



## General Family Functioning as a Predictor of Quality of Life in Parents of Children With Cancer

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### ABSTRACT

**Purpose:** The diagnosis of cancer in a child brings about a crisis for the whole family. This study aimed to (1) determine family functioning and parents' quality of life in comparison with groups in relevant studies, (2) assess the correlation between dimensions of family functioning and parents' quality of life domains, and (3) explore the predictive role of general family functioning (GFF) for quality of life domains in a sample of families (mother–father as a dyad) of children with cancer.

**Design and Methods:** This is a cross-sectional study which was performed on 62 pairs of parents of children with cancer ( $n = 124$ ). Data were collected using the Demographic–Clinical Information Questionnaire, validated Persian versions of the McMaster Family Assessment Device (FAD) and the World Health Organization's Quality of Life–BREF (WHOQOL–BREF). The Canonical Correlation Analysis and the Generalized Estimating Equation (GEE) model were used for data analysis.

**Results:** All dimensions of the FAD were reported as unhealthy dimensions. Also, a poor quality of life was reported in all domains by parents. Most of the family functioning dimensions were correlated with quality of life domains. Consequently, after controlling for several demographic and clinical variables the GFF was the most important predictor of parents' quality of life and its domains.

**Conclusions:** The GFF should be measured at the first meeting with a family of a child with cancer and during the follow-up meetings to help plan family empowerment interventions.

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### Introduction

According to the World Health Organization (WHO), the number of children with cancer increased from an estimated 10 million in 2000 to 15 million by 2020; approximately 60% of this increase will happen in under-developed countries (Steliarova-Foucher et al., 2017). Cancer is the second leading cause of mortality in Iranian children under the age of 14. Furthermore, cancer is responsible for about 13% of deaths among children <10 years old (Nikfarid, Rassouli, Borimnejad, & Alavimajd, 2015). In Iran, the incidence rate of cancer in children has increased dramatically from nine to fifteen per 100,000 children (Mousavi et al., 2008). Improvement in socioeconomic conditions and public health services in Iran during the past decade has improved diagnostic

and treatment methods resulting in increased survival rate of children with cancer (Mousavi et al., 2008; Siegel, Naishadham, & Jemal, 2013).

Diagnosis of cancer causes a crisis for the entire family (Wiener, Kazak, Noll, Patenaude, & Kupst, 2015). Compared to other chronic diseases, cancer causes more anxiety, stress and fear for the children's family (Rodríguez-Sánchez et al., 2011). Parents might experience feelings of anxiety, powerlessness and guilt as a result of blaming themselves for their children's illness (Popp, Conway, & Pantaleao, 2015). In an attempt to adapt to the new stressful conditions, family members usually re-organize their role and communication patterns within and outside the family (Phipps et al., 2015). Meeting the needs of an ill child reduces the interactions between family members and creates feelings of anxiety, a sense of overwhelming responsibilities, need for additional medical information and financial difficulties affecting many aspects of daily family life (Giammona & Malek, 2002; Hosoda, 2014).

The effect of cancer on a family goes beyond the family boundaries. It enormously influences the experience and relationship of the members outside of the home as well. Given the increased responsibilities at home, they may lose friends, connections and engage in fewer social

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activities. For other family members, absence from work or school days is common (Hosoda, 2014). Therefore, in addition to coping with intense feelings of anxiety and fear, families have to alter their communications style, re-negotiate roles and re-organize the responsibilities to meet the new demands of the child and the family members (Giammona & Malek, 2002; Hosoda, 2014). This highlights the importance of exploring the family functioning and parents' quality of life as important indicators of family stability during a family crisis (Marciano et al., 2010).

Family functioning indicates the extent to which families act in meeting the needs of their members (Ryan, Epstein, & Keitner, 2005). Family functioning refers to the ability of families to cope with stressful situations, so that members can resolve conflicts through cooperation and respecting the rules and principles of the family (Azmoode, Tafazoli, & Parnan, 2016; Sanayi, Alaeghaband, & Hooman, 2001). In a study of 90 families of children with cancer, more than half of the participants reported their families as dysfunctional and experienced severe struggling with cancer (Panganiban-Corales & Medina, 2011; Ryan et al., 2005).

Family functioning has a great influence on family members' health and is a significant element in disease prevention and health promotion of families (Santos, Crespo, Canavarró, & Kazak, 2015). Family functioning has been presented as one of the indicators of family's mental health and quality of life (Azmoode et al., 2016; Ryan et al., 2005).

Quality of life refers to an individual's perception towards life in relationship to the culture, values, goals, expectations, standards and priorities (World Health Organization, 2007). Family functioning greatly influences the physical and psychological domains of family's quality of life. Family's quality of life decreases following cancer diagnosis and treatment (Otto, 2004; Rodríguez-Sánchez et al., 2011).

Studies have explored family functioning and quality of life in primary caregivers of children affected by cancer (Klassen et al., 2011; Panganiban-Corales & Medina, 2011; Patistea, 2005; Sajjadi, Roshanfekr, Asangari, Gharai, & Torabi, 2011). A recently published literature review found that the parental perceptions of family functioning and quality of life had not been reported as a family dyad of Iranian children with cancer in last five years (Modanloo, 2015). Exploration of parental quality of life and family functioning may inform the development of interventions and policies for improved nurse-family communication, improvements in quality of life and family-centered nursing care. Therefore, the purposes of this study were to: a) determine family functioning and parents' quality of life in comparing with groups in relevant studies; b) assess the correlation between dimensions of family functioning and parents' quality of life domains; and c) explore the predictive role of general family functioning (GFF) for quality of life domains in a sample of Iranian families (mother-father as a dyad) of children with cancer.

