

PSYCHOLOGICAL DISTRESS IN MOTHERS AND FATHERS OF CHILDREN  
WITH CANCER: POSTTRAUMATIC STRESS, DEPRESSION, AND ANXIETY  
SYMPTOMS

By

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## CHAPTER I

### BACKGROUND

Each year approximately 13,000 children under the age of 20 are diagnosed with cancer (United States Cancer Statistics, 2005). Although survival rates for childhood cancer have increased substantially since the 1970s, about 2,200 children die from cancer each year, making the threat of death very real for children and their families (USCS, 2005). Not only are these families faced with the fear and stress of a life-threatening illness, but the treatment itself can be extremely stressful. Treatment of childhood cancer involves painful medical procedures, unpredictable hospital stays, frequent medical visits, difficult side effects of medication, financial burden, and significant changes to daily living.

#### *Post-Traumatic Stress Symptoms and Disorder in Parents of Children with Cancer*

The experience of having a child diagnosed with and treated for cancer can be extremely fear-inducing and traumatic for parents. The circumstances around the diagnosis and treatment of a child with cancer present parents with significant environmental, emotional, and psychological stress. Reactions to these stressors can include worry, anxiety, sadness, and physiological tension and arousal. Specifically, parents of children with cancer face an increased risk for clinically elevated levels of posttraumatic stress symptoms (PTSS) and posttraumatic stress disorder (PTSD) related to their child's diagnosis and treatment (Bruce, 2006). These symptoms include intrusive thoughts and worries about their child and his or her health, physiological hyperarousal,

and avoidance of conversations and stimuli that remind them of their child's life-threatening condition (Bruce, 2006; Kazak et al., 2004).

Parents appear to be at higher risk for PTSS than their children (Brown, Madan-Swain, & Lambert, 2003; Landolt, Margarete, Karin, Gnehm, & Sennhauser, 2003). In a review of 16 studies that assessed cancer-related PTSD and PTSS in parents of children with cancer, 12 studies reported specifically on the prevalence of PTSD using clinical diagnostic interviews. These studies reported diagnostic rates ranging from 6 to 25% for current cancer-related PTSD, 27% to 54% for lifetime prevalence of cancer-related PTSD, and 25 to 44% of current sub-threshold but moderate symptoms of PTSD (Bruce, 2006). Kazak et al. (2004) reported data for symptoms of PTSD and found that 97% of a sample of mothers of childhood cancer survivors currently met DSM-IV criteria for the re-experiencing symptoms of PTSD in reference to their child's cancer (87% of fathers), 34% for avoidance (16% of fathers), and 64% for arousal (44% of fathers) since the time of their child's diagnosis based on results from the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 2001).

By comparison, the National Comorbidity Survey Replication (NCS-R) found that the lifetime prevalence of PTSD in the U.S. is 6.8% (Kessler et al., 2005). For the subset of the population that has experienced at least one traumatic event, the original National Comorbidity Survey (NCS) reported 20.4% of women and 8.1% of men met diagnostic criteria for lifetime prevalence of PTSD (Kessler, 1995). Rates of PTSD in parents of children with cancer are clearly elevated above national norms based on the NCS and NCS-R and, in some studies even elevated above the rates expected for those who have experienced a traumatic event. National norms based on the NCS-R broken down by age

also show that the prevalence of PTSD is highest in adults ages 30-44 (8.2%) and 45-59 (9.2%), the two age groups most likely to encompass parents of children with cancer (Kessler et al., 2005).

In addition to research establishing the diagnostic rates of PTSD among parents of children with cancer, research using measures that produce scores on a continuum, including the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997), has shown that these parents display clinically significant levels of PTSS regardless of whether they meet diagnostic criteria for PTSD (Bruce, 2006; Dolgin et al., 2007; Jurbergs, Long, Ticonia, & Phipps, 2009; Kazak, Boeving, Alderfer, Hwang, & Reilly, 2005).

Psychometric studies of the IES-R have been done in a variety of populations. One study included a large sample of Vietnam War veterans and found that these veterans reported a mean total IES-R score of 47.4 (SD = 22; Creamer, Bell, & Failla, 2003). In a clinical sample of 84 adults seeking mental health treatment roughly 6 months after either direct or indirect exposure to the Oklahoma City Bombing, adults' scores on the IES-R had a mean of 50.3 (SD = 17.5; Pfefferbaum et al, 2002).

Rash, Coffey, Baschnagel, Drobos, and Saladin (2008) used the IES-R in a study of 124 individuals who had been the victim of a physical or sexual assault and were seeking treatment for substance abuse. All 124 of these adults met Criterion A of the DSM-IV diagnostic criteria for PTSD (APA, 2000) for experiencing a traumatic event because they had been exposed to physical or sexual assault. In this sample, those with a diagnosis of PTSD had a mean total IES-R score of 45.4 (SD = 17.8), while those who did not meet for PTSD but had been exposed to a traumatic event had a mean score of 21.5 (SD = 19.2). This study also administered the PTSD module of the Structured



Clinical Interview for DSM-IV (SCID; First et al., 2007), and thereby examined the predictive validity of the IES-R in deriving PTSD diagnoses. Rash et al. found that using a total cutoff score of 22 on the IES-R correctly classified 77% of the sample for the presence or absence of a diagnosis of PTSD and yielded the best balance of sensitivity (.92), specificity (.57), positive predictive value (.74), and negative predictive value (.83). Using the results of this study, one could also choose a higher IES-R total cutoff score to increase the positive predictive value, if one was willing to forfeit negative predictive value. For example, applying a cutoff score of 34 on the IES-R yielded a positive predictive accuracy of .81, and therefore fewer false positives, but lowered the negative predictive value to .66, indicating that some individuals with IES-R scores below 34 also met diagnostic criteria for PTSD (Rash et al., 2008). These studies provide important points of comparison for studies of parents of children with cancer.

Studies that have used the IES-R in parents of children with cancer have found mean total scores ranging from 27.9 (SD = 18.2) to 43.6 for mothers and fathers of children on treatment (Dolgin et al., 2007; Jurbergs et al., 2009; Kazak et al., 2005). It is noteworthy that these means fall above the cutoff of 22 recommended by Rash et al. (2008) to yield the highest overall predictive accuracy in determining PTSD diagnoses. These scores indicate that in each of these studies, a substantial proportion (over 50%) of the parents were above the recommended diagnostic cutoff on the IES-R. Research with parents of children with cancer who have completed treatment has found total scores on the IES-R comparable to parents of children on treatment (mean 28.2 for mothers, SD = 24.5; mean 24.2 for fathers, SD = 19.96; Kazak et al., 2004), but a recent study found that IES-R scores were lower (mean = 18.3, SD = 16.6; Jurbergs et al., 2009) for parents of

children off treatment than they were for parents of children on treatment.

The nature of PTSS in this population will continue to be clarified further as more data accumulates on factors that are associated with increased symptoms. To date, findings have tended to be mixed with regard to certain demographic variables, such as parents' socioeconomic status (SES). Some studies, for example, have found that SES is unrelated to parents' PTSD symptoms (Dolgin et al., 2007; Phipps, Long, Hudson, & Rai, 2005), whereas a recent study found that higher SES was associated with lower posttraumatic stress symptoms (Jurbergs et al., 2009).

The amount of time since the child's diagnosis of cancer at the time of assessment of parents' PTSS has generated slightly more consistent results in the literature than findings on SES, but there remains sufficient variability in the treatment of "time since diagnosis" as a variable. For example, several studies have found lower levels of PTSS in parents whose children are further out in time from diagnosis (Dolgin et al., 2007; Kazak et al., 2005; Jurbergs et al., 2009; Phipps et al., 2005), but these findings generally show that parents continue to have elevated PTSS even years after diagnosis. Inconsistencies within studies have also clouded findings, such as the study by Kazak et al. that found PTSD symptoms decreased as time since diagnosis increased on one self-report measure, the PTSD Checklist-Civilian Version, but not on another, the IES-R. On the other hand, one study (Kazak, 1998) found that the number of months the child had been off treatment was not associated with parents' PTSD symptoms. Studies have also differed in their treatment of "time since diagnosis" as a variable. For example, one study split their sample dichotomously according to years since diagnosis (Phipps et al., 2005), and another classified children as on-treatment vs. off-treatment, which was not used as a

strict measurement of time but rather as a clinically-relevant variable related to time since diagnosis (Kazak et al., 2005). Finally, other studies have used a multi-assessment, longitudinal design (Dolgin et al., 2007) or have formed multiple groups of patients into “time since diagnosis” categories in order to analyze the time course of symptoms cross-sectionally (Jurbergs et al., 2009).

