Risk of Posttraumatic Stress Symptoms: A Comparison of Child Survivors of Pediatric Cancer and Parental Bereavement

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Objective To compare the risk of posttraumatic stress (PTS) symptoms and the mediating effect of perceived future threat on the risk of PTS symptoms among survivors of pediatric cancer and children who had a parent die. **Methods** Seventy-eight children (39 survivors of cancer, 39 bereaved) completed self-report measures of PTS symptoms, depression, anxiety, and perceived risk of future threat for the event they experienced. **Results** The children who lost a parent reported significantly more PTS symptoms than the survivors of cancer. The effect of group status (survivor of cancer vs. bereaved) on PTS symptomatology was partly mediated by the children's perceived risk of future threat. **Conclusions** The rate of PTS symptoms was found to be higher among children who had lost a parent than among survivors of pediatric cancer. This difference may partly be explained by their perceived risk of a future threat. Clinical implications are discussed.

Key words bereaved; cancer; pediatric; posttraumatic stress; PTSD.

A diagnosis of a life-threatening illness such as cancer is an unpredictable event that elicits distress and feelings of helplessness from patients and loved ones alike. But it was not until the American Psychiatric Association (APA) (1994) recognized this experience as a traumatic event in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*; APA, 1994) that research has focused on the risk of posttraumatic stress (PTS) symptoms among cancer survivors and their families. The threat of death, disfiguring and aversive treatments, uncontrollable aspects of the disease, the social isolation and helplessness that patients experience all contribute to cancer qualifying as a traumatic event that could result in posttraumatic stress disorder (PTSD) or symptomatology (Andrykowski & Cordova, 1998). Epidemiological research supports this suggestion with rates for the disorder ranging from 5 to 24% for adult survivors (Amir & Ramati, 2002; Andrykowski & Cordova, 1998; Cordova et al., 1995) and 2 to 20% for pediatric survivors of cancer (Kazak et al., 1997; Pelcovitz et al., 1998; Stuber, Christakis, Houskamp, & Kazak, 1996).

Interestingly, parents of pediatric cancer survivors tend to be at a greater risk for PTS symptoms than cancer survivors. Stuber et al. (1996) found that approximately one-third of parents of childhood cancer survivors fell within the severe range of PTS symptoms on the Posttraumatic Stress Disorder Reaction Index (PTSD-RI). Kazak et al. (1997) observed that 10% of parents of childhood leukemia survivors fell within the severe range on the PTSD-RI, and an additional 30% of mothers and almost 21% of fathers fell within the moderate range of severity. Lifetime prevalence rates tend to be higher, with rates ranging from 27 to 54% for parents (Libov, Nevid, Pelcovitz, & Carmony, 2002; Pelcovitz et al., 1996).

Risk factors for PTS symptoms among parents include objective and subjective measures of treatment and disease-related factors (e.g., intensity of treatment), stressful life events, family cohesion, social support, perceived constraints about discussing cancer-related issues, and individual differences (e.g., trait anxiety) (Barakat et al., 1997; Kazak et al., 1997, 1998; Libov et al., 2002;

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Manne et al., 2002; Pelcovitz et al., 1996). The risk factors are similar for childhood cancer survivors and include being on treatment, time since treatment terminated, stressful life events, subjective ratings of treatment intensity, anxiety, parents' level of PTS symptomatology, and the parents' perceptions of treatment intensity (Pelcovitz et al., 1998; Stuber et al., 1997). The type of cancer does not appear to be related to the risk of symptoms (Barakat et al., 1997).

Although several factors can contribute to parents' and children's risk, one of the strongest correlates and predictors of PTS symptoms is perceived life threat (Barakat et al., 1997; Kazak et al., 1998; Libov et al., 2002). Manne et al. (2002) observed that the combination of the mother's perception of her child's risk of dying from cancer, the potential for her child's suffering, and the number and frequency of fears she exhibited before her child underwent a bone marrow transplantation (BMT) or stem-cell transplant was predictive of the mother's PTS symptoms 6 months post-transplant. Similarly, Barakat et al. (1997) found that perceived life threat during the child's illness had a stronger influence on PTS symptoms for long-term pediatric cancer survivors and their parents than objective treatment characteristics (e.g., treatment intensity). Kazak et al. (1998) found that parents' beliefs that their children were at risk and are still at risk of dying from cancer were strong predictors of the parents' PTS symptoms, even though their children were considered cured of cancer for as long as 6 years after treatment. Hence, perceptions about life threat and not just the child's actual risk of death appear to be important when considering risk factors for PTS symptoms.

