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ARTICLE



Illness cognition and health anxiety in parents of children with cancer

Nadeem Bilani, MD^a, Sarah Jamali, MD^a , Anastasia Chahine, MD^a, Maya Zorkot, MD^a, Mouafak Homsy, MD^a, Michael Saab, MD^a, Raya Saab, MD^{a,b,c} , Mona Nabulsi, MD^b, and Monique Chaaya, Dr PH^d 

^aFaculty of Medicine, American University of Beirut, Beirut, Lebanon; ^bDepartment of Pediatrics and Adolescent Medicine, American University of Beirut, Beirut, Lebanon; ^cLebanon Children's Cancer Center of Lebanon, American University of Beirut, Beirut, Lebanon; ^dDepartment of Epidemiology and Population Health, American University of Beirut, Beirut, Lebanon

ABSTRACT

Purpose: Health anxiety is a clinical entity characterized by a pathological fear of illness. Illness cognition refers to persistent positive or negative thoughts an individual has towards illness. Evidence has shown that patients with chronic conditions who possess negative illness cognitions experience greater social, emotional, and physical difficulties than patients with positive illness cognitions. This study aims to measure the prevalence of health anxiety in a population of parents of children with cancer, and investigate the association between positive and negative illness cognitions and health anxiety.


Methods: We interviewed 105 parents of children with cancer and administered Arabic versions of the *Illness Cognition Questionnaire – Parent Version* and the *Short Health Anxiety Inventory*.

Results: The mean parental age was 37.7 years with the majority of participants being mothers (78.1%) and married (94.3%) and with 35.2% having completed university education. The average age of the child with cancer was 8.4 years, with the largest proportion of children suffering from leukemia. The prevalence of health anxiety among parents of children with cancer was 21%. The following two dimensions of illness cognition were significantly associated with health anxiety: *Helplessness* ($B=0.222$, $p=0.021$) and lower *Acceptance* ($B=-0.242$, $p=0.008$). Other variables associated with health anxiety were perceived inadequate income ($B=-0.238$, $p=0.021$) and personal illness or illness of a family member/close friend ($B=0.251$, $p=0.013$).

Conclusions: Parents of children with cancer may experience health anxiety. Predictors of health anxiety include feelings of helplessness, lower acceptance, inadequate income, and extended family illnesses.

KEYWORDS

Cancer; illness cognition; hypochondriasis; health anxiety; oncology; parents; pediatrics

CONTACT Monique Chaaya Dr PH,  mchaaya@aub.edu.lb  Department of Epidemiology and Population Health, Faculty of Health Sciences, American University of Beirut, Room 205 A, Van Dyck, Van Dyck Building, PO Box 11-0236, Beirut, Lebanon.

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Background

The Lebanese Ministry of Public Health's *National Cancer Registry* reports that in 2015, over 400 children were diagnosed with cancer.¹ The actual incidence of disease in Lebanon is expected to be much higher when including refugees from Palestine and Syria, as well the steady influx of Middle Eastern travelers who come to seek an alternative to the healthcare infrastructures available in their home nations.²

Studies looking at the impact of cancer on patient families all around the world have shown that parents of children with cancer experience significant levels of psychological distress, at least during the initial period of their child's diagnosis and treatment. They are more likely to suffer from generalized anxiety, depression, denial, anger, as well as low self-esteem.^{3,4}

As a clinical entity, health anxiety is characterized by the pathologically persistent fear of becoming ill. Individuals with health anxiety often misinterpret their own normal bodily symptoms to be signs of serious medical conditions.⁵ Since extreme health anxiety can manifest in physical symptoms or bodily sensations, it has been categorized in the DSM-5 as a somatic symptom disorder rather than an anxiety disorder.⁶ Individuals with these maladaptive health-related thoughts have been shown to suffer in their personal, social, and occupational lives.⁷ Literature exploring health anxiety in parents of children with chronic diseases is scarce. Nevertheless, the available evidence suggests a correlation between child illness and the presence of anxieties parents have about *their own* health. For example, recurrent abdominal pain and chronic migraine in children were both associated with higher levels of parental health anxiety.^{8,9} Furthermore, health anxiety in either parent has been positively correlated with health anxiety in children.¹⁰ Health anxiety thus constitutes a unique potential stressor, distinguished from other anxiety disorders in how it might impact patients and their families, and how it might be addressed clinically.