Several factors have contributed to the inconsistency of the findings regarding parents’ PTSD and PTSS, including sample size and statistical power. More recent studies have included samples of over 100 mothers and/or fathers, but some older studies have included less than 70 parents (Kazak et al., 2001; Manne, Du Hamel, Gallelli, Sorgen, & Redd, 1998; Pelcovitz et al., 1996), which limits the ability to detect reliable findings. More important than variations in sample size, however, is the wide variation in research designs with this population. Studies range widely from limiting their sample based on specific criteria (Peltovitz et al., 1996) to including a large group of patients based only on the fact that the child had cancer at some point in their lifetime (Kazak et al., 2005; Manne et al., 2002). For example, Pelcovitz et al. specified for their study of parents that child patients were diagnosed before they were 18-years-old, were either off treatment or entering maintenance therapy, and were at least 13-years-old at the time of the study. On the other hand, Manne et al. (2002) used a sample of mothers whose children ranged in age from 9 months to 20 years who had been diagnosed with cancer between 1.5 months and 10 years earlier. Most of these differences in research designs and sampling are due to the fact that childhood cancer is a relatively rare phenomenon and certain concessions about research design had to be made in order to accrue acceptable sample sizes.

Now that substantial work has established this area of research and the phenomenon of PTSS in parents of children with cancer, efforts should be made to recruit patients according to more systematic criterion, or to recruit sample sizes large enough to compare groups on important variables. For example, being a parent of an infant with cancer is a very different experience than being a parent of a young but verbal child with cancer. One of the most stressful aspects of having a child with cancer is trying to communicate about the illness to the child while simultaneously offering emotional support. The current study includes parents of children ages 5 to 18-years-old in order to capture a sample of parents who face the challenge, among many others, of talking to their child about the experience.

A child's history of relapse is a third area where further research will help clarify findings. To date, only a very recent study of PTSS in parents of children with cancer has separately analyzed children's relapse history as a predictor of parents' symptoms (Jurbergs et al., 2009). This study found that parents of children with a relapse history had increased PTSS over parents of children with their first diagnosis who were on treatment (Cohen's  $d$ 's between these two groups of parents ranged from .33 to .44 for subscale and total PTSS). The sample was underpowered to detect some of these differences as significant, but the effect sizes are small to medium in magnitude (Jurbergs et al., 2009). The study by Jurbergs et al. is noteworthy because the on-treatment sample included children from 1 month to 5 years post-diagnosis, as long as they were receiving treatment. Most previous studies either purposely excluded relapses because they suspected that they would constitute a different posttraumatic stress profile (Kazak et al., 2004; Kazak et al., 2005), or assessed only parents of childhood cancer survivors, a

sample-selection process which would have excluded many parents of relapse patients who have worse prognoses and are less likely to survive to five or more years off treatment (Kazak, 1998; Kazak et al., 2001).

### *Symptoms of Depression and Anxiety in Parents of Children with Cancer*

Studies have established that parents of children with cancer are at risk for elevated PTSS (Bruce, 2006) at varying points in time from close to their child's diagnosis to many years later (Kazak et al., 2004). Fewer studies have examined symptoms of depression and generalized anxiety in parents of children with cancer, but those that have assessed these symptoms have consistently found that parents report mild-to-moderate depressive symptoms close to the time of their child's diagnosis (Dolgin et al., 2007), after their children were off treatment (Greening & Stoppelbein, 2007), and in a sample assessed at widely varying time points since their child's diagnosis (Roddenberry & Renk, 2008). Studies measuring more general or state anxiety, as opposed to or in addition to PTSS, found that parents reported state and trait anxiety in the non-clinical range when assessed after their child had completed treatment (Barakat et al., 1997; Greening & Stoppelbein, 2007; Kazak et al., 1997). One study assessed parents' symptoms of anxiety in a sample that varied widely from 2-months to 112-months after their child's diagnosis, and found that mothers and fathers reported minimal to mild symptoms of generalized anxiety, although the distribution of symptoms appeared highly positively skewed (Roddenberry & Renk, 2008).

In addition to the development of PTSD after a traumatic event, research has shown that generalized anxiety disorder (GAD; Green, Lindy, Grace, & Gleser, 1989;

Kessler, 1995) and major depressive disorder (MDD; Franklin & Zimmerman, 2001) may occur. Further, research investigating the underlying latent structure of PTSD, GAD, and MDD has shown that the three disorders should be considered distinct, but highly correlated, disorders (Grant, Beck, Marques, Palyo, & Clapp, 2008). For example, in parents of children with epilepsy, another pediatric condition where the diagnostic news has been characterized as a traumatic event, rates of PTSD and MDD were elevated in the sample (31.5% of sample met for PTSD, 35.1% for MDD), and 56% of parents who met criteria for PTSD also met criteria for MDD (Iseri, Ozten, & Aker, 2006), indicating that the comorbidity of PTSD and MDD in parents of pediatric patients should be paid special attention.

### *Current Study*

Of particular interest to the current study is to examine symptoms of post-traumatic stress, depression and generalized anxiety in mothers and fathers of children with cancer close to the time of their child's diagnosis. One question the current study aims to address is whether mothers and fathers close in time to their child's diagnosis experience a general distress reaction characterized by acute posttraumatic, depressive, and generalized anxiety symptoms or whether parents will have already begun to show specificity for increased PTSS over other symptoms of psychological distress less than 4 months after their child's diagnosis.

The current study aimed to examine acute posttraumatic, depressive, and generalized anxiety symptoms in parents of children with cancer by recruiting a large sample of parents of children currently receiving treatment for cancer from two medical

centers. Because there have been substantially more studies that have examined PTSS in these parents and fewer that have examined depression and anxiety symptoms, specific hypotheses were made regarding PTSS, whereas the current study's examination of depression and anxiety symptoms was regarded as more exploratory. The current study included mothers and fathers of relapsed patients and first-time diagnoses, and offers an opportunity to replicate the findings of Jurbergs et al. (2009) with respect to the parents of on-treatment children reporting similar levels of PTSS, regardless of relapse status. The current study addresses recent findings that the inclusion of fathers and the separate analysis of mothers and fathers has been relatively lacking in pediatric research compared to non-health child clinical research (Phares, Lopez, Fields, Kamboukos, & Duhig, 2005) by assessing psychological symptoms in both mothers and fathers, when possible, rather than only one parent per child.

Although the current study cannot offer information on PTSS, depressive, and anxiety symptoms for parents far-removed from diagnosis, it does offer a substantially larger sample size of parents within approximately 100 days of their child's diagnosis than many of the other studies that include large sample sizes of parents, but whose time of assessment is distributed over a wide range of years since diagnosis. The current study was thus designed to thoroughly examine the nature of posttraumatic stress symptoms in a group of parents fairly homogeneous for time since diagnosis, and to examine factors that may be associated with PTSS and other symptoms of psychological distress in parents of children with cancer close to diagnosis. It is important to note in that in the current study specific efforts were made to recruit parents close to the time of their child's diagnosis, and symptoms of posttraumatic stress reported by these parents may be

more accurately labeled symptoms of acute stress, especially for those parents assessed less than 1-month post-diagnosis (APA, 2000). However, for ease of understanding and comparison to existing research, these symptoms will continued to be labeled PTSS throughout the paper.

Distributions of scores on measures of PTSS were examined for mothers and fathers according to total self-reported symptoms and subscale symptoms on intrusive thoughts, avoidance, and hyperarousal, as well as for total depressive and anxiety symptoms. Based on several studies that have found means and standard deviations of posttraumatic stress symptoms suggestive of distributions skewed toward zero in this population, (Jurbergs et al., 2009; Kazak, 1998; Kazak et al., 2004; Phipps et al., 2005), the current study anticipated that the distributions of parents' total and subscale PTSS would be non-normal.