## Methods

### Design and Sample

This cross-sectional study was conducted in three children teaching hospitals affiliated with Tehran Universities of Medical Sciences in Iran. A convenience sample of 124 parents (mother-father) of children with cancer (62 dyads) was recruited from inpatient and outpatient settings of the hospitals. The sample size was estimated by confidence level of 1.96, test power of 0.80, error level of 0.05 and precision of 0.5. Inclusion criteria consisted of: 1) parents (both mother & father) of a child <12 years old with a registered cancer diagnosis, and 2) ability to read and write in Persian to answer the questionnaires. To be included in the study, the children were required to be living with their biological parents in the same residence. This study focused on children who are <12 years old, since this age group has the highest mortality rate in Iran due to cancer (cancer is the second cause of death in Iranian

children <14 years old) (Mousavi et al., 2008) and to avoid the crisis of transmission to adolescence.

### Measures

In this study, the outcomes were measured with three different tools as follows:

**Demographic-Clinical Characteristics Information Questionnaire:** This questionnaire was used to collect demographic features of the parents and demographic and clinical features of the child, consisting of 15 questions. Demographic information for parents and their children were collected using a short interview by the questionnaire sheet at the first visit; and clinical data for children was collected from the child's medical records. Demographic items included parents' age, education, employment status, family income, numbers of children, and number of family members, the child portion of the questionnaire was composed of items related to the child's age, duration of illness, cancer type, birth sequence, and number of hospitalizations (Table 1).

**McMaster Family Assessment Device (FAD):** This is a self-reported standardized questionnaire based on the McMaster Model of Family Functioning (MMFF) with 60 items for assessing family functioning in six dimensions, including problem solving (6 items), communication (9 items), roles (11 items), affective involvement (7 items), behavior control (9 items), and affective responsiveness (6 items). The FAD also contains an independent dimension of general functioning for measuring overall functioning of the family (12 items) (Ryan et al., 2005). In this questionnaire, scoring of the 33 items are reversed in terms of the Likert scale (Questions number 1, 4, 5, 7–9, 11, 13–15, 17, 19, 21–23, 25, 27, 28, 31, 33–35, 37, 39, 41, 42, 44, 45, 47, 48, 51–54 and 58). Each dimension is scored on a Likert scale between 1 and 4, higher scores represent more problems (Ryan et al., 2005). A Persian version of the questionnaire was used in the present study. The psychometric properties of the questionnaire are well established and validated in Iran (Usefy et al., 2010; Zadeh Mohammadi & Malekhsoravi, 2006). In this study, internal consistency of the FAD by the alpha Cronbach coefficient was 0.81 in total and between 0.60 and 0.87 in the dimensions. Test-retest among 18 pairs of parents of children with cancer ( $n = 36$ ) independently of the main study sample showed an intraclass correlation coefficient (ICC) of 0.70.

**World Health Organization's Quality of Life (WHOQOL-BREF):** The WHOQOL-BREF is a self-reported questionnaire which was developed by the WHOQOL group and adapted from the WHOQOL-100 (World Health Organization, 1996). It has four domains with 26 questions in total, consisting of physical health (7 items), psychological health (6 items), environmental health (8 items), social relationships (3 items) and two facets of general quality of life (very poor to very good from 1 to 5) and general health (very dissatisfied to very satisfied from 1 to 5). Converting raw scores to transformed scores was done according to the instructions. Each domain scored between 4 and 20, the score of 4 indicating the worst and 20 indicating the best quality of life (World Health Organization, 1996). In the present study a validated Persian version of the questionnaire was used. The psychometric properties of the Persian version of the questionnaire were satisfactory (Nedjat, Montazeri, Holakouie, Mohammad, & Majdzadeh, 2008). In our study, internal consistency of the WHOQOL-BREF by the alpha Cronbach coefficient was 0.83 in total and between 0.65 and 0.81 in domains. Test-retest was done for 18 pairs of parents of children with cancer ( $n = 36$ ) independently of the main study sample (ICC of 0.81).

### Procedures

Permission for the study was obtained from the Ethical Board of Research at Shahid Beheshti University of Medical Sciences, School of Nursing and Midwifery and the ethical boards of three training hospitals in Tehran. The first author approached the parents in the hospitals during the visiting hours. Research objectives were explained and oral and

**Table 1**  
Demographic and clinical characteristics of parents (n = 62 pairs) and their children with cancer (n = 62).

Variables	Number (%)	Variables	Number (%)	Variables	Number (%)
<b>Mother's age (year)</b>		<b>Father's age (year)</b>		<b>Sufficient monthly income</b>	
21–29	19 (30.6)	25–32	13 (20.9)	Yes	10 (16.1)
30–38	31 (50.0)	33–40	38 (61.3)	Somewhat	36 (58.1)
>39	12 (19.4)	>41	11 (17.8)	No	16 (25.8)
<b>Mother's education</b>		<b>Father's education</b>		<b>Duration of child illness from diagnosis (month)</b>	
High school or less	12 (19.3)	High school or less	18 (29.1)	≤2	24 (38.7)
College	28 (45.2)	College	23 (37.1)	3–6	18 (29.0)
University	22 (35.5)	University	23 (33.8)	≥7	20 (33.2)
<b>Mother's job</b>		<b>Father's job</b>		<b>Child's cancer type</b>	
Housewife	55 (88.7)	Unemployment	3 (4.8)	Leukemia	47(75.8)
Employed	7 (11.3)	Employed	59 (95.2)	Lymphoma	5 (8.1)
<b>Children's age (month)</b>		<b>Child birth sequence</b>		Anemia	3 (8.4)
1–12	10 (16.2)	1	35 (56.5)	Rhabdomyosarcoma	4 (6.5)
13–36	18 (29.0)	2	24 (38.7)	Neuroblastoma	3 (4.8)
≥37	34 (54.8)	≥3	3 (4.8)	<b>Number of family members</b>	
<b>Number of children</b>		<b>Number of hospitalizations</b>		3	23 (37.1)
1	22 (35.5)	1–2	49 (79)	4	32 (51.6)
2	34 (58.4)	≥3	13 (21)	≥5	7 (11.3)
≥3	6 (9.7)				