According to the cognitive behavioral (CB) model, maladaptive core beliefs about illness increase the likelihood that individuals develop health anxiety.¹¹ Illness cognition is an emerging concept in psychological literature, and can be defined as one's personal "perception, interpretation, and understanding" of disease.¹² In other words, it refers to the persistent thoughts an individual has towards illness, whether positive or negative. In medicine, the impact of illness cognition has been investigated thoroughly in patients with chronic conditions.¹³ We postulated that beliefs parents have about health – as it relates not just to the health of their family members but also to their own health – might be shaped by the prolonged stressful experience of their child's illness. The journey of a pediatric cancer patient's parent includes distressing milestones, such as witnessing one's child enduring medical procedures and repeated hospitalizations as well as

fearing recurrence of his/her cancer. These hardships might foster negative illness perceptions in parents, such as the notion that they are powerless to protect their child's health, or that disease is incontrovertibly resistant to medical intervention. It is thus important to investigate if these cognitions do exist prevalently in this population, and to what extent are they associated with health anxiety and its related personal, social, and financial costs.^{13–15}

Many studies have already described the incredible degree of cultural stigma associated with cancer in the Middle East.^{16–18} It is a taboo topic, oftentimes not even disclosed to the patient and not freely discussed within families. Lebanese culture is strongly collectivistic, as such when one becomes ill, family members extending far beyond the nuclear family unit become emotionally involved.¹⁹

Moreover, Lebanon hosts multiple major religions with a uniting factor being the paramount role of God and fate. Lebanese parents tend to rely heavily on the notion that events of the real world, including their children's disease, are determined by "His will"¹⁹. However, Lebanese parents also perceive their child's battle with cancer to be one in which they also have agency, restoring a sense of urgency to manage the situation.²⁰ Interestingly, this often leads Lebanese families to look beyond Western medicine to alternative medicine practices, including spiritual healing, dietary supplementation and unconventional practices (e.g. ingesting bone ashes) in Lebanon.²¹

Research exploring different psychological variables in this population is growing, but thus far illness cognition and health anxiety have not been explored in depth, especially in Arab cultures. The objective of this study was to assess the prevalence of health anxiety in parents of children with cancer and the association of positive and negative illness cognitions.

Methods

A cross-sectional study of 105 parents of children with cancer was conducted at the Children's Cancer Institute (CCI), American University of Beirut, Lebanon. The CCI is affiliated with St. Jude Children's Research Hospital in Memphis, Tennessee, USA. It provides free treatment for children with cancer. Participants included Arabic-speaking biological mothers or biological fathers of children within the pediatric age range (0–18 years old) who were being actively treated at the CCI as either inpatients or outpatients. In an effort to control for *severity* of disease, pre-defined exclusion criteria consisted of parents of terminally-ill children with a life expectancy of under 6 months, as well as those undergoing a bone marrow transplant. Parents of children who had been diagnosed less than one month

previously were also excluded in an attempt to investigate illness perceptions that were adequately persistent. Additionally, caregivers that were neither the child's biological mother nor biological father were excluded. Only one parent of each child participated in the study.

Measures

Illness cognition is the independent variable in this investigation and was assessed using the *Illness Cognition Questionnaire – Parent Version (ICQ-P)*. The *ICQ-P* was recently adapted by Nicolaas et al. (2016) to specifically assess the illness cognitions in parents of children with cancer.²² The *ICQ-P* consists of 18 items scored from 1 to 4 on a Likert scale. The items are grouped under the 3 main factors of “Helplessness”, “Acceptance” and “Perceived Benefits” and factor scores consist of the sum of their 6 items. Higher scores in each subcategory indicate the extent to which parents experience those specific cognitions. The *ICQ-P* was shown by Nicolaas et al. (2016) to be internally consistent and valid (Cronbach's alpha ranging from .80 to .88) in a population of parents of children with cancer.