Specifically, the current study expected a positive skewness to indicate that scores tended to be closer to zero with smaller groups of parents showing elevated symptoms, and that the distribution would be leptokurtic ("too tall") with a high cluster of symptoms below the mean. No hypotheses were made concerning the distribution of depressive and anxiety symptoms. In general, the current study expected PTSS, symptoms of depression, and symptoms of anxiety to be related to one another. Because the study was designed to examine a large group of parents relatively close to the time of their child's diagnosis, we did not expect time since child's diagnosis to be related to parents' psychological distress.

In addition, the current study examined variables related to (1) parent and family demographic characteristics and (2) aspects of the child's disease and treatment in order to identify possible moderators of elevated PTSS that would lead to subgroups of parents



with elevated symptoms, as well as variables related to more psychological distress in general as evidenced by elevated depressive, anxious, and posttraumatic stress symptoms. Related to the parents' demographics, we expected mothers' and fathers' education to be inversely related to PTSS because parents with less education would likely find the cancer and treatment experience more frightening and uncontrollable, and family's income to be inversely related to PTSS because families with low income likely experience more concurrent environmental stressors that are risk factors for developing psychological symptoms. A recent review of the literature concerning parents of children with chronic illness has revealed that there is a significant lack of studies addressing the phenomenon of being a single parent of an ill child (Brown et al., 2008). The current study conducted exploratory analyses comparing single or divorced mothers and fathers with those who were married or living with someone in order to begin to address this important psychosocial variable as a possible risk factor for elevated psychological distress.

Related to the child's medical condition and treatment, we expected child diagnosis type to be unrelated to PTSS since all types of cancer diagnoses undergo painful medical procedures and entail uncertainty that increase risk for PTSS, child age to be inversely related to parents' PTSS because younger children are expected to suffer more during painful medical procedures that are often traumatic events for parents, and child relapse history to be unrelated to PTSS because the experience of being on-treatment appears to act as an equalizer of PTSS based on Jurbergs and colleagues' finding (2009). The same analyses concerning demographic and medical variables were conducted with parents' depression and anxiety symptoms, but in an exploratory fashion

based on the relative lack of research concerning these psychological symptoms in parents of children with cancer compared to PTSS.

## CHAPTER II

### METHODS

#### *Participants*

Parents were recruited from outpatient clinics at two major pediatric oncology centers as part of a larger study in which their children also served as participants. Eligible parents had children ages 5 to 17-years-old who received a primary cancer diagnosis and had no known developmental or cognitive disabilities. Parents of patients who were at least 1 week post-diagnosis were eligible for recruitment, and efforts were made to recruit parents very close to the time of their child's diagnosis, which included patients at the time of a diagnosis of a cancer relapse. That is, parents of patients who had relapsed were recruited at least 1 week from the date of the relapse.

Ninety-three percent of families who were approached about the study had at least one parent give consent to participate and 93% of families who consented to the study completed the questionnaires. The reasons given by parents who declined participation in the study included not having time to complete the measures, being overwhelmed by the cancer experience, and not wanting to participate in psychological research. This resulted in a sample of 173 parents of children with cancer (172 mothers and 81 fathers) who agreed to participate and returned the measures. Two rounds of exclusions were performed with this sample to identify a sample that was reasonably homogeneous for the length of time between child's diagnosis and parents' completion of the measures. First, the distribution of the number of days between child's diagnosis and parent's completion

of the measures was examined. The range of time of completion for the complete sample was 12 days to 699 days (23 months) post-diagnosis ( $M = 71.6$ ,  $SD = 108.2$ ). All but 10 of the 173 patients had parents who completed the measures within 200 days of their child's diagnosis, so parents of these 10 patients were excluded as outliers. Next, parents of 9 of the remaining 163 patients who completed the measures more than two standard deviations out from the mean (47.7 days,  $SD = 30.6$ ) were excluded.

The final sample included 153 mothers and 76 fathers of 154 children with cancer (children ages 5 to 18 years, mean age 10.5,  $SD = 3.9$ ) who enrolled in the study between 7 days and 90 days after their child's diagnosis ( $M = 33.6$ ,  $SD = 16.85$ ). These parents completed the questionnaires between 12 and 108 days after their child's diagnosis (mean 42.9 days,  $SD = 23.6$ ). The diagnoses of the children were generally representative of the population served by the two institutions, with 36% of the sample diagnosed with leukemia, 28% lymphoma, 10% brain tumor, and 27% another solid tumor (e.g. osteosarcoma, neuroblastoma, Wilm's tumor; see Table 1). A total of 25 patients (16%) were recruited into the study as relapsed patients. There were no differences in parent age, race, marital status, education, family income, child's diagnostic group, or child's relapse status between the 19 patients excluded from the current study and the 154 included here. Table 1 displays demographic and medical characteristics of the sample.

### *Measures*

*Post-traumatic stress symptoms.* The Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) was used as an index of mothers' and fathers' intrusive thoughts, avoidance, and physiological hyperarousal related to their child's cancer. The IES-R was

developed to closely parallel DSM-IV criteria for PTSD. The 22-items are rated for the distress caused by a given symptom experienced over the past seven days from 0 (not at all) to 4 (extremely). Parents were asked to respond to the measure specifically in reference to their child's cancer diagnosis and treatment. Three scales (avoidance, intrusion, hyperarousal) and a total summary score were derived. The IES-R has been used frequently with parents of children with cancer, as well as other diverse samples, and demonstrates good reliability and validity (Weiss & Marmar, 1997). Internal consistency reliability for the total IES-R score was  $\alpha = .92$  for mothers and  $\alpha = .95$  for fathers, and subscale  $\alpha$ 's ranged from .79 to .89 for the current sample.

*Depression and anxiety symptoms.* Mothers and fathers completed the Beck Depression Inventory-II as a measure of current depressive symptoms (BDI-II; Beck, Steer, & Brown, 1996) and the Beck Anxiety Inventory as a measure of current generalized anxiety symptoms (BAI; Beck & Steer, 1990). Both are well standardized measures of symptoms of depression and anxiety in non-psychiatric samples and demonstrate good psychometric properties, including the best discriminant validity for the self-report assessment of anxiety and depression symptoms in adults (Steer, Ranieri, Beck, & Clark, 1993). Both measures have 21-items on which participants rate the symptoms on a 4-point scale from 0 (no change/not at all) to 3 (substantial change/severely). Internal consistency reliability for the BDI-II in the current sample was  $\alpha = .94$  for mothers and  $\alpha = .93$  for fathers; for the BAI,  $\alpha = .91$  for mothers and  $\alpha = .91$  for fathers.

Parents also completed a demographic information form to assess the number of years of education completed, annual family income, and marital status.

### *Procedure*

The Institutional Review Boards at the two respective sites approved the study protocol. Parents were approached by a member of the research team to introduce the study and determine parents' and children's interest in participating. If they expressed interest, parents completed an informed consent form and children completed an assent form. Questionnaire packets were given to parents during a visit to the hospital after informed consent was obtained. In the case that only one parent was present, consent forms and questionnaires were sent home for the other parent to consider, when applicable. Parents completed the measures in the hospital or outpatient clinic, or took them home to complete them.

### *Data Analyses*

All data pertaining to mothers and fathers was analyzed separately. First, means and standard deviations for mothers' and fathers' PTSS, subscale PTSS, depressive symptoms, and anxiety symptoms were calculated. Because the findings of previous research suggested that the distributions of mothers' and fathers' PTSS would be non-normal, special attention was paid to the examination of the distributions of mothers' and fathers' PTSS by creating histograms and scatterplot graphs of the distributions of PTSS, depressive, and anxiety symptoms in the current sample. Pearson correlations were calculated to examine the relation among mothers' and fathers' symptoms, demographic variables, and medical variables.