written informed consent was obtained from the participants. Permission to access the medical records of the children was acquired from the parents, while confidentiality of participating in this study was emphasized. Data collection was done in a room close to the units during a one-month data collection period in the summer of 2014. The three questionnaires were distributed among 124 parents. Every parent filled out the questionnaires independently from the other spouse. All parents returned the questionnaires; missing data in the questionnaires was <3%.

#### Data Analysis

The Kolmogorov-Smirnov test was used for evaluating the distribution normality of the outcome variables. Descriptive statistics were used for data analysis of demographic (both parents and children) and clinical characteristics (only children).

Mean scores of the FAD dimensions and the WHOQOL-BRFF domains were calculated for parents (mother-father dyad, n = 124), and the results were compared with other studies. Differences between the groups were interpreted by calculation of effect size. The effect size computed for groups with different sample size (Lenhard & Lenhard, 2016) and Cohen's thresholds were used for interpretation: none <0.20, small 0.20–0.49, moderate 0.50–0.79, and large ≥0.80 (Fayers & Machin, 2013).

In this study, the McMaster cut-off points were used for evaluation of family functioning dimensions (general functioning: 2.0, problem solving: 2.2, communication: 2.2, roles: 2.3, affective involvement: 2.1, behavior control: 1.9, and affective responsiveness: 2.2). Scores equal and higher than the cut-off points are indicative of an unhealthy family functioning and scores lower than that as a healthy functioning (Akister & Stevenson-Hinde, 1991). In addition, the canonical correlation analyses were used to measure bivariate correlations between variables in the parents' quality of life and family functioning.

Finally, the Generalized Estimating Equation (GEE) models were conducted with correlated outcomes, after controlling for demographic and clinical variables, to find the correlation between the GFF and the WHOQOL-BRFF domains and the facet of general quality of life. The GEE uses the generalized linear model to measure regression parameters for within subject correlations and is applied to analyze longitudinal and other correlated data, especially binary data or in the form of count (Indrayan, 2012). In different types of dyad family relationships such as mother-child, brother-sister, husband-wife etc., GEE models can be used to address the various types of correlated measures models coming from this type of family research (Homish, Edwards, Eiden, & Leonard, 2010).

At first, in the primary GEE analyses, the correlation of quality of life (four domains and the facet of the quality of life as a general quality of life) with the GFF and demographic and clinical variables were computed individually, one at a time, to find significant demographic and clinical variables (univariate analysis). Then, five final GEE models were conducted in the study with the GFF and each of the four domains of quality of life, the facet of general quality of life (two questions) and significant demographic and clinical variables. Dependent (general family functioning) and independent variables (four domains of quality of life and the facet of general quality of life) were assigned to the models based on previous studies (Alonso et al., 2008; Ghamari & Khoshnam, 2011; Rodríguez-Sánchez et al., 2011). Statistical analyses were run with SPSS version 20. Missing data were treated by mean series replacement in SPSS. The significant level was considered as <0.05 in this study.

## Results

### Descriptive Data

The findings showed that the mean age of mothers and fathers was  $31.6 \pm 5.9$  and  $36.6 \pm 5.3$  years, respectively. Among 62 children who were registered in the study around 45% were at 36 months of age and less. Also, 75.8% of children diagnosed with leukemia. The demographic and clinical characteristics of the parents and children are shown in Table 1.

Mean scores of each dimension of the FAD in parents of children with cancer in comparison with a healthy group and families with five chronic conditions in children (Herzer et al., 2010) have been shown in Table 2. The results of the effect sizes clarify that the mean scores of all dimensions of the FAD in Iranian families of children with cancer were dramatically higher than the comparison groups.

Proportion of healthy and unhealthy family functioning in parents of children with cancer according to the McMaster cut-off points showed that all dimensions of the FAD were reported as unhealthy dimensions, i.e., communication (98.4%), affective involvement (98.4%), affective responsiveness (98.4%), problem solving (96.8%) and roles (90.3%), respectively. However, the general family functioning (100%) and behavior control (100%) were the unhealthiest dimensions.

Parents' mean scores in two facets and four domains of the WHOQOL-BRFF were reported in comparison with different populations (Nedjat et al., 2008; Skevington, Lotfy, & O'Connell, 2004) as shown in Table 3. The results of the effect sizes indicate a decrease in all domains of quality of life in parents of children with cancer. Descriptive statistics of the facet of quality of life as general quality of life in parents of children with cancer indicated that most of the parents (60.5%)

**Table 2**

Descriptive statistics for the dimensions of family functioning in the present study based on the McMaster cut-off points and in comparison with families with chronic conditions in children.