Health anxiety is the dependent variable and was measured using the *Short Health Anxiety Inventory (SHAI)*.⁹ The questionnaire provides a total score based on 14 items, with each item scored on a 4-point Likert scale (from 0 to 3). Higher total scores indicate increased levels of health-related anxiety, as in, the extent to which participants had occupying thoughts about their *own* health. The *SHAI* addresses not only the content of anxious thoughts, but also the *intrusiveness* of these thoughts (related by multiple choice answers like “nothing can take my mind off thoughts about my health” or “I am not relieved even if my doctor tells me there is nothing wrong”) and the presence of associated *symptoms* (related by answers such as “I notice aches and pains in my body all the time”, “I am constantly aware of bodily sensations or changes” or “I constantly have images of myself being ill”), The *SHAI* was consistently shown to have good Cronbach's alpha scores and strong construct validity.²³ Although there is no clear consensus on the cutoff score that designates significant health anxiety, many sources in the literature, including the UK National Health Service, recommend that a score of 18 or higher indicates the presence of clinically significant health anxiety.^{24,25} The scale has been used and validated in both clinical and community samples.²³ Most similarly to the target population of this study, the *SHAI* has previously been used with mothers of healthy children, mothers of children with asthma, and mothers of children with recurrent abdominal pain.⁶ It is worth noting that the *SHAI* has been successfully translated and validated in Spanish, Chinese, and most recently in Dutch.^{26–28}

Both the *ICQ-P* and the *SHAI* were translated into Arabic and then back-translated into English for comparison to create the final versions that were used. This was completed independently by four fluently bilingual translators that had knowledge in the fields of medicine and psychology.

Other covariates included parent characteristics (age, gender, marital status, number of children, education level, occupational status, perceived inadequate income, and transport time to hospital), parent stressors (personal/family/friend illness, death of family/friend, financial stressors, personal stressors, perceived spousal stress, perceived coping of spouse, perceived stress of child and perceived coping of child) and child characteristics (age, gender, hospital status, time since diagnosis and type of cancer). Based on an extensive literature search, these covariates were chosen due to their possible associations with parental anxiety.^{10,16,17}

Data collection

The American University of Beirut Institutional Review Board granted approval for the conduction of this study. The investigative team was concerned with protecting the privacy and wellbeing of all participants, as well as minimizing any inconvenience the interview process might cause. Nurses already familiar with parents at the CCI approached those deemed appropriate candidates as per the inclusion and exclusion criteria. They used a pre-approved script to gain consent in a non-coercive manner. A trained investigator then also approached to gain informed consent orally after more information was given to parents. Data were collected through face-to-face interviews in Arabic in a private conference room. All parents were given a referral pamphlet to psychological services available to them at the CCI should they find themselves distressed.

The interviewers were trained to administer the following standardized questionnaires: a self-developed socio-demographic questionnaire ([supplementary material Appendix 1](#)), the *Illness Cognition – Parent Version (ICQ-P)* ([supplementary material Appendix 3](#)) and *Short Health Anxiety Inventory (SHAI)* ([supplementary material Appendix 5](#)). These questionnaires were filled using an interview process, where questions and answers were read aloud to the participants, to account for varying levels of literacy in the target population.

Data analysis

SPSS-23 was used to analyze the data. Frequencies and means were generated to present the sociodemographic profile of participants and to examine levels of illness cognition and health anxiety. Bivariate analysis

Table 1. Bivariate analysis of health anxiety with sociodemographic profile and background characteristics as covariates for 105 parents of children with cancer.

	No. (%)	Mean (SD)	Mean health anxiety score (SD)	<i>p</i> Value ^a
Parent Characteristics				
Age		37.7 (7.8)		0.554
Gender				0.672
Male	23 (21.9)		13.5 (7.4)	
Female	82 (78.1)		13.8 (6.6)	
Marital status				0.111
Married	99 (94.3)		13.4 (6.3)	
Other	6 (5.7)		19.7 (10.5)	
Education level				0.105
Elementary or less	14 (13.3)		18.3 (8.3)	
Intermediate or middle	17 (16.2)		14.2 (8.0)	
High school or technical	37 (35.2)		12.6 (5.3)	
University	37 (35.2)		12.9 (6.2)	
Occupation status				0.810
Employed	36 (34.3)		13.4 (5.9)	
Unemployed	20 (19.0)		12.9 (6.1)	
Housewife	49 (46.7)		14.3 (7.6)	
Perceived inadequate income: "Do you perceive your family income to be sufficient?"				0.005
No	37 (35.2)		17.0 (7.9)	
Somewhat	57 (54.3)		12.1 (5.4)	
Sufficient	11 (10.5)		11.3 (4.6)	
Transport time to hospital		102.2 (70.7)		0.037
Number of children		3.0 (1.4)		0.372
Child characteristics				
Age		8.4 (5.0)		0.406
Gender				0.511
Male	57 (54.3)		14.3 (7.7)	
Female	48 (45.7)		13.0 (5.2)	
Hospital status				0.520
Inpatient	18 (17.1)		14.4 (7.1)	
Outpatient	87 (82.9)		13.6 (6.7)	
Time since initial diagnosis		16.0 (23.3)		0.229
Type of cancer				0.916
Leukemia	63 (60.0)		14.0 (7.1)	
Lymphoma	13 (12.4)		12.6 (5.1)	
CNS tumors	8 (7.6)		14.0 (6.3)	
Other	15 (14.3)		13.0 (6.7)	
Unknown	6 (5.7)		14.8 (7.7)	