Table 1. Demographic and Medical Variables

	Mothers (n = 153)	Fathers (n = 76)
Age [mean (SD)]	37.6 (8.8)	38.9 (7.4)
Race [n (%)]		
White	133 (86.9)	71 (93.4)
African-American	15 (9.8)	3 (3.9)
Asian-American	1 (.7)	1 (1.3)
American-Indian/Native Alaskan	2 (1.3)	---
Other	2 (1.3)	1 (1.3)
Annual Family Income [n (%)]		
≤ \$25,000	36 (23.8)	13 (17.1)
\$25,001 – \$50,000	51 (33.8)	21 (27.6)
\$50,001 – \$75,000	21 (13.9)	15 (19.7)
\$75,001 – \$100,000	21 (13.9)	14 (18.4)
≥ \$100,000	22 (14.6)	13 (17.1)
Education [n (%)]		
Some high school	12 (7.9)	5 (6.5)
Graduated high school	40 (26.1)	27 (35.5)
Some technical school	26 (17.0)	12 (15.7)
Some college	44 (28.8)	9 (11.8)
Graduated college	23 (15.0)	14 (18.4)
One or more years graduate school	8 (4.7)	9 (11.8)
Marital Status [n (%)]		
Married/Living with Someone	114 (75.0)	69 (92.0)
Single, Divorced, Separated, Or Widowed	38 (25.0)	6 (8.0)
Diagnostic Category [n (%)]	Children	
Leukemia	55 (35.7)	
Lymphoma	43 (27.9)	
Brain tumor	15 (9.7)	
Other solid tumor	41 (26.6)	
Relapse History [n (%)]		
No relapse	129 (83.8)	
One or more relapses	25 (16.2)	

Paired sample *t*-tests were calculated to compare mothers and fathers of the same patient on psychological symptoms. Independent sample *t*-tests were calculated to compare psychological symptoms between mothers and fathers of children who had

relapsed versus those with their first diagnosis, and to compare mothers who were married versus those who were single or divorced on psychological symptoms. One-way ANOVAs were calculated to compare mothers' and fathers' psychological symptoms among categories of the child's cancer diagnosis. Finally, independent sample *t*-tests were calculated to compare mothers' with PTSS in the top and bottom 33% of the sample on key psychological, demographic, and medical variables in order to examine the characteristics of groups on extreme ends of the distribution of PTSS.

Power analyses using R2 (Steiger & Fouladi, 1992) indicated that the current sample of 154 mothers produced 99% power to detect small correlations ( $r = .2$ ), and greater than 99.99% power to detect medium and larger correlations ( $r \geq .5$ ). The current sample of 76 fathers produced 84% power to detect small correlation coefficients ( $r = .2$ ), and 99.99% power to detect medium and larger correlations ( $r \geq .5$ ). Power calculations using SAS GLMPOWER program indicated that for paired *t*-tests between mothers and fathers there was 56% power to detect a medium effect size ( $d = .5$ ) and 92% power to detect a large effect size ( $d = .8$ ). For *t*-tests between mothers of relapse and first diagnosis patients, there was 70% power to detect a medium effect size ( $d = .5$ ) and 93% power to detect a large effect size ( $d = .8$ ). For *t*-tests between fathers of relapse and first diagnosis patients, there was 30% power to detect a medium effect size ( $d = .5$ ) and 64% power to detect a large effect size ( $d = .8$ ). For *t*-tests between mother in the top and bottom third of the sample on PTSS, there was 70% power to detect a medium effect size ( $d = .5$ ) and 98% power to detect a large effect size ( $d = .8$ ).



## CHAPTER III

### RESULTS

#### *Descriptive Statistics: Mothers' and Fathers' Psychological Symptoms*

Means, standard deviations and minimum and maximum scores for mothers' and fathers' total and subscale PTSS, as well as depressive and generalized anxiety symptoms, are presented in Table 2. Previous studies of the diagnostic predictive power of the IES-R have shown that total PTSS scores greater than or equal to 22 predict diagnoses of PTSD with an optimized balance between the positive predictive value of .74 and the negative predictive value of .83 (Rash et al., 2008). The mean total score on the IES-R for mothers ( $M = 30.23$ ) and fathers ( $M = 26.69$ ), representing severity of total reported PTSS is above this cutoff value. Specifically, 64.5% of mothers (98 of 152) and 57% of fathers (43 of 76) had total PTSS scores greater than or equal to 22. Rash et al. also noted that increasing the cutoff score to 34 increased the positive predictive value to .81 but lowered the negative predictive value to .66, thereby reducing the number of false positives but increasing the number of false negatives. In the current sample, 43% of mothers (66 of 152) and 32% of fathers (24 of 76) had IES-R scores of 34 or greater.

For patients whose mother and father participated in the study ( $n = 75$  patients), paired  $t$ -tests were calculated to compare mothers' and fathers' total PTSS. For this subgroup, mothers and fathers of the same patient did not differ significantly on PTSS (mothers,  $M = 29.39$ ,  $SD = 16.23$ ; fathers,  $M = 26.18$ ,  $SD = 16.60$ ;  $t = 1.37$ ,  $p = .18$ ), but

the sample was underpowered to detect the small effect size between mothers' and fathers' symptoms ( $d = .20$ ).

The mean score for mothers' depressive symptoms ( $M = 14.69$ ) was in the "mildly depressed" category, whereas the mean for fathers' depressive symptoms ( $M = 12.22$ ) was in the "minimally depressed" category (BDI-II; Beck et al., 1996). (Six fewer mothers are reported on the BDI ( $n = 147$ ) than the other measures ( $n = 153$ ) because they either skipped the measure or skipped too many questions to calculate a total score). Fourteen mothers (9.7%) and 3 fathers (3.9%) reported depressive symptoms in the "severe depression" range (total scores greater than or equal to 30).

Mothers' and fathers' anxiety symptoms ( $M = 11.52$ ,  $M = 8.38$ , respectively) are in the "mild anxiety" range (BAI; Beck & Steer, 1990). Fourteen mothers (9.5%) and 4 fathers (5.2%) reported anxiety symptoms in the "severe anxiety" range (total scores greater than or equal to 26). Only six of the mothers and two of the fathers scored in both the severe depression and the severe anxiety range.

Paired  $t$ -tests comparing mothers and fathers of the same patient ( $n = 75$ ) revealed that mothers' and fathers' depressive and anxiety symptoms were not significantly different for these parents, but effect sizes reveal that mothers are slightly higher than paired fathers on depressive,  $t(1, 70) = 1.40$ ,  $p = .17$ ,  $d = .21$ , and anxiety symptoms,  $t(1, 73) = 1.92$ ,  $p = .06$ ,  $d = .32$ . Six of these mother-father pairs were not married or living together at the time of assessment.

### *Characteristics of Mothers' and Fathers' Psychological Symptoms*

The distribution of mothers' and fathers' total and subscale PTSS, as well as depressive and anxiety symptoms, were examined in two ways: (1) visual examination of histograms and scatterplots for mothers and fathers, (2) calculation of skewness and kurtosis values for the distributions, and determination of significance of these values by calculating z-scores.

Histograms and scatterplots of mothers' and fathers' total PTSS, depression, and anxiety symptoms are presented in Figure 1. Mothers' and fathers' PTSS, depressive symptoms, and anxiety symptoms do not appear to include subgroups, as depicted by the scatterplot graphs. The distributions of fathers' depressive symptoms, and mothers' and fathers' anxiety symptoms, however, do include some outliers. There were relatively few participants with extremely high scores, and there does not appear to be any clustering or clear demarcation of an extremely high subgroup on mother or father PTSS, depressive symptoms, or anxiety symptoms. The histograms suggest that the distributions of total PTSS, depressive symptoms, and anxiety symptoms are not normal for mothers or fathers. The distribution of mothers' PTSS does not have a single central tendency, whereas the distribution of fathers' PTSS is skewed, but does appear to have a central tendency. The distributions of mothers' and fathers' depressive and anxiety symptoms do appear to each have a central tendency, and each distribution appears to be positively skewed toward zero.

Skewness and kurtosis values are presented in Table 2. Skewness values between -1 and 1, and kurtosis values between -3 and 3 are generally accepted as not departing substantially from the values expected in normal distributions (Maxwell & Delaney, 2004). In addition, the significance of the skewness and kurtosis values were calculated

by dividing each raw value by its standard error to produce a z-score, significant at  $\alpha = .05$  when  $z \geq \pm 1.96$  (Stricker et al., 2003).