The significance of perceived life threat suggests that one hypothesis for why the survivors of pediatric cancer exhibit relatively low rates of PTS symptoms is that as a group, they may perceive themselves at a low risk for a recurrence. Because all of the long-term survivors of cancer included in research have avoided a fatal outcome, their experience may have reinforced perceptions about being less vulnerable to harm than the average person. Although developmental psychologists have hypothesized that adolescents are particularly susceptible to perceiving themselves as being unique and invulnerable to harm (Elkind, 1994), research suggests that people of all ages are unrealistically optimistic about their risk of harm (Weinstein, 1980). Hence, children who have survived a terminal illness might perceive their survival as evidence of their lower risk of harm, and subsequently reinforce their perceived risk of reexperiencing a similar threat as being low.

Although there is empirical evidence linking perceived threat as well as perceived future threat to PTS symptoms (Kazak et al., 1998; Libov et al., 2002; Stuber et al., 1997), there are few studies evaluating perceived future threat as a *mediating* factor for children's risk of PTS symptoms. Thus, the goal of this study was to examine perceived future threat as a mediating factor by comparing survivors of pediatric cancer to a group of children who had experienced the death of a parent. We selected parentally bereaved children as a comparison group because personally experiencing the irrevocable loss of a significant figure on which one is dependent upon could, theoretically, reduce their unrealistic optimism about a future threat. Furthermore, there is empirical evidence indicating that bereaved children and adolescents may be at a greater risk for PTS than for depressive symptoms (Stoppelbein & Greening, 2000). Hence, there is empirical support for comparing parentally bereaved children to survivors of pediatric cancer on their risk of PTS symptoms. We hypothesized that perceived future threat would mediate the relation between group status (i.e., pediatric cancer vs. bereaved) and PTS symptoms. The bereaved children were expected to report a greater risk of future threat and more symptoms than the pediatric cancer survivors because they had experienced an irreversible loss unlike the survivors of cancer. Although there are similarities between PTSD symptoms and traumatic grief, PTSD was conceptualized as a different syndrome because it involves distinctly different symptom presentations, time courses, and outcomes (Clark, Pynoos, & Goebel, 1994). In addition, we evaluated the children's perceived threat of the event that they had personally experienced (i.e., cancer or parental death) rather than their general sense of vulnerability to future threats because trauma research suggests that survivors exhibit event-specific vulnerability (Sanchez, Fristad, Weller, Weller, & Moye, 1994). Finally, we included only children who had lost a parent by nonviolent means in the bereaved group to control for exposure to violent deaths.

To review, the hypotheses were that (a) the children who had lost a parent would be more likely to perceive a future threat (i.e., another personal loss) than the survivors of cancer (i.e., threat of recurrence) and that (b) the children's perceived future threat would mediate the relation between group status (cancer survivor vs. parental bereavement) and PTS symptoms, with children in the bereaved group reporting more symptoms. Demographic variables including age and gender were examined as possible correlates because there is evidence of younger children and girls reporting more PTS symptoms on average (Gilbert, Greening, & Dollinger, 2001; Stuber et al., 1997). The findings could prove to

be especially useful for identifying and treating families at risk for PTS symptoms.

Method

Participants

Forty-five families were recruited from a pediatric oncology clinic and a camp to participate, of which three families declined because of time constraints, two children declined because of disinterest, and one family did not complete the measures. Nearly an equal number of survivors were recruited from the clinic (n = 19) and camp (n = 20). By using Bonferroni correction for multiple comparisons (.05/19), The only significant difference between the two groups after correcting for experiment-wise error was that fewer African-American families were recruited from camp, probably, because fewer African-American children attended camp, $\chi^2(1, N = 39) = 9.56$, $p = .002$. Sixty-eight families with one deceased parent were also recruited to participate. Only one child from each family was recruited. One family declined to participate, 20 neglected to return the consent form, and eight parents neglected to return their measures. The response rate for the bereaved group (57%) is comparable to rates reported in the bereavement literature (Weller, Weller, Fristad, & Bowes, 1991).