^aSpearman's correlation for continuous variables and non-parametric tests for categorical ones.

was conducted to evaluate the associations between covariates and total health anxiety scores. The scores of our main outcome, health anxiety, were initially checked for normality. We found that the distribution was not normal and accordingly used nonparametric tests to calculate *p* values when the predictor was a categorical variable (Mann–Whitney *U* for binary covariates and Kruskal–Wallis one-way ANOVA for categorical covariates with more than two categories). At the bivariate level, we used Spearman's

Table 2. Bivariate analysis for health anxiety with parental stressors as covariates for 105 parents of children with cancer.

	No. (%)	Mean health anxiety score (SD)	p Value ^a
Parental stressors			
Personal illness or illness of family member or close friend			0.069
Did not occur	74 (70.4)	12.7 (6.0)	
Low-moderate impact	5 (4.8)	16.2 (7.9)	
Severe impact	26 (24.8)	16.2 (7.6)	
Death of a family member or close friend			0.663
Did not occur	58 (55.2)	13.3 (5.9)	
Low-moderate impact	21 (20.0)	13.2 (6.9)	
Severe impact	26 (24.8)	15.2 (8.3)	
Financial stressors			0.154
Did not occur	13 (12.5)	12.6 (3.9)	
Low-moderate impact	44 (42.3)	12.2 (5.6)	
Severe impact	47 (45.2)	15.4 (7.8)	
Personal stressors			0.383
Did not occur	31 (29.5)	13.1 (7.2)	
Low-moderate impact	30 (28.6)	13.1 (5.2)	
Severe impact	44 (41.9)	14.6 (7.2)	
Perceived spousal stress: "To what extent do you feel that your spouse is stressed due to your child's illness?"			0.566
Not at all	6 (5.9)	10.5 (3.7)	
To a little extent	12 (22.9)	14.5 (5.8)	
To some extent	23 (22.8)	14.4 (8.0)	
To a great extent	60 (59.4)	13.7 (6.6)	
Perceived coping of spouse: "To what extent do you feel that your spouse is able to cope with your child's illness?"			0.794
Not at all	5 (5.0)	13.6 (6.6)	
To a little extent	8 (8.0)	13.9 (8.0)	
To some extent	44 (44.0)	15.1 (7.6)	
To a great extent	43 (43.0)	12.4 (5.2)	
Perceived stress of child: "To what extent do you feel that your child is stressed due to their illness?"			0.106
Not at all	8 (7.7)	15.4 (10.0)	
To a little extent	12 (11.5)	12.1 (8.0)	
To some extent	46 (44.2)	12.8 (6.0)	
To a great extent	38 (36.5)	15.0 (6.1)	
Perceived coping of child: "To what extent do you feel that your child is able to cope with their illness?"			0.642
Not at all	7 (6.8)	20.2 (11.2)	
To a little extent	11 (10.7)	12.3 (3.8)	
To some extent	41 (39.8)	13.8 (7.1)	
To a great extent	44 (42.7)	13.3 (6.0)	

^aNon-parametric test.

Table 3. Correlation between illness cognition subcategories and the mean health anxiety score at the bivariate level.