*Table 2. Descriptive Statistics for Mothers' and Father's Psychological Symptoms.*

	Mean (SD)	Median	Min	Max	Skewness (std error)	Kurtosis (std error)
<b>Mothers' PTSS (IES-R; n = 153)</b>	30.23 (16.50)	29.00	0	68.0	.18 (.20)	-.82* (.39)
Total	12.20 (6.69)		0	26.0	-.02 (.20)	-.94* (.39)
Intrusion	8.72 (5.74)		0	31.0	.82* (.20)	.85* (.40)
Avoidance	9.30 (6.40)		0	26.0	.49* (.20)	-.60 (.39)
Hyperarousal						
<b>Fathers' PTSS (IES-R; n = 76)</b>	26.69 (17.08)	24.50	0	68.0	.53 (.28)	-.43 (.55)
Total	10.66 (6.46)		0	24.0	.12 (.28)	-.96 (.55)
Intrusion	8.03 (5.72)		0	23.0	.60* (.28)	-.43 (.55)
Avoidance	8.01 (6.34)		0	26.0	.96* (.28)	.49 (.55)
Hyperarousal						
<b>Mothers' Depression (BDI; n = 147)</b>	14.69 (10.44)	12.00	0	50.0	1.11* (.20)	1.22* (.40)
<b>Fathers' Depression (BDI; n = 76)</b>	12.22 (9.25)	11.00	0	53.0	1.40* (.28)	4.23* (.55)
<b>Mothers' Anxiety (BAI; n = 153)</b>	11.52 (9.78)	10.00	0	53.0	1.06* (.20)	1.29* (.39)
<b>Fathers' Anxiety (BAI; n = 76)</b>	8.38 (8.82)	5.50	0	42.0	1.47* (.28)	2.21* (.55)

\* $z \geq \pm 1.96$ ,  $\alpha = .05$

For mothers' and fathers' PTSS, the avoidance and hyperarousal subscales are significantly positively skewed. For fathers, PTSS were skewed toward the lower half of the distribution of scores. For mothers, the distribution of PTSS is not skewed toward one lower value, but appears to have two central tendencies, suggesting that the group may be

split into groups of higher and lower PTSS. For mothers' PTSS, total symptoms and intrusive thoughts were significantly platykurtic, indicating the distributions of these symptoms were flatter than a normal distribution; avoidance symptoms were significantly leptokurtic, indicating scores were too clustered around a certain value. For fathers' PTSS, none of the distributions are significantly deviant from a normal kurtosis. Mothers' and fathers' depressive and anxiety symptoms were all positively skewed toward zero, indicating that most parents reported relatively low levels of these symptoms. For mothers and fathers, depressive and anxiety symptoms were all leptokurtic, as expected for highly skewed distributions, indicating that scores were more clustered than a normal distribution.

#### *Mothers' and Fathers' Psychological Symptoms and Demographic Factors*

Pearson correlation analyses for mothers' and fathers' psychological symptoms and demographic factors are presented in Table 3. For mothers, correlations between education and income and PTSS ranged from  $r = -.07$  to  $r = -.27$ . Mothers' education and income were significantly negatively related to hyperarousal symptoms, and income was also negatively related to total PTSS ( $r$ 's ranged from  $-.19$  to  $-.27$ ). Mothers who were more educated and had higher family income had fewer hyperarousal symptoms ( $r$ 's =  $-.21$  and  $-.27$ , respectively). Mothers who were more educated and had higher family income also had fewer depressive and anxiety symptoms ( $r$ 's ranged from  $-.15$  to  $-.24$ ). These relations are in the expected direction, but are small in magnitude and do not hold for all of the subscales of PTSS. Importantly, mothers who were married had

significantly higher incomes than single mothers,  $t(1, 148) = -6.54, p < .001; d = 1.48$ , thus confounding mothers' income and marital status.

Figure 1. Scatterplot and Hisogram Depictions of Distributions of Mothers' and Fathers' Total PTSS.

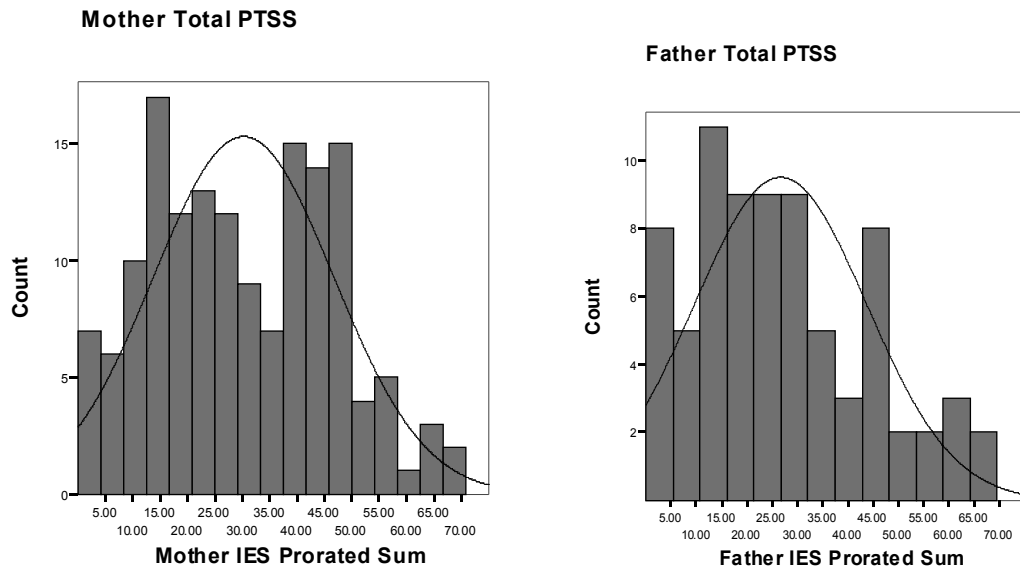
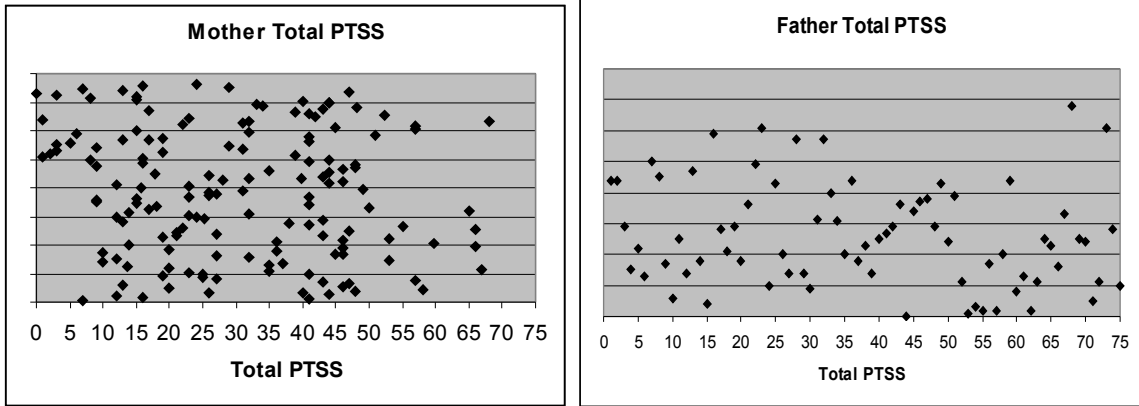


Figure 2. Scatterplot and Histogram Depictions of Distributions of Mothers' and Fathers' Total Depressive and Anxiety Symptoms.