Family functioning dimensions	McMaster cut-off points <sup>a</sup>	Range in this study (n = 124)	This Study parents of children with cancer (n = 124) Mean ± SD	Healthy comparison group (n = 57) <sup>b</sup> Mean ± SD	Effect size (Confidence Interval 95%)	Families with five chronic conditions in children <sup>c</sup> (n = 301) <sup>b</sup> Mean range (SD range)
General functioning	2.00	1.92–4.00	2.74 ± 0.41	1.58 ± 0.50	2.63 (–3.05–2.22)	1.60–1.77 (0.5–0.8)
Problem solving	2.20	1.83–4.00	2.96 ± 0.51	1.78 ± 0.50	2.33 (–2.72–1.93)	1.82–1.88 (0.5–0.8)
Communication	2.20	1.67–4.00	2.75 ± 0.40	1.82 ± 0.50	2.14 (2.53–1.76)	1.86–2.04 (0.5–0.8)
Roles	2.30	1.36–3.55	2.57 ± 0.38	2.12 ± 0.60	0.98 (1.31–0.65)	2.13–2.22 (0.5–0.8)
Affective involvement	2.10	1.29–3.71	2.67 ± 0.35	1.88 ± 0.60	1.78 (2.14–1.42)	1.86–1.97 (0.5–0.9)
Behavior control	1.90	1.89–3.44	2.68 ± 0.33	1.52 ± 0.60	2.68 (3.09–2.26)	1.54–1.60 (0.5–0.8)
Affective responsiveness	2.20	2.00–3.50	2.72 ± 0.31	1.67 ± 0.60	2.48 (2.89–2.08)	1.65–1.82 (0.6–0.9)

<sup>a</sup> Akister and Stevenson-Hinde (1991).

<sup>b</sup> Herzer et al. (2010).

<sup>c</sup> Five chronic conditions in children were cystic fibrosis, obesity, sickle cell disease, inflammatory bowel disease and epilepsy.

reported their general quality of life as neither poor nor good. The rest of the parents reported their quality of life as very poor (8.1%), poor (18.5%), good (9.7%) and very good (3.2%).

### Canonical Correlation Results

The canonical correlation analyses between seven dimensions of the FAD and four domains of the WHOQOL-BRFF and the facet of general quality of life for parents' data revealed that most of the FAD dimensions were correlated with the WHOQOL-BRFF domains (Table 4).

### GEE Analysis Results

Five final models of the GEE are presented in Table 5. At first step, GFF and demographic and clinical variables (independent variables) one at the time with every one of the WHOQOL-BRFF domains and the facet of general quality of life with two questions (dependent variables) were entered into the model, and then only the significant variables were considered in the final models. It shows that there was a correlation between the GFF and all the WHOQOL-BRFF domains and the facet of the general quality of life. The GFF could predict all domains of the WHOQOL-BRFF and the facet of the general quality of life, after controlling for significant demographic and clinical variables (child birth sequence, parents' job, sufficient monthly income, number of children, and number of hospitalizations). In other words, when the GFF increased one standard deviation, the score of general quality of life increased by 0.22 (after controlling for child birth sequence), physical health by 0.33 (after controlling for child birth sequence and parents' job), psychological health by 0.36, environmental health by 0.36 (after controlling for sufficient monthly income and number of children) and social relationships by 0.11 (after controlling for sufficient monthly income, number of children and number of child hospitalization times).

**Table 3**

Mean and standard deviation of domains of quality of life in parents of children with cancer in comparison with healthy and diseased populations.

Quality of life domains and facets (score range)	This study (n = 124)	Iran healthy and diseased population (n = 1164) <sup>a</sup>	Effect size (Confidence Interval 95%)	WHO report in 23 countries, healthy and diseased population <sup>c</sup> (n = 11,830) <sup>b</sup>	Effect size (Confidence Interval 95%)
Physical health (4–20)	10.93 ± 1.82	14.3 ± 2.60	–1.77 (–1.96–1.57)	16.2 ± 2.9	–2.87 (–3.05–2.69)
Psychological health (4–20)	11.34 ± 1.68	13.4 ± 2.60	–1.15 (–1.34–0.96)	15.0 ± 2.8	–2.16 (–2.34–1.98)
Environmental health (4–20)	10.59 ± 2.08	12.3 ± 2.40	–0.81 (–0.99–0.62)	13.5 ± 2.6	–1.39 (–1.57–1.22)
Social relationships (4–20)	11.10 ± 2.66	13.9 ± 2.60	–1.05 (–1.24–0.86)	14.3 ± 3.2	–1.2 (–1.38–1.02)
Quality of life (1–5)	2.81 ± 0.83	3.4 ± 0.86	–0.71 (–0.89–0.52)	– <sup>d</sup>	–
Health (1–5)	3.00 ± 0.83	3.6 ± 0.97	–0.71 (–0.89–0.52)	– <sup>d</sup>	–

<sup>a</sup> Nedjat et al. (2008).

<sup>b</sup> Skevington et al. (2004).

<sup>c</sup> Adjusted based on age and sex.

<sup>d</sup> Not reported: for two facets of QoL only frequency responses were reported.