Demographic and loss/disease-related data about the pediatric cancer and bereaved groups are presented in Table I. The parents ranged from 26 to 58 years of age. Most of the parents in the cancer group were married (68%), whereas only 15% of the bereaved parents were remarried. All separations and remarriages had occurred at least 3 years before participation for both groups. Half the cancer survivors had been diagnosed with acute lymphoblastic leukemia, with the remaining diagnosed with other types of cancer. Nearly all the survivors had been treated with chemotherapy (97%), 5% had a BMT, and 38% received radiation, none of which were irradiated above the neck. Over half (63%) were in remission for >12 months and 37% were in remission 6–12 months. The cause of parental death in the bereaved group was either disease (71%) or accident

Table I. Sample Characteristics

Variable	Bereaved (n = 39)	Cancer (n = 39)	F/χ^2	p
Child's age, mean (*SD*)	12.97 (2.74)	12.79 (2.81)	0.08	.7760
Child's gender—percentage of male (female)	33 (67)	36 (64)	0.06	.8119
Child's/parent's ethnicity				
Percentage of African American (White)	5 (95)	21 (79)	3.62	.0569
Primary breadwinner's occupation				
Professional	33	3	26.76	<.0001
Middle management	59	41		
Civil service/blue collar	0	41		
Social security income	8	15		
Parent's age, mean (*SD*)	42.74 (5.42)	40.63 (6.67)	2.13	.1493
Parent's gender—percentage of male (female)	13 (87)	3 (97)	2.78	.0954
Child's mean age at loss/diagnosis	9.79 (4.33)	9.08 (4.32)	0.53	.4682
Mean length of time since loss/remission	3.14 (2.80)	2.60 (2.08)	3.21	.0770
Child-report measures				
CDI, mean *T* score (*SD*)	50.21 (10.59)	46.38 (10.45)	2.57	.1129
RCMAS, mean *T* score (*SD*)	52.13 (9.06)	47.82 (10.63)	3.71	.0579
CPTSD-RI, mean score (*SD*)	37.15 (16.20)	24.03 (11.84)	16.70	<.0001
Perceived future threat	4.18 (1.64)	2.91 (1.59)	10.90	.0015
Parent-report measures				
CDI, mean *T* score (*SD*)	47.62 (11.53)	47.15 (10.82)	0.03	.8558
RCMAS, mean *T* score (*SD*)	43.87 (12.82)	47.38 (12.75)	1.47	.2289
CPTSD-RI, mean score (*SD*)	28.33 (13.99)	25.15 (13.01)	1.08	.3020
BDI, mean score (*SD*)	8.44 (6.94)	11.18 (11.27)	1.67	.1996
STAI-S, mean *T* score (*SD*)	54.05 (11.77)	55.08 (14.51)	0.12	.7327
STAI-T, mean *T* score (*SD*)	53.46 (11.39)	58.87 (13.26)	3.74	.0569
PTSD-RI, mean score (*SD*)	15.54 (5.40)	16.03 (4.62)	0.18	.6699

BDI, Beck Depression Inventory; CDI, Children's Depression Inventory; CPTSD-RI, Children's Posttraumatic Stress Disorder–Reaction Index; PTSD-RI, Posttraumatic Stress Disorder-Reaction Index; RCMAS, Revised Children's Manifest Anxiety Scale; STAI–S, State Trait Anxiety Scale–State Form; STAI-T, State Trait Anxiety Scale-Trait Form.

(29%). None of the deaths involved interpersonal violence, and none of the children had witnessed the death or viewed the parent's body at the time of death. Preliminary analyses revealed that the type of event (disease vs. accident) and the anticipation of the parent's death were not significantly related to adjustment and, therefore, were not included in further analyses.