	Mean health anxiety score (SD)	Spearman's correlation	<i>p</i> Value
Illness cognition			
Helplessness	15.56 (4.436)	0.343	<0.001
Acceptance	18.93 (4.127)	−0.133	0.176
Perceived benefits	17.20 (5.588)	−0.079	0.440

Correlation to look for associations between continuous variables (including parental age, transport time to hospital, number of children, age of child, time since initial diagnosis, as well as the three illness cognition subcategories: “Helplessness”, “Acceptance”, and “Perceived Benefits”) and health anxiety. A multivariable analysis was then run using multiple linear regression. All covariates that were significantly associated with a *p* value cutoff of 0.2 at the bivariate level were included in this model. Finally, Cronbach’s alpha was calculated to measure and report on the internal consistency of the translated *ICQ-P* and *SHAI* questionnaires.

Results

A total of 140 parents were eligible as per our inclusion and exclusion criteria and were all initially approached. From this sample, 105 parents of children with cancer consented and participated in our survey, giving us a response rate of 75%.

Table 1 outlines the distribution of sociodemographic and background characteristics of the sample of parents. The mean age of a parent was 37.7 years old (SD = 7.8, range 20–55). The majority of the participants were female (78.1%) and married (94.3%), with a mean number of children equal to 3. An equal proportion of parents reported “high school or technical” and “university” (35.2%) as their highest level of education. Almost one fifth of parents reported being unemployed (19%), and 46.7% were homemakers. Only 10.5% of parents perceived their family income to be sufficient. Parents reported extremely varying proximities of their place of residence to the cancer center, with the mean transport time being 102 minutes (SD = 70.7, range 5–360).

The sample of children had a mean age of 8.4 years old (SD = 5.0), 54.3% were male, and 82.9% had outpatient status. The mean time since the initial diagnosis of their child was 16 months (SD = 23.3, range 1–216). Sixty percent of parents reported that their child had leukemia, 12.4% lymphoma, 7.6% CNS tumors, 14.3% a variety of other less common types while 5.7% reported they did not know.

Anxiety scores for parents in this sample ranged from 3 to 39, with a mean score of 13.7 (SD = 6.72). Using a cutoff score of 18 on the *SHAI*,²⁹

Table 4. Multivariable linear regression analysis for health anxiety score.

Covariates ^a	Unstandardized coefficients		Standardized coefficients Beta	95% CI		<i>p</i> Value
	B	Std. error		Lower bound	Upper bound	
Helplessness	0.356	0.152	0.222	0.054	0.657	0.021
Acceptance	-0.434	0.159	-0.242	-0.750	-0.118	0.008
Perceived inadequate income	-2.504	1.224	-0.238	-4.934	-0.072	0.021
Personal illness or illness of family member or close friend	1.950	0.687	0.251	0.586	3.314	0.013

^aMultivariable analysis also adjusts for marital status, education, transport time to hospital, extent of financial stressors and perceived stress of child.

the prevalence of health anxiety in our sample can be estimated as 21%. Of the sociodemographic and background characteristics presented in Table 1, perceived inadequate income ($p = 0.005$) and transport time to hospital ($p = 0.037$) were significantly associated with parental health anxiety scores at the bivariate level. Table 2 outlines the self-reported impact of potential parental stressors that might relate to anxiety and stress.

Table 3 represents the bivariate analysis between the different categories of the independent variable and the total health anxiety score using Spearman's Correlation. "Helplessness" was the only illness cognition factor that was significantly associated with health anxiety at the bivariate level ($p < 0.001$).

Variables that had a significant p -value to the 0.2 level in bivariate analysis were included in the multivariable analysis (Table 4). The two categories of illness cognition that remained significant predictors of health anxiety were "Helplessness" ($B = 0.222$, 95% CI 0.054–0.657, $p = 0.021$), and "Acceptance" ($B = -0.242$, 95% CI -0.750 to -0.118 , $p = 0.008$). The negative B value indicates an inverse correlation: higher scores of acceptance were associated with lower scores of health anxiety. Other statistically significant covariates in the regression model included: perceived inadequate income ($B = -0.212$, 95% CI -4.934 to -0.072 , $p = 0.021$) and personal illness or illness of a family member/close friend ($B = 0.251$, 95% CI 0.586 to 3.314, $p = 0.013$).