### Discussion

Understanding the impact of cancer on families is essential for family empowerment and the development of nursing interventions and family support (Otto, 2004). In general, this study demonstrates the extent to which family functioning and parental quality of life were influenced by having a child with cancer. The results of this study showed that >90% of families reported “unhealthy functioning” in all dimensions of the FAD. Thus, a poor function in all dimensions of family functioning for most of the families was observed. The mean scores of the family functioning in all dimensions were considerably higher than the mean scores of the families with five chronic conditions in children (Herzer et al., 2010). These findings are similar to the results of a study by Panganiban-Corales and Medina (2011), on 90 Filipino families of children with cancer. They found that almost half of the caregivers experienced severe strain in caring for their children and reported their family functioning as unhealthy.

Unhealthy family functioning raises the risk of significant emotional and behavioral problems in children (Popp et al., 2015). In a literature review of family functioning of children with chronic diseases (e.g. seizure, cycle cell anemia, cystic fibrosis, obesity and inflammatory bowel diseases), Herzer et al. (2010) indicated that 13% to 36% of the families experienced unhealthy family functioning in areas such as problem solving (13%), communication (28%), roles (36%), affective responsiveness (16%), affective involvement (36%), behavior control (21%) and general functioning (25%). Thus, the highest proportions of unhealthy family functioning were in the dimensions of roles, affective involvement and communication. However, in our study the general family functioning and behavior control were the unhealthiest dimensions demonstrating the problematic impact of cancer as a chronic disease on family functioning. It appears that families encountering a crisis such as cancer may experience more disequilibrium and disorganization, which can be determined by measuring the level of family functioning (Martin et al., 2012).

**Table 4**

Canonical correlation matrix between the Family Assessment Device (FAD) dimensions and the WHOQOL-BREF domains in parents of children with cancer (n = 62 pairs).

Variables	GQoL <sup>a</sup>	PH <sup>b</sup>	PSYH <sup>c</sup>	EH <sup>d</sup>	SR <sup>e</sup>	GF <sup>f</sup>	PS <sup>g</sup>	C <sup>h</sup>	R <sup>i</sup>	AI <sup>j</sup>	BC <sup>k</sup>	AR <sup>l</sup>
GQoL	–											
PH	0.54***	–										
PSYH	0.48***	0.36**	–									
EH	0.5***	0.59***	0.64***	–								
SR	0.69***	0.69***	0.79***	0.21	–							
GF	0.49***	0.31	0.69***	0.61**	0.73***	–						
PS	0.31	0.20	0.74***	0.56**	0.52**	0.57**	–					
C	0.44**	0.57***	0.49**	0.48**	0.53***	0.31	0.33	–				
R	0.59***	0.22	0.56***	0.70**	0.66**	0.45**	0.32	0.52**	–			
AI	0.32	0.31	0.36	0.20	0.41**	0.61***	0.63***	0.67***	0.52**	–		
BC	0.37*	0.22	0.39*	0.38**	0.38	0.52**	0.29	0.52**	0.63***	0.73***	–	
AR	0.34	0.18	0.22	0.28	0.38*	0.36	0.27	0.30	0.43*	0.66***	0.54**	–

<sup>a</sup> General quality of life (it is consisted of two questions of facet of the WHOQOL-BREF questionnaire).<sup>b</sup> Physical health.<sup>c</sup> Psychological health.<sup>d</sup> Environmental health.<sup>e</sup> Social relationships.<sup>f</sup> General functioning.<sup>g</sup> Problem solving.<sup>h</sup> Communication.<sup>i</sup> Roles.<sup>j</sup> Affective involvement.<sup>k</sup> Behavior control.<sup>l</sup> Affective responsiveness.

\* Significant: p &lt; 0.05.

\*\* Significant: p &lt; 0.01.

\*\*\* Significant: p &lt; 0.00.

The difference between our findings with the reported results of studies can be argued by illness variable. Rolland and Walsh (2006) discussed the key characteristics of a disease, such as course (e.g., progressive, constant or relapsing) and outcome (e.g., fatal, life-shortening and nonfatal) which can influence family functioning. It appears that cancer as a trajectory disease in comparison with other diseases has more impact on the function of the family. Also, emotional-behavioral responses of the families to the sick child and his/her disease can be different in various cultures.

Factors, such as lower socioeconomic status, being an unemployed single mother and having more children at home were correlated with lower family functioning (Herzer et al., 2010). Thus, family structure is key component when measuring family functioning. After a series of studies, Epstein et al. (Ryan et al., 2005) also concluded that poor family functioning may be related to the family structure and not the disease or cultural group. This suggests that the presence of a specific chronic disease alone cannot influence family functioning.

**Table 5**

The results of the five Generalized Estimating Equation (GEE) model analyses between general family functioning (GFF: independent variable) and the WHOQOL-BREF domains (dependent variables) after controlling for significant demographic and clinical variables in parents of children with cancer.

Variables	General QoL <sup>a</sup>			Physical health			Psychological health			Environmental health			Social relationship		
	B	SE	P	B	SE	P	B	SE	P	B	SE	P	B	SE	P
GFF <sup>b</sup>	0.22	1.32	<b>0.000</b>	0.33	0.05	0.010	0.36	0.04	<b>0.000</b>	0.36	0.04	<b>0.000</b>	0.11	0.04	<b>0.008</b>
Parents' gender															
Mother	0.03	0.25	0.905	−0.11	0.30	0.724	0.21	0.31	0.490	−0.18	0.38	0.643	−0.32	0.51	0.530
Father (reference)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Child birth sequence															
1	3.99	0.80	0.000	6.01	2.06	0.700									
2	4.04	1.28	0.002	4.20	2.92	<b>0.002</b>									
3 (reference)	–	–	–	–	–	–									
Parent's job															
Housewife mothers				2.14	0.41	<b>0.000</b>									
Working parents				1.09	0.43	<b>0.000</b>									
Other (reference)				–	–	–									
Sufficient income															
No										−1.65	0.95	<b>0.030</b>	−0.67	0.19	<b>0.000</b>
Somewhat										−0.21	1.14	0.840	−0.20	−0.34	0.550
Yes (reference)										–	–	–	–	–	–
Number of child															
NCHT <sup>c</sup>										−0.89	0.47	<b>0.040</b>			
<3													−4.38	1.66	<b>0.008</b>
>3 (reference)													–	–	–
NCHT × GFF (interaction effect)													0.13	0.04	<b>0.005</b>

Significant demographic and clinical variables were entered to the models.