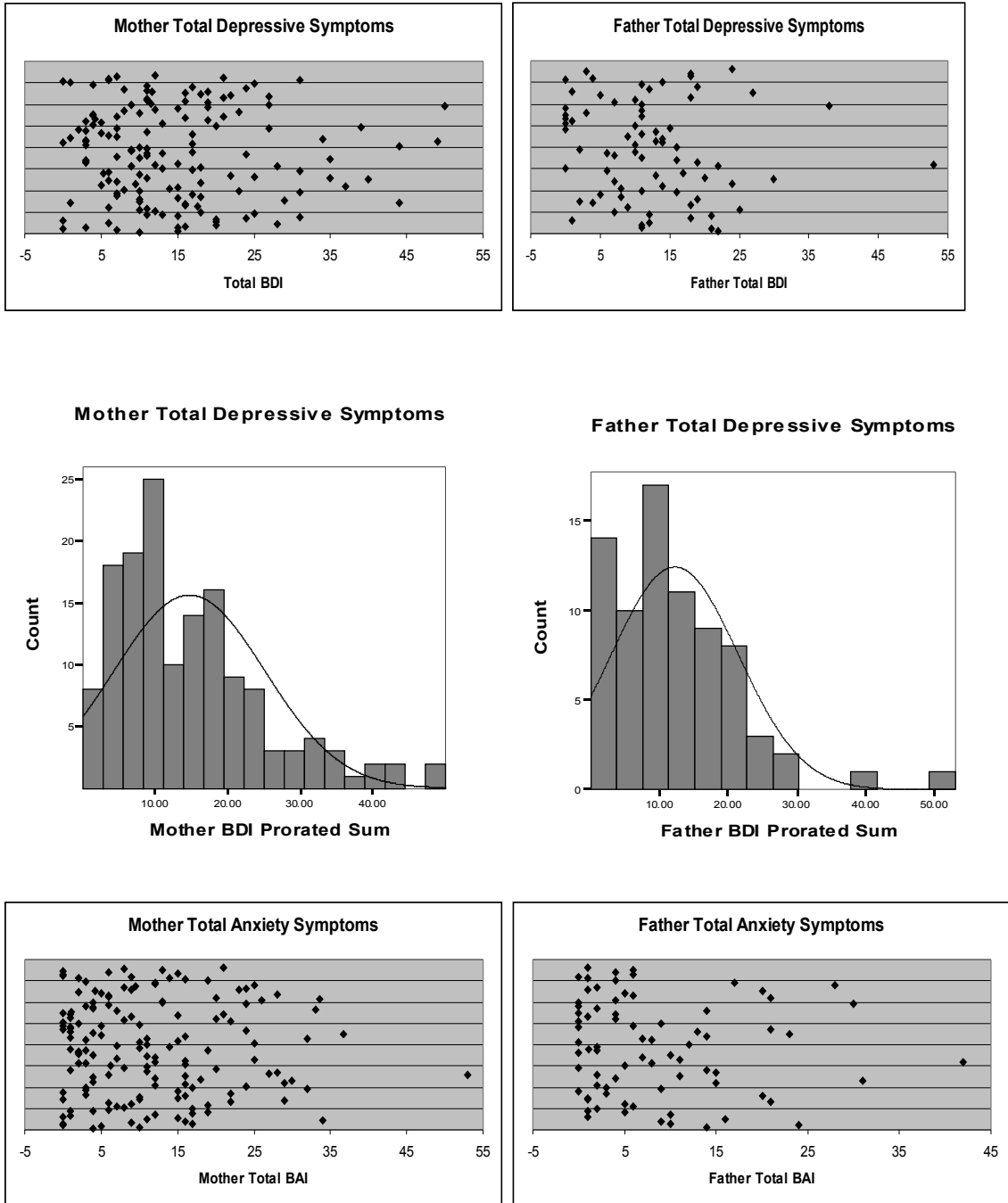
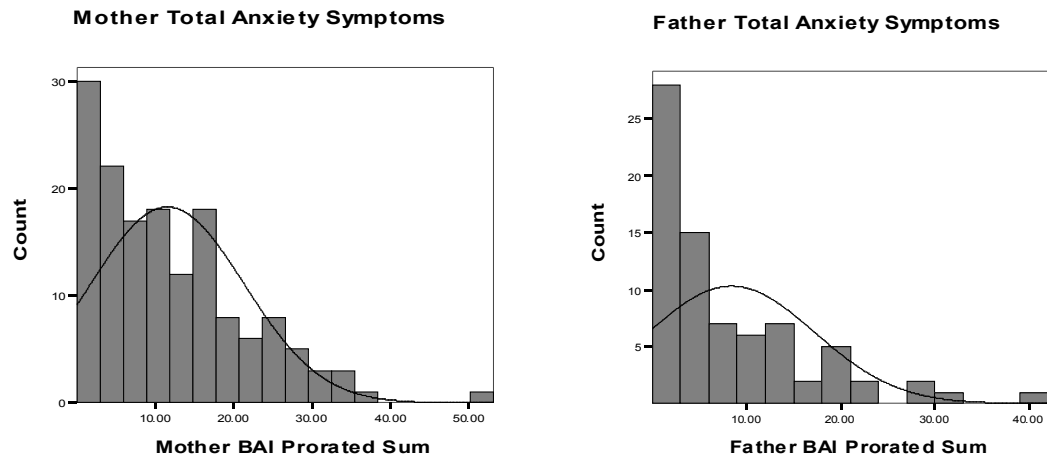


Figure 2—continued.



For fathers, education was significantly negatively related to intrusive thoughts, avoidance, hyperarousal, total PTSS, depressive, and anxiety symptoms ( $r$ 's ranged from  $-.20$  to  $-.34$ ). Income was marginally negatively related to fathers' depression ( $r = -.20$ ), but income was not related to fathers' PTSS.

For mothers, children's age was negatively related to avoidance posttraumatic symptoms and depressive symptoms; as children's age increased, mothers' avoidance symptoms and depressive symptoms decreased ( $r$ 's =  $-.18$  and  $-.20$ ). For fathers, child's age was not related to symptoms.

Finally, independent samples  $t$ -tests were calculated to compare total PTSS for mothers and fathers who were married (or living with someone as if married) with those who were single or divorced. Mothers who were single or divorced ( $n = 38$ ) were marginally higher in avoidance posttraumatic symptoms than mothers who were married,



$n = 114$ ;  $t = 1.89$ ,  $p = .06$ ;  $d = .34$ . This effect, however, was smaller in magnitude,  $F(1, 149) = 3.20$ ,  $p = .08$ , when children's age was included as a covariate in an ANCOVA. Mothers did not differ on other subscale symptoms or total PTSS according to marital status. Mothers who were single or divorced also were not significantly different on reported depressive and anxiety symptoms ( $t$ 's =  $-.28$  and  $-.67$ ,  $p$ 's =  $.78$  and  $.51$ , respectively). Seventy of 76 fathers (92%) were married or living with someone, so the  $t$ -test was underpowered to detect differences in symptoms between married and single fathers. Despite low power, single fathers, just like single mothers, were higher in avoidance posttraumatic symptoms than married fathers,  $t(1, 73) = 2.08$ ,  $p < .05$ ; Cohen's  $d = .69$ .

Table 3. Correlation analyses for mothers' ( $n = 152$ ) and fathers' ( $n = 76$ ) psychological symptoms and environmental variables.

	Educa- tion	Income	Child's Age	Intru- sion	Avoid- ance	Hyper- arousal	Total PTSS	Anxiety
<b>Mothers:</b>								
Intrusion	-.07	-.08	-.07	--				
Avoidance	-.07	-.14	-.18*	.53**	--			
Hyperarousal	-.21**	-.27**	-.08	.79**	.62**	--		
Total PTSS	-.13	-.19*	-.12	.90**	.80**	.92**		
<b>Fathers:</b>								
Intrusion	-.20 <sup>+</sup>	.02	.03	--				
Avoidance	-.32**	-.12	-.06	.72**	--			
Hyperarousal	-.33**	-.19	-.09	.79**	.82**	--		
Total PTSS	-.30**	-.10	-.04	.91**	.91**	.94**		
<b>Mothers:</b>								
Depression	-.15 <sup>+</sup>	-.19*	-.20*	.57**	.44**	.62**	.62**	.67**
Anxiety	-.16*	-.24**	-.09	.61**	.43**	.69**	.69**	--
<b>Fathers:</b>								
Depression	-.27*	-.20 <sup>+</sup>	-.10	.57**	.52**	.67**	.64**	.71**
Anxiety	-.34**	-.17	-.12	.47**	.51**	.67**	.60**	--

\*  $p < .05$ , \*\*  $p < .01$ , <sup>+</sup> $p < .10$

INT = intrusion; AVD = avoidance; HYP = hyperarousal; TOT = total; ANX = anxiety

### *Mothers' and Fathers' Psychological Symptoms and Medical Variables*

Child diagnosis type was examined in reference to mothers' and fathers' subscale and total PTSS and was expected to be unrelated to PTSS, given that all childhood cancers are potentially life-threatening and involve extensive, painful medical treatments, and are thus likely to be experienced by parents as extremely frightening and stressful. One-way ANOVAs were performed to compare mothers' and fathers' total and subscale PTSS, depressive symptoms, and anxiety symptoms, separately, among the diagnostic categories described previously: leukemia, lymphoma, brain tumor, and other solid tumor. There were no significant differences in mothers' or fathers' total or subscale PTSS among the diagnostic categories. Mothers of children diagnosed with solid tumors other than brain tumors (e.g., osteosarcoma, Ewing's sarcoma, rhabdomyosarcoma), however, had significantly higher depressive symptoms ( $M = 18.34$ ) than mothers of leukemia ( $M = 12.47$ ) and lymphoma ( $M = 12.63$ ) patients; overall  $F(3,143) = 3.78, p < .05$ ; Tukey post hoc tests  $p$ 's  $< .06$ ;  $d$ 's = .53, .66, respectively. There were no significant differences in depressive symptoms reported by mothers of solid tumor patients ( $M = 18.34$ ) and mothers of brain tumor patients ( $M = 18.48$ ).