The internal consistencies for Arabic translations of the validated English questionnaires were calculated and are represented in Table 5. The *ICQ-P* subcategories of "Helplessness", "Acceptance" and "Perceived Benefits" had Cronbach's alpha values of 0.688, 0.737, and 0.533, respectively. The *SHAI* had a Cronbach's alpha of 0.773.

Discussion

This study is the first to measure and correlate the two variables of illness cognition and health anxiety in the selected population. The estimated prevalence for health anxiety among parents of children with cancer is

21%, a significant but expected burden. Previous studies on parents of children with cancer in Lebanon have reported similarly high levels of other measures of psychological distress as well as significant benzodiazepine abuse.^{16,18} These results thus add another dimension to the growing literature highlighting parents of children with cancer as a vulnerable population that is essential to address.

Our multivariable model depicts results similar to Nicolaas et al.'s (2016) original study that adapted the *ICQ* for parents. Feelings of powerlessness and lack of agency were associated with the presence of pathological, health-related anxieties. Furthermore, difficulty accepting the diagnosis and implications of a child's disease was also associated with disease-related anxieties in parents that also manifested in relation to their own health. Nicolaas et al. (2016) found that these two measures of illness cognition were significantly associated with multiple other categories of psychological distress, including HADS Depression, HADS Anxiety, POMS Tension, POMS Irritation, and POMS Fatigue scales.¹⁰ In both studies, "Perceived Benefits" was not significantly associated with any outcome. Nicolaas et al. (2016) also found that only the "Helplessness" and "Acceptance" sub-scores had sufficient Cronbach's alpha scores of larger than 0.6.¹⁰

In considering how certain illness cognitions might affect the way one copes with disease, it is important to consider the impact of culture. One review by Daher (2012) outlined the many myths and stigmas attached to a cancer diagnosis in Lebanon, such as the notion that cancer is a contagious disease or that it is punishment from God.³⁰ Another Lebanese publication found that cancer is often not referred to directly by name but instead by many euphemisms, and that patients often refrain from sharing their cancer diagnosis with their communities.³¹ Furthermore, some families choose to withhold the diagnosis from patients themselves, and Lebanese legislation even permits physicians to withhold the diagnosis from a patient.³² Thus, available evidence in the literature already shows that Arab cultural characteristics may influence illness cognition, and this warrants further consideration. This was outside the scope of our investigation; however, our recommendation for subsequent studies is to qualitatively delve into the origins and implications of this hypothesis.

One possible explanation for the relationship between illness cognition and mental wellbeing is the Cognitive Behavioral (CB) model, which suggests that interpersonal factors can contribute to the development of anxiety disorders.³³ The model advocates that the pathological behavior of misinterpreting benign symptoms as physical illness stems from specific health beliefs, or cognitions. The literature proposes three mechanisms for how these negative health beliefs are acquired, including "experiencing disturbing or traumatic events, absorbing threatening information, and

acquisition by vicarious learning”.^{34,35} The connection between illness cognition and anxiety is supported by literature in various populations.^{35,36} Furthermore, this hypothesis is corroborated by our study which showed that parents who experienced a significant illness themselves in the past year, or knew another family member or close friend diagnosed with a significant illness, suffered from significantly higher health anxiety with regards to their own health (Table 4).

Previous studies have found that significant predictors of psychological distress in similar populations include parental gender, parental age, time since diagnosis, number of children, inpatient status of the child, distance to hospital, low income, job status, paying for treatment, and high perceived stress in the spouse.^{17,37} On the other hand, our model showed that the only significant predictors of health anxiety at the multivariable level in this population were specific illness cognitions, personal illness or illness of family member/close friend and perceived income adequacy. Although costs of their child’s cancer treatment are fully covered by the CCI, parents who reported their incomes as less sufficient experienced higher levels of health anxiety about their own health. This could possibly be due to the adjunctive costs associated with the burden of disease on family members, such as the cost of travel and transportation, having to pay for accommodation to remain in proximity to the hospital, and the disruption of the parent’s work.¹⁹

Study limitations

The cross-sectional nature of this study supports correlational relationships only. Although this study recruited a sufficient sample size based on power analysis, we found that the participant pool was slightly skewed to include parents of children with leukemia as opposed to other types of cancer. This is possibly due to our focus on the outpatient setting where these patients visit more frequently. However, neither type of cancer nor hospital status was significantly associated with health anxiety upon statistical analysis. Moreover, out of the 140 parents approached, 35 eligible participants chose not to participate in the study. As their characteristics were not measured, this creates the possibility of a self-selection bias in which these parents who did not participate could have had higher levels of health anxiety or maladaptive illness cognitions.