Child-Report Measures

Child Posttraumatic Stress Disorder Reaction Index

The Child posttraumatic stress disorder reaction index (CPTSD-RI) is a 20-item self-report measure of PTS symptoms for children based on *DSM-IV* criteria for PTSD (Pynoos et al., 1993). The children rated on a five-point scale ranging from 0 (*none of the time*) to 4 (*most of the time*) how frequently they have been experiencing the symptoms since the time of their diagnosis/loss. Sum scores ≤11 indicate that PTS is doubtful, scores from 12 to 24 suggest mild stress, scores ranging from 25 to 39 suggest moderate distress, and scores ≥40 indicate severe PTS. The measure is internally consistent and correlates highly with *DSM-IV* criteria for PTSD (Gilbert et al., 2001). Internal consistency was equally high with this sample (Cronbach $\alpha = .88$).

Revised Children's Manifest Anxiety Scale

The Revised Children's Manifest Anxiety Scale (RCMAS) is a 37-item self-report measure of anxiety for youth (Reynolds & Richmond, 1985). Respondents indicated whether or not they experienced each item using a yes/no format. The items are summed (*yes*, 1; *no*, 0) to yield an overall score. Internal consistency is acceptable, with alphas ranging from .78 to .85. Test–retest reliability ranges from .68 for a 9-month interval to .98 for 3 weeks.

Children's Depression Inventory

The Children's Depression Inventory (CDI) is a 27-item self-report measure of depressive symptoms for children. Each item includes three possible alternatives describing increasing levels of depressive symptomatology. The children selected one of the three alternatives that best described how they had been feeling during the past 2 weeks. The CDI is a well-validated measure of depression with internal consistency estimates ranging from .70 to .86; test–retest reliability was also found to be acceptable for a 1-month time interval, .82 (Kovacs, 1992).

Perceived Future Threat

The children indicated on a six-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) how much they agreed/disagreed with the statement, "I am at risk for experiencing cancer again (the loss of my surviving parent while I am still young)."

Parent-Report Measures

The parents completed the CPTSD-RI, the RCMAS, and the CDI as parent-report forms. Internal consistency was high across the measures for the sample (Cronbach $\alpha = .89–.91$).

PTSD-RI

The PTSD-RI is a 25-item self-report measure of PTSD for adults (Frederick, 1985). Test items parallel the *DSM-IV* criteria for PTSD (APA, 1994). Parents indicated whether they have been (score = 1) or have not been experiencing (score = 0) a list of symptoms since their spouse's death or their child's diagnosis of cancer. Cut-off scores for symptom severity are >6, diagnostic of the disorder; 7–12, moderate severity; and >12, marked severity. Internal consistency is high, Cronbach $\alpha = .91$, and was equally high in this study, $\alpha = .89$. Construct validity is supported by correlations with cases of PTSD diagnosed in clinical settings (Frederick, 1985).

State-Trait Anxiety Inventory

The state-trait anxiety inventory (STAI) is a self-report measure of situational (STAI-S) and trait anxiety (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Each scale consists of 20 items for which respondents indicated on a four-point scale how much they agreed with the statements. Internal consistency is high (αs = .90 and .93 for STAI-T and STAI-S, respectively) and was high in this study, αs = .94 and .96. Test–retest reliability is acceptable for the STAI-T, with a median coefficient of .76.

Beck Depression Inventory

The Beck depression inventory (BDI) is a 21-item self-report measure of depressive symptoms. Respondents rated along a four-point scale ranging from 0 to 3 the severity of symptoms described for each item. Cut-off scores for clinically significant symptoms are <10, minimal; 10–16, mild; 17–29, moderate; and >29, severe. The scale has high internal consistency, moderate concurrent validity, and discriminates between depressive and anxiety symptoms (Beck, Steer, & Garbin, 1988).