Independent samples  $t$ -tests were calculated to compare mothers' and fathers' PTSS of children who were newly diagnosed versus children diagnosed with a relapse upon enrolling in the current study (Table 4). All comparisons had non-significant  $F$  values on the Levene's test of equal variances, indicating that the distributions of scores between groups were not different from each other. There were no significant differences in subscale or total PTSS for mothers and fathers between parents of children with their

first diagnosis versus parents of relapse patients. In addition, there were no significant differences in mothers' and fathers' depressive and anxiety symptoms in parents of children with their first diagnosis of cancer versus parents of relapse patients. Effect sizes were small and in the direction expected, with mothers of relapse patients higher on depressive symptoms ( $d = .31$ ) and hyperarousal ( $d = .21$ ), and fathers of relapse patients higher on hyperarousal ( $d = .28$ ). Because the relapse group had only 23 patients, the  $t$ -tests was underpowered to detect these small effects.

*Table 4. T-tests comparing mothers' and fathers' psychological symptoms between those who had a newly diagnosed child and those who had a child who relapsed directly before enrollment in the current study.*

	<b>No Relapse</b> (mothers, n = 127) (fathers, n = 65) Mean (SD)	<b>Relapse</b> (mothers, n = 25) (fathers, n = 11) Mean (SD)	t value	p	<i>Cohen's d</i>
<b>Mothers</b>					
Intrusion	12.24 (6.73)	12.00 (6.60)	.17	.87	-.04
Avoidance	8.70 (5.86)	8.83 (5.22)	-.10	.92	.02
Hyperarousal	9.08 (6.34)	10.44 (6.71)	-.97	.33	.21
Total PTSS	30.02 (16.50)	31.26 (16.79)	-.34	.73	.07
Depression	14.18 (10.44)	17.41 (10.19)	-1.37	.17	.31
Anxiety	11.39 (10.08)	12.14 (8.27)	-.35	.73	.08
<b>Fathers</b>					
Intrusion	10.55 (6.47)	11.27 (6.66)	-.34	.74	.11
Avoidance	8.18 (5.67)	7.09 (6.17)	.58	.56	-.18
Hyperarousal	7.76 (6.44)	9.45 (5.80)	-.82	.42	.28
Total PTSS	26.50 (17.15)	27.82 (17.46)	-.24	.82	.08
Depression	12.23 (9.44)	12.18 (8.48)	.02	.99	-.01
Anxiety	8.55 (9.24)	7.36 (5.97)	.41	.68	-.16

Finally, PTSS were expected to be unrelated to the time lapsed between the child's diagnosis and the parent's completion of the measures. Although this sample was

specifically selected to assess parents close to the time of their child's diagnosis or relapse date and was not designed to examine parents' symptoms over a long range of time, fathers' intrusive thoughts, hyperarousal, and total PTSS were significantly related to the amount of time since their child's diagnosis ( $r$ 's =  $-.31$ ,  $-.24$ ,  $-.28$ , respectively; all  $p$ 's  $< .05$ ). Fathers' depressive and anxiety symptoms were also significantly related to the amount of time since their child's diagnosis ( $r$ 's =  $-.22$  and  $-.22$ , respectively,  $p$ 's  $< .06$ ). That is, as time since diagnosis increased, fathers' symptoms decreased. For mothers, however, there was no relation between their psychological symptoms and the amount of time lapsed since their child's diagnosis.

#### *Mothers' and Fathers' Extreme Scores on PTSS*

When PTSS was examined in relation to parents' demographic information and child's medical variables, only a few weak relations emerged (e.g., fathers' symptoms negatively related to fathers' education). Given that the distributions for mothers' and fathers' symptoms did not fully conform to normality and distinct subgroups were not identified, post hoc analyses were calculated to compare the bottom and top third (33%) of mothers' total reported PTSS on the variables of interest in the current study, resulting in two groups of 50 and 53 mothers. Descriptive statistics and results of the  $t$ -tests are presented in Table 5. Comparisons of mothers' marital status and child's relapse status were made by calculating the  $\chi^2$  value of a contingency table. Mothers with PTSS scores in the bottom 33% had significantly higher family income and were significantly further from the time of their child's diagnosis than mothers with scores in the top 33% ( $t$ 's =  $1.95$  and  $2.33$ , respectively,  $p$ 's  $\leq .05$ ;  $d$ 's =  $.46$ ,  $.38$ ). Mothers in the bottom and top 33%

on total PTSS did not differ significantly on years of education, child's age, likelihood of being married (Pearson  $\chi^2 = .63, p = .43$ ), or likelihood of having a child who had relapsed (Pearson  $\chi^2 = .34, p = .56$ ). Fathers' extreme scores were not compared because the top and bottom 33% yielded two groups of 25 each, and t-tests were significantly underpowered to detect differences between the groups with such a small sample size.

*Table 5. Mothers with low and high extreme total PTSS scores: Descriptive statistics and comparisons.*

	<b>Low 33%</b> (n = 50) Mean (SD)	<b>High 33%</b> (n = 53) Mean (SD)	t value	p	Cohen' s d
Intrusion	5.04 (3.27)	18.77 (3.59)	-20.25	<.01	4.00
Avoidance	3.63 (2.32)	13.49 (5.44)	-11.83	<.01	2.54
Hyperarousal	2.97 (2.05)	16.31 (3.94)	-21.36	<.01	4.45
Total PTSS	11.64 (5.37)	48.55 (7.64)	-28.20	<.01	5.67
Depression	7.61 (7.22)	22.78 (10.44)	- 8.41	<.01	1.72
Anxiety	4.63 (4.92)	19.89 (9.42)	-10.39	<.01	2.13
Number of days between child's diagnosis and assessment	48.20 (24.08)	39.21 (22.83)	1.95	.054 <sup>+</sup>	-.38
Years of mothers' education	15.86 (3.71)	14.89 (3.35)	1.40	.17	-.27
Child's age	10.86 (3.34)	9.85 (4.07)	1.37	.17	-.27
Annual Family Income	2.80 (1.41)	2.20 (1.18)	2.33	.02*	-.46

\*  $p < .05$ , \*\*  $p < .01$ , <sup>+</sup> $p < .10$

Annual Family Income: Scores of 2 corresponded to family income between \$25,000-50,000; scores of 3 corresponded to family income between \$50,000-75,000.

### *Linear Multiple Regression*

Mothers' income was significantly related to hyperarousal and total PTSS and single mothers' showed increased avoidance symptoms compared with married mothers. In addition, married mothers reported significantly higher family incomes than single mothers. A linear multiple regression analysis was performed with total and subscale

PTSS as separate dependent variables and mothers' reported income and marital status entered as independent predictors in order to attempt to address the confound between these variables in the current study. With respect to total PTSS, annual family income was a significant and independent predictor of symptoms ( $\beta = -.18, p = .06$ ), but mothers' marital status was not. A similar pattern emerged for mothers' hyperarousal symptoms, but both predictors were not significant for avoidance and intrusion symptoms.

## CHAPTER IV

### DISCUSSION

The current study supports the general finding in the literature that mothers and fathers of children with cancer show clinically-significant elevations of PTSS (Bruce, 2006; Kazak et al., 2005). Mean reported symptoms on the IES-R were not as high, however, as those reported for adult war veterans (Creamer et al. 2003) or adults seeking treatment after the Oklahoma City Bombing (Pfefferbaum et al., 2002). Using a recommended cutoff score on the IES-R that balances positive and negative predictive values in determining full diagnoses of PTSD (Rash et al., 2008), 64.5% of mothers and 57% of fathers in the current sample yielded scores indicative of PTSD. Even when a more conservative cutoff value of 34 was used, a significant minority of both mothers (43%) and fathers (32%) had scores above the cutoff. These levels of scores predictive of PTSD are higher than those reported by the NCS for women and men who experienced a trauma (20.4% and 8.1%, respectively; Kessler, 1995).