B: unstandardized coefficient, SE: standard error. Bold font: significant, P&lt;0.05

<sup>a</sup> General quality of life (it is consisted of two questions of facets of WHOQOL-BREF questionnaire).<sup>b</sup> GFF: general family functioning.<sup>c</sup> NCHT: number of child hospitalizations times.

Although, we did not find similar studies on families of children with cancer in Iran, there were several studies with other chronic diseases in children. Ahmadi, Anisi, and Abdolmohammadi (2011) in their study of Iranian families with children with disabilities used the same instrument (FAD) for estimation of family functioning and found that 46.7% of the families reported unhealthy family functioning. Family functioning impacts the lifestyle of a family, especially when a family member requires more help to cope with a life-threatening disease. Therefore, it seems that healthy family functioning has a supportive and crucial role in having a healthy family lifestyle (Kaakinen, Coehlo, Steele, Tabacco, & Hanson, 2014). In general, healthy family functioning is associated with better outcomes for the family as a whole and its members. When parents feel empowered during a crisis, they can support their sick child and improve his/her treatment process (Martin et al., 2012).

Compared to healthy Iranian population (Nedjat et al., 2008), parents of children with cancer showed poor quality of life in all domains. Nevertheless, around 60% of parents reported their general quality of life, neither poor nor good. This result might indicate family's efforts in maintaining the balance. Family caregivers of children (76 mothers, 41 fathers, 4 sisters and 1 aunt) with cancer in a study by Sajjadi et al. (2011) in Iran reported better quality of life mean scores. No other similar studies were found with Iranian samples. Methodological factors, such as different samples, children of older age and considering only one parent (mother) might explain these divergent findings between this study and ours in Iran. Obviously, the mean scores of parents' quality of life in all domains were lower than the healthy population in Iran (Nedjat et al., 2008) and general populations in other countries (Nedjat et al., 2008). It is apparent that caring for a sick child with cancer causes many challenges in caregivers' life style, roles, responsibility and social communication (Martin et al., 2012; Otto, 2004).

Canonical correlation analyses indicated a correlation between most of the family functioning dimensions and parental quality of life domains. The GEE analysis confirmed these correlations and showed that when the GFF increases, parental quality of life in various domains increases as well. Consequently, the GFF was the most important predictor of family quality of life and its domains, after controlling for variables of (parents' gender) child birth sequence, number of children, and number of child hospitalizations, family income adequacy and the parents' job.

Rodríguez-Sánchez et al. (2011) found the predictive role of family functioning for all domains of quality of life in their study by regression models. In our study, higher family income, being employed parents, few hospitalizations, not being the first child and having fewer children at home were associated with better family quality of life. These findings are comparable with a study on childhood leukemia by Patistea (2005) in which they found a positive correlation between parental socioeconomic status and their patterns of behavior. They also found that the higher the parents' level of education and socioeconomic status, the more effective were their attempts to keep the family organized in stressful circumstances and cope with the child's medical situation. Similarly, in a study of parents of children who underwent liver transplantation, Alonso et al. (2008) found that parents with lower social status had a lower quality of life. Therefore, study findings indicate paying more attention to these variables during the planning of nursing care is essential for more effective clinical interventions to improve the quality of life of parents in various domains.

In our study, most families reported "unhealthy functioning" in all dimensions of family functioning and showed a poor quality of life in all domains. The family functioning dimensions were correlated with the family quality of life domains. The GFF was the most important predictor of family quality of life and its domains after controlling for several demographic and clinical variables. Therefore, it is very important to assess every family as a unique entity and consider to the GFF. All this emphasizes the need for measuring GFF at the initial meeting and during the follow-ups to provide appropriate interventions based on quality of life domains.

## Limitations and Strength of the Study

Being the first study to include both parents of children with cancer and compare two outcome variables of family functioning and quality of life is considered a significant strength of this study.

Although one might argue that quality of life or family functioning are unique individual concepts, each parent is different in terms of demographic features such as gender, ethnicity, and so forth. However, the aim of this study is critically looking at the importance of family as a whole when they encounter a crisis such as cancer in a child. This crisis affects the entire family. We acknowledge that family members in response to such crisis might take different approaches and are affected differently based on their roles, gender and involvement in a family. Nevertheless, the assessment of personal differences such as gender is not the objectives of this study, as the results of this difference in FAD scores and efficient demographic and clinical variables were previously published (Modanloo, Rohani, Farahani Shirin Abadi, & Pourhossein Gholi, 2015).

The study sample was selected by a non-random sampling technique in the teaching hospitals; therefore, the generalization of the results should be done cautiously. Further study with a larger sample size and more population variety is suggested. Another limitation was lack of a control group; instead, the results were compared with other studies that were conducted with similar sample. In addition, the findings are based on self-reported questionnaires, which are subject to respondent biases. For reduction of this bias, we tried to provide a calm and private place for parents to answer the questions separately from each other with enough time, and there was no chance of talking together.