Procedure

After obtaining approval from the Institutional Review Board, survivors of pediatric cancer were recruited from a university medical center and from a camp located in the same region. Exclusionary criteria included (a) remission of cancer, as defined by the conclusion of their medical treatment, less than 6 months before participation, (b) history of a relapse of cancer, (c) having a deceased parent, and (d) a history of a psychiatric disturbance or

treatment. Parents provided written consent to participate when they arrived for a medical appointment or when they registered for camp, and the children provided written assent before participating. The families from the medical center completed their measures while waiting for their appointment, whereas the families from camp completed the measures at camp. After obtaining approval from school boards, school counselors at 12 public schools distributed and collected consent forms from families in which one parent had died. Exclusionary criteria for participation included (a) parental death occurring less than 6 months before participation or by violent means, (b) history of psychiatric disturbance or treatment, and (c) history of a life-threatening illness among the children in the family. Children with parental consent provided written assent before participating individually in the school counselor's office. The counselors either gave the parent-report forms to the surviving parents to complete or sent them home with the child. The parents returned their forms to the counselor or mailed them in a stamped, self-addressed envelope to the researchers. Doctoral clinical psychology students administered the measures to the children and assisted them with questions. Participation took 40–50 min. Anyone showing clinical levels of distress on the measures was referred to appropriate social service agencies.

Results

Group Differences

As summarized in Table I, there were no significant group differences on demographic and disease/loss-related variables when correcting for experimentwise error (.05/19), with the exception that more bereaved families' breadwinners worked in professional jobs, whereas more breadwinners in the cancer group worked in blue collar jobs. The children in both groups scored within normal limits and showed no significant differences on the CDI and RCMAS. The bereaved children, however, reported significantly more PTS symptoms, with their mean score falling in the moderate range of severity using Pynoos et al.'s (1993) classification system (see Table I for means). More of the children in the bereaved group (41%) also scored in the severe range on the CPTSD-RI than those in the cancer group (10%), $\chi^2(3, N = 78) = 11.87, p = .0079$. Finally, the bereaved children reported significantly higher scores for perceived future threat.

There were no significant group differences for the parents' report of their child's adjustment or for their own adjustment. Their CDI and RCMAS scores were within normal limits. However, their mean CPTSD-RI scores fell in the moderate range of severity. There was no significant difference in the severity of the parents' CPTSD-RI scores, $\chi^2(3, N = 78) = 1.68, p = .6423$. Both groups scored within normal limits or in the mild range on the BDI, STAI-S, and STAI-T, but in the marked range of severity on the PTSD-RI.

Types of PTS Symptoms

The CPTSD-RI items were grouped into three broad clusters of PTSD symptoms as defined in the *DSM-IV* (APA, 1994), including reexperiencing symptoms (7 items), avoidance/numbing (5 items), and hyperarousal (4 items). Ratings on the five-point scale of the CPTSD-RI that were ≥3 (*occurs much of the time*) were coded as present (score = 1), and ratings indicating that the symptoms occurred less frequently were coded as absent (score = 0) for classification. Four items did not fit into any category and were not classified (e.g., somatic complaints). Interrater agreement for classification = .90, and internal consistency was acceptable (Cronbach $\alpha = .87$ for reexperiencing; .81 for avoidance/numbing; .65 for hyperarousal).

More of the bereaved children (77%) tended to report ≥1 symptom in the reexperiencing cluster than the survivors of cancer (54%), $\chi^2(1, N = 78) = 4.59, p = .0322$. However, the difference did not reach statistical significance when correcting for experimentwise error (.05/6). There were no significant group differences for the other clusters, nor were there significant differences for the parents' report of their children's symptoms across the clusters. When using the minimum number of symptoms required in each category to meet *DSM-IV* criteria for PTSD, excluding the psychosocial impairment criterion, significantly more bereaved children (23%) met criteria than survivors of cancer (0%), $\chi^2(1, N = 78) = 10.17, p = .0014$.

The parents' responses on the PTSD-RI were also classified into the three broad clusters of symptoms. Interrater reliability for classification was 100% and internal consistency was moderate (Cronbach $\alpha = .75, .71$, and .69 for reexperiencing, avoidance/numbing, and hyperarousal symptoms, respectively). Group comparisons revealed that a larger percentage of the parents in the pediatric cancer group tended to report ≥ 1 hyperarousal symptoms (56%) than the bereaved parents (33%), $\chi^2(1, N = 78) = 4.20, p = .0405$. However, the difference did not quite reach statistical significance when correcting for experimentwise error (.05/3). There was no significant difference between the two groups of parents for meeting *DSM-IV* criteria for PTSD, when

excluding the psychosocial impairment criterion, (10% vs. 8%), $\chi^2(1, N = 78) = .15$, $p = .6920$.