It can be argued that the large proportion of mothers and fathers experiencing these elevated levels of PTSS points to these symptoms actually being a normative reaction to the experience of having a child diagnosed with cancer. The current data suggest, however, that despite the substantial number of parents who do exhibit elevated PTSS, another substantial portion do not show elevated levels of psychological distress. PTSS often brings significant impairment to those experiencing the symptoms and in this population of parents such impairment can have serious consequences on the family

environment and medical experience. The heightened levels of emotional and physiological arousal experienced by parents of children with cancer can be disruptive to their ability to communicate with and provide emotional support to their children. PTSS can also interfere with a parent's ability to both communicate effectively with and understand their child's physician, increasing the risk for medical misunderstanding and noncompliance. Such impairment should not simply be accepted as a normative reaction. It is important for the field to develop a thorough understanding of PTSS in parents of children with cancer as well as the risk factors associated with elevated symptoms in order to help maintain a high standard of medical care and develop appropriate psychological interventions for these families.

Mothers' and fathers' depressive and generalized anxiety symptoms, however, were not significantly elevated, although they were significantly related to each other and PTSS. These findings are consistent with other studies that have found minimal depressive symptoms (Dolgin et al., 2007) and minimal anxiety symptoms (Roddenberry & Renk, 2008) in parents of children with cancer. These findings indicate that mothers' and fathers' of children with cancer experience acute and significant PTSS less than 4 months after their child's diagnosis, but that they do not generally experience elevations of other psychological symptoms. Specificity for PTSS over general psychological distress as a psychological response among parents of children with cancer is supported in the current sample.

The current study is the first, to our knowledge, that examined the distributions of mothers' and fathers' total and subscale PTSS in detail. Although distributions of total PTSS were not normal for these parents, no distinct subgroups could be visually



identified that were either high or low in symptoms. Avoidance and hyperarousal subscales, in particular, were positively skewed. Parents had a wider range of intrusion symptoms than other subscales of PTSS. Distributions of depressive and anxiety symptoms were highly positively skewed, corroborating the finding that most parents experienced low levels of these symptoms at the time of assessment.

With respect to demographic variables, our hypotheses were partially confirmed. As expected, mothers' hyperarousal and total PTSS decreased as their family income increased; for fathers, all subscale and total PTSS decreased as the number of years of education increased. Other studies have found mixed results with respect to SES, but the current study is consistent with Jurbergs et al. (2009) finding that as SES increased, parents' PTSS decreased. The results in the current study, however, were not consistent across all subscale of PTSS and were small in magnitude.

As expected, mothers' avoidance symptoms decreased as child age increased, as did mothers' depressive symptoms. Fathers' symptoms, however, were not related to their child's age. Although specific hypotheses were not made concerning depressive and anxiety symptoms, both generally decreased as education and income increased for mothers and fathers. The hypotheses concerning the relation of education, income, and child age to psychological distress were partially supported, but the magnitudes of these relations were small. Given these modest relations, conclusions should be drawn cautiously about parents of certain demographic characteristics being especially at risk for psychological distress. Based on the current study, parents of lower socioeconomic status do appear to be at somewhat increased risk for psychological distress with respect to their child's cancer.

The current study is the first to report on symptoms as related to parents' marital status, to the best of our knowledge. Single and divorced mothers and fathers were higher in avoidance PTSS than married mothers and fathers. This finding did not hold across other subscales of PTSS, but future studies should examine parents' marital status with respect to psychological distress, as the current study suggests that single parents may be at elevated risk for symptoms.

With respect to medical variables, child's type of diagnosis did not differentiate PTSS in mothers or fathers, as expected. Surprisingly, mothers of children with solid tumors (and, marginally, brain tumors) showed elevated levels of depression in the current sample. This is a new finding and should be replicated before conclusions are drawn. The current study did not find significant differences in parents' PTSS, depressive symptoms, or anxiety symptoms between parents of relapsed patients versus parents of children with their first diagnosis, but the small sample size of relapse patients rendered the *t*-tests underpowered to detect the small effect sizes for hyperarousal symptoms in mothers and fathers and depressive symptoms in mothers.

Importantly, Jurbergs et al. (2009) only found significant differences between parents of relapse patients and parents of children without relapse who were off treatment. Parents of children who were on treatment were generally not significantly different from parents of children who had relapsed in the Jurbergs et al. study, although there were small effect sizes for the differences between these two groups of parents (*d*'s ranged from .33 to .44). All of the children in this current study were on treatment at the time the parent completed the measures. Also noteworthy is that parents in the Jurbergs et al. study of children who were on treatment were assessed between 1 month and 5 years

after their child's diagnosis. The current study recruited a sample much more homogeneous for the amount of time passed since diagnosis and much closer to the time of the child's diagnosis. Therefore, the current study had the ability to begin to corroborate the findings concerning symptoms for parents of relapse versus first diagnosis for children on treatment, although it was not designed to specifically replicate the findings.

Indeed, the current study showed very small effect sizes in the direction of parents of relapse patients being more distressed, but all of the differences were non-significant. Given the lack of significant differences and the very small effect sizes, our study may indicate that being on treatment is an equalizing experience for parents. That is, parents of children who are on treatment may experience similar levels of acute psychological distress, and clinically significant differences between groups may only begin to emerge as parents move further from the time of their child's diagnosis.

Time since the child's diagnosis was expected to be unrelated to mothers' and fathers' psychological symptoms, but fathers' symptoms actually decreased as the time since their child's diagnosis increased. Mothers' symptoms, however, were not related to the amount of time passed since their child's diagnosis. Longitudinal studies and cross-sectional studies with multiple groups have found that parents' symptoms tend to decrease as time since diagnosis increases (e.g. Dolgin et al., 2007; Jurbergs et al., 2009). The current sample, however, was intentionally recruited to be relatively homogeneous for time since child's diagnosis. The current study's findings suggest that mothers and fathers may experience similar levels of acute distress after their child's diagnosis, but that fathers' symptoms may diminish over time while mothers' elevated symptoms may

have more stability. More longitudinal, multi-assessment studies are needed before conclusions can be drawn.

Although subgroups did not emerge with respect to mothers' PTSS when distributions of scores were visually examined, mathematical comparisons of the low and high thirds of mothers revealed some interesting findings. First, mothers in the lowest and highest third of the sample with respect to PTSS symptoms also appear to have very low and very high depressive and anxiety symptoms. That is, mothers in the highest part of the sample on PTSS seem to be experiencing more severe psychological symptoms in general, and mothers experiencing the fewest PTSS also appear to be functioning well in other psychological domains. These findings would corroborate evidence that there is a high degree of relatedness between PTSD, MDD, and GAD (Grant et al., 2008), and that PTSD, MDD, and GAD may develop in response to a traumatic event (Iseri et al., 2006; Franklin & Zimmerman, 2001). Mothers in the lower group on PTSS were also assessed further out from their child's diagnosis and reported higher family incomes, although these relations were small in magnitude. Further examination of other psychological characteristics of mothers reporting the lowest and highest PTSS will begin to flesh out possible additional risk and protective factors, such as coping style and perceived stress.

The current study confirms that mothers and fathers of children with cancer are at risk for clinically significant levels of acute PTSS less than 4 months after their child's diagnosis, and that a significant minority of these parents meet very conservative cutoff criteria for a diagnosis of PTSD. These parents are generally not, however, at significant risk for depressive and generalized anxiety symptoms. Future studies should include diagnostic interviewing to draw conclusions about diagnostic levels of PTSD in parents

close to the time of their child's diagnosis. The data also suggest that lower socioeconomic status and being a single parent may put parents at increased risk for developing higher levels of PTSS, depressive symptoms, and anxiety symptoms. The current study included a sample of parents that was more heterogeneous with respect to socioeconomic variables than some previous studies (e.g. Kazak et al., 2001), and future research should attempt to replicate the current findings. The current study establishes that parents' marital status is potentially an important variable when assessing risk for psychological symptoms, and future studies should take this into account.

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