## Implications

In Iran, where the professional roles of nurses are significantly changing to a more preventive care, there is a clear need to promote the family education through home visits for the families who are dealing with life-threatening illnesses in their children. In addition, this study highlights the importance of the family support for community health nurses. Also, the results of this study collaborate in updating the curriculum of family nursing cares in nursing schools, providing in-service training programs for nurses, and developing a family-centered care in hospitals of Iran. Moreover, this study helps policy makers paying more attention in establishing some peer support groups and developing professional virtual support for these families after discharge to keep them educated and motivated through their challenges with the illness of a child.

## Conclusion

Measurement of the GFF should be considered at the first meeting with the family of a child with cancer and during the follow-up sessions to plan some family empowerment interventions with a focus on poor domains of quality of life.

Overall, interventions with focus on family-centered care, including parental education in group format can improve family empowerment. Improving family functioning will recover the family's quality of life. The results of this study are a foundation for assessment of every family as a unique entity and consider to the GFF in this unit.

## Declaration of Conflicting Interests

None to declare.

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### Credit Author Statement

Each author's contributions to the manuscript are listed below;

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- Data curation; Shokoufeh Modanloo
- Formal analysis; Shokoufeh Modanloo, Camelia Rohani, Asma Pourhosseingholi
- Funding acquisition; Shokoufeh Modanloo
- Investigation; Shokoufeh Modanloo, Camelia Rohani, Azam Shirinabadi Farahani, Parvaneh Vasli
- Methodology; Shokoufeh Modanloo, Camelia Rohani, Azam Shirinabadi Farahani, Parvaneh Vasli
- Project administration; Shokoufeh Modanloo
- Resources; Shokoufeh Modanloo
- Software; Shokoufeh Modanloo, Camelia Rohani, Asma Pourhosseingholi
- Supervision; Camelia Rohani
- Validation; Shokoufeh Modanloo, Camelia Rohani, Azam Shirinabadi Farahani, Parvaneh Vasli
- Visualization; Shokoufeh Modanloo, Camelia Rohani
- Roles/Writing – original draft; Shokoufeh Modanloo, Camelia Rohani
- Writing – review & editing; Shokoufeh Modanloo, Camelia Rohani