Differences in Parent-Child Reports

Survivors of cancer did not differ significantly from their parents on the CPTSD-RI, CDI, or the RCMAS, $t(38) = 0$ to .60, $p > .05$. Although there was no significant difference between the bereaved children and their parents on the CDI, $t(38) = 1.11$, $p = .2754$, the bereaved children reported significantly more symptoms on the CPTSD-RI, $t(38) = 3.65$, $p = .0008$, and on the RCMAS, $t(38) = 3.88$, $p = .0004$, than their parents after correcting for multiple pairwise comparisons (.05/4). The parents and children were also compared on PTS symptoms after centering their scores but no significant differences were observed.

Correlational Analyses

Demographic and disease/loss-related variables were evaluated as correlates of PTS symptoms (Table II). After correcting for experimentwise error (.05/36), group status was negatively related to CPTSD-RI and perceived future threat scores, with being in the cancer group relating to lower scores on these variables. Age was positively related to age at the time of loss/diagnosis but negatively related to time since loss/remission. Gender was negatively related to time since loss/remission, with being male being linked to reporting a longer duration of time. The parents' and children's CPTSD-RI scores were positively related, as were the parents' level of PTS symptoms and their perception of their child's level of PTS symptoms.

Regression Analyses

The children's CDI score was included as a covariate in regression analyses predicting the children's CPTSD-RI score because depression is often a comorbid disorder of PTSD. Using hierarchical regression analyses, the children's CPTSD-RI score was regressed on to their CDI score, followed by the parents' PTSD-RI score because it was a marginally significant correlate. Group status was entered at the third step, followed by perceived future threat. As summarized in Table III, all four equations were statistically significant, as were the semipartial correlations.

Perceived future threat was tested as a mediator for the effect of group status on PTS symptoms using Baron and Kenny's (1986) procedure. Support emerged for a partial mediation effect. The effect was significant using the Sobel test, $z = -2.51$, $p < .01$, and revealed that the effect of parental loss on PTS symptoms was mediated by the children perceiving a greater risk of a future threat.

Discussion

As hypothesized, the bereaved children reported significantly more PTS symptoms than the survivors of cancer. Although parental death by nonviolent means in childhood is not typically conceptualized as a precipitant of PTS symptoms, the bereaved children's rate of symptoms is similar to rates for natural disaster survivors and is also higher than rates for the general population of youth (Gilbert et al., 2001). It appears that the differential risk of PTS symptoms between the two groups is partly mediated by their perceived risk of a future threat. The cancer survivors reported a lower risk of reexperiencing cancer, maybe because their remission reinforced perceptions of being less vulnerable to harm; whereas the bereaved children's personal experience with death might have shaken their illusion of invulnerability. Another hypothesis for their different risk perceptions is that the survivors' risk of death was not a focal point during their illness because they might have been more

Table II. Zero-Order Correlations

Variable	1	2	3	4	5	6	7	8	9
1. Group	—	−.03	−.03	−.08	−.20	−.42**	−.12	.12	−.37*
2. Gender		—	−.03	.20	−.33*	.13	.09	.14	.19
3. Age			—	.74**	−.10	−.20	.03	−.02	.16
4. Age at loss/diagnosis				—	−.63**	−.04	.12	.02	.25
5. Time since loss/remission					—	−.05	−.22	−.11	−.11
6. CPTSD-RI_{CR}						—	.52**	.31*	.51**
7. CPTSD-RI_{PR}							—	.58**	.22
8. PTSD-RI								—	.16
9. Perceived threat of a recurrence									—

Group coded 0, bereaved; group coded 1, pediatric cancer; gender coded 0, male; gender coded 1, female; CPTSD-RI_{CR}, Child Posttraumatic Stress Disorder-Reaction Index, child report; CPTSD-RI_{PR}, Child Posttraumatic Stress Disorder-Reaction Index, parent report; PTSD-RI, Posttraumatic Stress Disorder-Reaction Index.
*$p < .005$. **$p < .0001$.