Additionally, despite the rigorous translation and the adequate internal consistency of *ICQ-P* and *SHAI* questionnaires, these tools were not validated in Arabic and this requires a follow-up study. It is also difficult to determine whether or not the questionnaire items retain cultural validity in the religious and sociodemographic context of Lebanon, and how this

population approaches the concepts of health anxiety and illness cognition, without a separate validation study. The continuous nature of these scales, however, affords us comfort despite these weaknesses. Parents are evaluated according to the *extent* to which they experience these varying psychological variables and are not categorized into distinct classes or groups based on the scoring systems of these questionnaires. In addition, each measure was carefully explained by the interviewer to ensure the participant understood the concept. It is thus less likely that the effects of translation would affect the directionality or the significance of our results.

For that same reason, we must emphasize that our estimated prevalence rate is a cautious one, being based off the cutoff score proposed for the English version of the *SHAI* by Rode et al. (2006) who found this to be the optimal score that identified individuals who meet the DSM-4 criteria for hypochondriasis. Moreover, while we have shown that many parents do experience varying levels of these maladaptive thoughts, the *SHAI* cannot replace the diagnosis of a trained psychiatrist in diagnosing clinical health anxiety. Finally, although the interviewers were trained and the techniques were standardized, there is always room for human error and bias.

Conclusion

Addressing psychological distress in cancer patients and their families is imperative. One possible way to do this might be through targeting illness cognition. The *ICQ-P* outlines two illness cognitions that have been correlated with multiple measures of psychological distress. Further study might involve investigation of the effect of other illness cognitions in this population, such as illness investment or fear of recurrence during remission. If this association can be corroborated by other projects with study designs that support causal relationships, knowledge of illness cognitions can be applied in many different ways. One example is to develop culturally-specific screening tools that target individuals who have negative perceptions of disease and who might be at a higher risk of developing health anxiety. These can be applied in the form of questionnaires for both clinical and community settings. In those who have been diagnosed with clinical health anxiety by a trained professional, catering therapies to address these relevant cognitions could also improve outcomes. Cognitive Behavioral Therapy (CBT) is one mode of therapy available for patients with health anxiety. Specialists offering this CBT can use this information to foster relevant, significant positive illness cognitions and minimize negative ones. Institutional changes and public health awareness campaigns can also be adapted using the data from this study. “Helplessness”, for example, can be addressed at medical centers through educational programs, activities or

events that empower parents in their caregiving. If parents are armed with knowledge and practical know-how in caregiving techniques, perhaps their helplessness might be replaced by positive cognitions, such as hopefulness and achievement.

In further investigation of this topic, we first recommend validating the Arabic versions of the *ICQ-P* and *SHAI*. We also recommend replicating the study using a prospective study design, which would more strongly support causal relationships. The study can even be extended to include other populations, such as parents of children with other diseases, to see if the same conclusions hold true.

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The American University of Beirut Institutional Review Board granted approval for the conduction of this study on January 23, 2017. The protocol ID: is FHS.MC.37

For participants of our study, we were concerned with protecting their privacy and minimizing any inconvenience the interview process might cause. Parents were approached with a pre-approved script to gain consent in a non-coercive manner. They were interviewed in a private conference room and all parents were given a referral pamphlet to psychological services available to them at the CCI should they find themselves distressed.

The American University of Beirut and its Institutional Review Board, under the Institution's Federal Wide Assurance with OHRP, comply with the Department of Health and Human Services (DHHS) Code of Federal Regulations for the Protection of Human Subjects ("The Common Rule") 45CFR46, subparts A, B, C, and D, with 21CFR56; and operate in a manner consistent with the Belmont report, FDA guidance, Good Clinical Practices under the ICH guidelines, and applicable national/local regulations.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Sarah Jamali  <http://orcid.org/0000-0001-7618-1520>

Raya Saab  <http://orcid.org/0000-0001-5776-2303>

Monique Chaaya  <https://orcid.org/0000-0002-2695-8079>

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