### References

- Ahmadi, A., Anisi, J., & Abdolmohammadi, E. (2011). Problems of families with disabled children. *Iranian Journal of Military Medicine*, 13(1), 49–52.
- Akister, J., & Stevenson-Hinde, J. (1991). Identifying families at risk: Exploring the potential of the McMaster Family Assessment Device. *Journal of Family Therapy*, 13(4), 411–421.
- Alonso, E. M., Neighbors, K., Barton, F. B., McDiarmid, S. V., Dunn, S. P., Mazariegos, G. V., ... Bucuvalas, J. C. (2008). Health-related quality of life and family function following pediatric liver transplantation. *Liver Transplantation*, 14(4), 460–468.
- Azmoude, E., Tafazoli, M., & Paman, A. (2016). Assessment of family functioning and its relationship to quality of life in diabetic and non-diabetic women. *Journal of Caring Sciences*, 5(3), 231.
- Fayers, P. M., & Machin, D. (2013). *Quality of life: The assessment, analysis and interpretation of patient-reported outcomes*. John Wiley & Sons.
- Ghamari, M., & Khoshnam, A. (2011). The relationship of original family function and quality of life among students. *Journal of Family Research*, 7, 343–354.
- Giammona, A. J., & Malek, D. M. (2002). The psychological effect of childhood cancer on families. *Pediatric Clinics of North America*, 49(5), 1063–1081.
- Herzer, M., Godiwala, N., Hommel, K. A., Driscoll, K., Mitchell, M., Crosby, L. E., ... Modi, A. C. (2010). Family functioning in the context of pediatric chronic conditions. *Journal of Developmental and Behavioral Pediatrics*, 31(1), 26.
- Homish, G. G., Edwards, E. P., Eiden, R. D., & Leonard, K. E. (2010). Analyzing family data: A GEE approach for substance use researchers. *Addictive Behaviors*, 35(6), 558–563. <https://doi.org/10.1016/j.addbeh.2010.01.002>.
- Hosoda, T. (2014). The impact of childhood cancer on family functioning: A review. *Graduate Student Journal of Psychology*, 15, 18–30.
- Indrayan, A. (2012). *Medical biostatistics*. CRC Press.
- Kaakinen, J. R., Coehlo, D. P., Steele, R., Tabacco, A., & Hanson, S. M. H. (2014). *Family health care nursing: Theory, practice, and research*. FA Davis.
- Klassen, A. F., Raina, P., McIntosh, C., Sung, L., Klaassen, R. J., O'donnell, M., ... Dix, D. (2011). Parents of children with cancer: Which factors explain differences in health-related quality of life. *International Journal of Cancer*, 129(5), 1190–1198.
- Lenhard, W., & Lenhard, A. (2016). *Calculation of effect sizes*. Retrieved from [https://www.psychometrica.de/effect\\_size.html](https://www.psychometrica.de/effect_size.html) Dettelbach (Germany): Psychometrica. <https://doi.org/10.13140/RG.2.1.3478.424>.
- Marciano, R. C., Soares, C. M. B., Diniz, J. S. S., Lima, E. M., Silva, J. M. P., Canhestro, M. R., & Correa, H. (2010). Mental disorders and quality of life in pediatric patients with chronic kidney disease. *Jornal Brasileiro de Nefrologia*, 32(3), 316–322.
- Martin, S., Calabrese, S. K., Wolters, P. L., Walker, K. A., Warren, K., & Hazra, R. (2012). Family functioning and coping styles in families of children with cancer and HIV disease. *Clinical Pediatrics*, 51(1), 58–64.
- Modanloo, S. (2015). *Assessment the correlation of family functioning and quality of life among parents of children with cancer*. Tehran, Iran: School of nursing, Shahid Beheshti University of Medical Sciences (Master's thesis).
- Modanloo, S., Rohani, C., Farahani Shirin Abadi, A., & Pourhossein Gholi, A. (2015). Assessment of family function among parents of children with cancer. *Iranian Journal of Nursing Research*, 10(1), 56–65.
- Mousavi, S. M., Gouya, M. M., Ramazani, R., Davanlou, M., Hajsadeghi, N., & Seddighi, Z. (2008). Cancer incidence and mortality in Iran. *Annals of Oncology*, 20(3), 556–563.
- Nedjat, S., Montazeri, A., Holakouie, K., Mohammad, K., & Majdzadeh, R. (2008). Psychometric properties of the Iranian interview-administered version of the World Health Organization's Quality of Life Questionnaire (WHOQOL-BREF): A population-based study. *BMC Health Services Research*, 8(1), 61.
- Nikfarid, L., Rassouli, M., Borimnejad, L., & Alavimajid, H. (2015). Chronic sorrow in mothers of children with cancer. *Journal of Pediatric Oncology Nursing*, 32(5), 314–319.
- Otto, S. E. (2004). *Oncology nursing clinical reference*. Elsevier Health Sciences.
- Panganiban-Corales, A. T., & Medina, M. F. (2011). Family resources study: Part 1: Family resources, family function and caregiver strain in childhood cancer. *Asia Pacific Family Medicine*, 10(1), 14.
- Patistea, E. (2005). Description and adequacy of parental coping behaviours in childhood leukaemia. *International Journal of Nursing Studies*, 42(3), 283–296.
- Phipps, S., Long, A., Willard, V. W., Okado, Y., Hudson, M., Huang, Q., ... Noll, R. (2015). Parents of children with cancer: At-risk or resilient? *Journal of Pediatric Psychology*, 40(9), 914–925.
- Popp, J. M., Conway, M., & Pantaleao, A. (2015). Parents' experience with their child's cancer diagnosis do hopefulness, family functioning, and perceptions of care matter? *Journal of Pediatric Oncology Nursing*, 32(4), 253–260.
- Rodriguez-Sánchez, E., Pérez-Peñaranda, A., Losada-Baltar, A., Pérez-Archaeoederra, D., Gómez-Marcos, M.Á., Patino-Alonso, M. C., & García-Ortiz, L. (2011). Relationships between quality of life and family function in caregiver. *BMC Family Practice*, 12(1), 19.
- Rolland, J. S., & Walsh, F. (2006). Facilitating family resilience with childhood illness and disability. *Current Opinion in Pediatrics*, 18(5), 527–538.
- Ryan, C. E., Epstein, N. B., & Keitner, G. I. (2005). *Evaluating and treating families: The McMaster approach*. Taylor & Francis.
- Sajjadi, H., Roshanfekar, P., Asangari, B., Gharai, N., & Torabi, F. (2011). Quality of life and satisfaction with services in caregivers of children with cancer. *Iran Journal of Nursing*, 24(72), 8–17.
- Sanayi, B., Alaeghaband, S., & Hooman, H. (2001). *Family and marital scales*. Tehran: Besat Pub.
- Santos, S., Crespo, C., Canavarró, M. C., & Kazak, A. E. (2015). Family rituals and quality of life in children with cancer and their parents: The role of family cohesion and hope. *Journal of Pediatric Psychology*, 40(7), 664–671.
- Siegel, R., Naishadham, D., & Jemal, A. (2013). Cancer statistics, 2013. *CA: a Cancer Journal for Clinicians*, 63(1), 11–30.
- Skevington, S. M., Lotfy, M., & O'Connell, K. A. (2004). The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL group. *Quality of Life Research*, 13(2), 299–310.
- Steljarova-Foucher, E., Colombet, M., Ries, L. A. G., Moreno, F., Dolya, A., Bray, F., ... Bouzbid, S. (2017). International incidence of childhood cancer, 2001–10: A population-based registry study. *The Lancet Oncology*, 18(6), 719–731.
- Usefy, A., Ghassemi, G. R., Sarrafzadegan, N., Mallik, S., Baghaei, A., & Rabiei, K. (2010). Psychometric properties of the WHOQOL-BREF in an Iranian adult sample. *Community Mental Health Journal*, 46(2), 139–147.
- Wiener, L., Kazak, A. E., Noll, R. B., Patenaude, A. F., & Kupst, M. J. (2015). Standards for the psychosocial care of children with cancer and their families: An introduction to the special issue. *Pediatric Blood & Cancer*, 62(5S), S419–S424.
- World Health Organization (1996). *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment: Field trial version, December 1996*.
- World Health Organization (2007). *Cancer control: Knowledge into action: WHO guide for effective programmes. Vol. 2*. World Health Organization.
- Zadeh Mohammadi, A., & Malekshosravi, G. (2006). Preliminary study of psychometric properties of family assessment device (FAD). *Journal of Family Study*, 5, 69–89.