Table III. Summary of Hierarchical Regression Analyses for Variables Predicting the Children's Posttraumatic Stress (PTS) Symptoms ($N = 78$)

Variable	F	R^2	p	β
Step 1				
CDI_{CR}	25.01	.25	<.0001	.50**
Step 2				
CDI_{CR}	15.15	.29	<.0001	.45**
PTSD-RI				.21
Step 3				
CDI_{CR}	19.89	.45	<.0001	.38**
PTSD-RI				.27*
Group status				−.41**
Step 4				
CDI_{CR}	16.91	.51	<.0001	.34*
PTSD-RI				.21
Group status				−.28*
Perceived threat				.31*

CDI_{CR}, Children's Depression Inventory, child report; PTSD-RI, Posttraumatic Stress Disorder-Reaction Index; group status coded 0, bereaved; group status coded 1, pediatric cancer; $\Delta R^2 = .04$ for Step 2 ($p < .05$); $\Delta R^2 = .16$ for Step 3 ($p < .01$); $\Delta R^2 = .06$ for Step 4 ($p < .01$).
*$p < .005$. **$p < .0001$

preoccupied with medical treatments and interruptions in social activities and relationships. The bereaved children's loss, on the other hand, was a more tangible event that made the reality of death more evident to them and, therefore, might have heightened their risk of PTS symptoms.

Interestingly, research has revealed that perceived life threat during one's illness is a stronger predictor of PTS symptoms in survivors of cancer than treatment variables (Barakat et al., 1997). To date, much of this research has involved children older than 7–8 years of age (e.g., Barakat et al., 1997; Stuber et al., 1997) because of developmental issues and concerns about young children's responses to self-report questionnaires. Hence, our inclusion of children younger than 8 years of age limits comparisons to other studies. However, only 3.75% of the children were less than 8 years old, thereby minimizing the extent of this problem.

Although perceived life threat has been linked to PTSD in other research (e.g., Barakat et al., 1997), this is the first study known, to date, that tested perceived future threat as a mediator for the relation between the type of traumatic event and the risk of PTS symptoms among children. These findings suggest that perceptions of an impending threat may be related to PTS symptoms in some child survivors of a life-threatening event. However, by the same token, *not* perceiving a future threat might shield some survivors from experiencing symptoms. Hence, understanding such mediating effects may prove useful for treating as well as preventing PTS symptoms. We did not test the mediational hypothesis with the parents because most of the bereaved parents had not remarried and, therefore, were at a low risk of losing another spouse. Furthermore, the parents of cancer survivors and of bereaved children did not differ significantly on their reports of PTS symptoms, thus restricting the range of scores on the dependent variable. Even though the mediational hypothesis was supported for the children, the correlational design of the study precludes inferring a cause and effect relation, as it is possible that the children's perception of a future threat was a concomitant symptom of PTS and not necessarily a predictor. Nevertheless, Manne et al. (2002) recently observed that perceived life threat predicted mothers' PTS symptoms 6 months after their child had undergone a BMT for cancer, thus providing some evidence for pursuing longitudinal research with pediatric cancer survivors to test the mediational hypothesis for perceived threat.

Although the parents in the two groups did not differ on PTS symptoms, more parents in the cancer group *tended* to report at least one or more hyperarousal symptom. The precarious nature of cancer, the associated treatments, and the potential late effects linked to treatment (neurocognitive impairment, vision and hearing deficits, and second cancers) might lead some parents of survivors to be hypervigilant to physical changes in their children for months and, sometimes, years after remission. Clinicians might be sensitive to this possible risk; however, replications are warranted before drawing definitive conclusions because, although others (LaGreca, Silverman, Vernberg, & Prinstein, 1996) have used the clustering procedure described to examine the nature of PTS symptoms, the lack of psychometric tests for this procedure limits conclusions.

An examination of the children's symptoms revealed that the bereaved children *tended* to endorse more reexperiencing symptoms than the survivors of pediatric cancer. LaGreca et al. (1996) used a similar procedure to classify PTS symptoms on the CPTSD-RI and observed that children who survived a natural disaster tended to endorse reexperiencing symptoms more than avoidance and hyperarousal symptoms. These findings suggest that assessing the types of symptoms that trauma survivors experience is relevant for treatment planning. The bereaved children may have been vulnerable to reexperiencing symptoms because they were reminded of their loss more often than cancer survivors were reminded of their illness. Developmental and social events that would have involved the deceased parent might occur more often than reminders of cancer and,

therefore, increase the risk of reexperiencing symptoms for the bereaved group.

