and adolescents: a systematic review. *Psycho-Oncology* 2007;**16**:101–126.
- Okamura M, Yamawaki S, Akechi T, Taniguchi K, Uchitomi Y. Psychiatric disorders following first breast cancer recurrence: prevalence, associated factors and relationship to quality of life. *Jpn J Clin Oncol* 2005;**35**:302–309.
- Drabe N, Wittmann L, Zwahlen D, Büchi S, Jenewein J. Changes in close relationships between cancer patients and their partners. *Psycho-Oncology* 2013;**22**:1344–1352.
- Northouse LL, Templin T, Mood DW, Oberst M. Couples’ adjustment to breast cancer and benign breast disease: a longitudinal analysis. *Psycho-Oncology* 1998;**7**:37–48.
- Faulkner RA, Davey M. Children and adolescents of cancer patients: the impact of cancer on the family. *Am J Fam Ther* 2002;**30**:63–72.
- Lewis FM, Zahlis EH, Shands ME, Sinsheimer JA, Hammond MA. The functioning of single women with breast cancer and their school-aged children. *Cancer Pract* 1996;**4**:15–24.
- Kühne F, Krattenmacher T, Bergelt C et al. Parental palliative cancer: psychosocial adjustment and health-related quality of life in adolescents participating in a German family counseling service. *BMC Palliat Care* 2012;**11**:21–29.
- Salonen P, Tarkka MT, Kellokumpu-Lehtinen PL, Koivisto AM, Aalto P, Kaunonen M. Effect of social support on changes in quality of life in early breast cancer patients: a longitudinal study. *Scand J Caring Sci* 2013;**27**:396–405.
- Visser A, Huizinga GA, Hoekstra HJ et al. Emotional and behavioural functioning of children of a parent diagnosed with cancer: a cross-informant perspective. *Psycho-Oncology* 2005;**14**:746–758.
- Watson M, James-Roberts S, Ashley S et al. Factors associated with emotional and behavioural problems among school age children of breast cancer patients. *Brit J Cancer* 2006;**94**:43–50.
- Sigal JJ, Perry JC, Robbins JM, Gagne MA, Nassif E. Maternal preoccupation and parenting as predictors of emotional and behavioral problems in children of women with breast cancer. *J Clin Oncol* 2003;**21**:1155–1160.
- Pitceathly C, Maguire P. The psychological impact of cancer on patients’ partners and other key relatives: a review. *Eur J Cancer* 2003;**39**:1517–1524.
- Thastum M, Watson M, Kienbacher C et al. Prevalence and predictors of emotional and behavioural functioning of children where a parent has cancer: a multinational study. *Cancer* 2009;**115**:4030–4039.
- Song L, Northouse LL, Braun TM et al. Assessing longitudinal quality of life in prostate cancer patients and their spouses: a multi-level modeling approach. *Qual Life Res* 2011;**20**:371–381.
- Mellon S, Northouse LL, Weiss LK. A population-based study of the quality of life of cancer survivors and their family caregivers. *Cancer Nurs* 2006;**29**:120–131.
- Northouse LL, Swain MA. Adjustment of patients and husbands to the initial impact of breast cancer. *Nurs Res* 1987;**36**:221–225.
- Krauß O, Ernst J, Kuchenbecker D, Hinz A, Schwarz R. Predictors of mental disorders in patients with malignant diseases: empirical results. *Psychother Psychosom Med Psychol* 2007;**57**:273–280.
- Lewis FM. Parental cancer and dependent children: selected issues for future research. *Psycho-oncology* 2007;**16**:97–98.
- Lewis F, Hammond M, Woods N. The family’s functioning with newly diagnosed breast cancer in the mother: the development of an explanatory model. *J Behav Med* 1993;**16**:351–370.
- Beierlein V, Morfeld M, Bergelt C, Bullinger M, Brähler E. Measuring health-related quality of life with the SF-8: German norms from a representative self-administered survey. *Diagnostica* 2012;**58**:145–153.
- Ware J, Kosinski M, Dewey J, Gandek B. 2001. How to Score and Interpret Single-item Health Status Measures: A Manual for Users of the SF-8 Health Survey. Quality Metric Inc: Lincoln, RI.
- Aaronson NK, Ahmedzai S, Bergman B et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;**85**:365–376.
- Herrmann C, Buss U, Snaith RP. 1995. HADS-D, Hospital Anxiety and Depression Scale – Deutsche version. Hans Huber: Bern.
- Meltzer H. 2003. In *Developing Common Instruments for Health Surveys*, Nosikov A, Gudex C (eds.), Development of a common instrument for mental health. EUROHIS IOS Press: Amsterdam.
- The-KIDSCREEN-Group-Europe. 2006. The KIDSCREEN Questionnaires – Quality of Life Questionnaires for Children and Adolescents. Handbook. Pabst Science Publishers: Lengerich.
- Weissman MM, Orvaschel H, Padian N. Children’s symptom and social functioning self-report scales – comparison of mother’s and children’s reports. *J Nerv Ment Dis* 1980;**168**:736–740.
- Gazendam-Donofrio SM, Hoekstra HJ, van der Graaf WTA et al. Quality of life of parents with children living at home: when one parent has cancer. *Support Care Cancer* 2008;**16**:133–141.
- Ernst J, Götze H, Brähler E, Körner A, Hinz A. Quality of life of parents diagnosed with

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Conflict of interest

None of the contributing authors has any conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript. We have full control of all primary data, and we agree to allow the journal to review the data if requested.

- cancer: change over time and influencing factors. *Eur J Cancer Care* 2012;**21**:535–541.
33. Ernst J, Weißflog G, Brähler E, Romer G, Götze H. Depression in children of cancer patients over time and dependence of the parental distress. *Prax Kinderpsychol K* 2012;**61**:432–446.
34. Edwards L, Watson M, St James-Roberts I *et al*. Adolescent's stress responses and psychological functioning when a parent has early breast cancer. *Psycho-Oncology* 2008;**17**:1039–1047.
35. Mehnert A, Koch U. Predictors of employment among cancer survivors after medical rehabilitation – a prospective study. *Scand J Work Env Hea* 2013;**39**:76–87.
36. Huizinga GA, Visser A, van der Graaf WTA *et al*. Stress response symptoms in adolescent and young adult children of parents diagnosed with cancer. *Eur J Cancer* 2005;**41**:288–295.
37. Schmitt F, Piha J, Helenius H *et al*. Multinational study of cancer patients and their children: factors associated with family functioning. *J Clin Oncol* 2008;**26**:5877–5883.
38. Howes MJ, Hoke L, Winterbottom M, Delafield D. Psychosocial effects of breast cancer on the patient's children. *J Psychosoc Oncol* 1994;**12**:1–21.
39. Singer S, Kuhnt S, Götze H *et al*. Hospital anxiety and depression scale cutoff scores for cancer patients in acute care. *Br J Cancer* 2009;**100**:908–912.
40. Romer G, Bergelt C, Möller B. 2014. *Kinder krebskranker Eltern: Manual zur kindzentrierten Familienberatung nach dem COSIP-Konzept*. Hogrefe: Göttingen.
41. Lewis FM, Casey SM, Brandt PA, Shands ME, Zahlis EH. The enhancing connections program: pilot study of a cognitive-behavioral intervention for mothers and children affected by breast cancer. *Psycho-Oncology* 2006;**15**:486–497.
42. Kenny DA, Kashy DA, Cook WL. 2006. *Dyadic Data Analysis*. Guilford Press (Methodology in the social sciences): New York.