Compared to the parents' reports of their children, the bereaved children reported significantly more PTS and anxiety symptoms, whereas the children and parents in the cancer group did not differ significantly. The bereaved parents' underestimation is consistent with research suggesting that internalizing symptoms are less noticeable than externalizing symptoms (Kashani, Orvaschel, Burk, & Reid, 1985). Other hypotheses include that the bereaved parents did not pay as much attention to their children as the mothers in the cancer group because their children were not ill and, therefore, they were not as observant of possible symptoms. By the same token, the focused attention on the pediatric survivors may have buffered these children's risk of PTS symptoms. These hypotheses warrant empirical evaluation before drawing conclusions. Nevertheless, regardless of the explanation, the bereaved parents' underestimation suggests that self-report measures should be included when assessing children for PTS symptoms.

Two of the strongest correlates of PTS symptoms that we observed among the children were their perceived future threat and their parents' PTS symptoms. The latter relation is consistent with evidence of a shared genetic predisposition for PTSD among family members (Goldberg, True, Eisen, & Henderson, 1990). Yet, familial concordance rates tend to be less than 20% (e.g., Goldberg et al., 1990; Kazak et al., 2004), suggesting that other risk factors such as the children's perception of a future threat may play an important role. Their perceptions, however, could be shaped by their parents' perceptions, in which case the parents might contribute to their child's symptoms and should be included in clinical interventions. Stuber et al. (1997) found that the mother's perceptions of threat and treatment intensity were related to pediatric cancer survivors' perception of threat and influenced the children's risk of PTS symptoms through the child's level of anxiety and perceived life threat/treatment intensity. Stuber et al. subsequently recommended that clinicians assess mothers' perceptions of danger and treatment intensity to aid in identifying families appropriate for clinical intervention.

According to the literature, girls and younger children generally tend to report more PTSD symptoms than boys and older children, respectively (Gilbert et al., 2001; Stuber et al., 1997). Such correlations, however, were not observed in this study. Perhaps, the overrepresentation of girls and the underrepresentation of children less than 10 years old (5%) limited the statistical power to detect such differences.

Methodological Limitations

Using self-report measures of psychiatric symptoms limit generalizations to research using measures of clinical disorders (APA, 1994). Although the Reaction Index has been revised to ascertain a diagnosis of PTSD, per *DSM-IV* criteria (Pynoos, Rodriquez, Steinberg, Stuber, & Frederick, 1999), this version was not yet available when this study was initiated. The revised measure is recommended for future research. Nevertheless, the PTS-RI and CPTSD-RI are well-validated measures that have been used extensively in empirical research and using them allowed for comparisons across similar studies (Barakat et al., 1997; Pynoos et al., 1993). In addition, rates from self-report measures of PTS symptoms are similar to rates from structured clinical interviews (Pelcovitz et al., 1998). These findings, however, cannot be compared to studies of lifetime rates of PTS symptoms because we assessed for current and enduring symptoms.

There are psychometric limitations with using a single-item measure of perceived future threat, which requires interpreting the results with caution. Although others have used similar items (e.g., Barakat et al., 1997; Stuber et al., 1997), further research on developing a psychometrically sound measure is warranted. Some may also question the validity of the measure because the perceived threat of the surviving parent dying may not be comparable to the perceived threat of a potentially fatal illness that was successfully treated in the past. Although there is some merit to this criticism, cancer is generally recognized as a life-threatening event, and the painful medical treatments for cancer are typically perceived as threatening by former patients (APA, 1994; Kazak et al., 2001). Other issues include the concern that the perceived threat question measures one's fear of a recurrence rather than one's cognitive appraisal of his or her risk, or that perceived threat is actually a symptom of PTSD. These concerns address the issue that perceptions about threatening events do not occur devoid of any emotional reactions as well as the issue that perceived threat might be a facet of the PTSD syndrome. Although we asked the children to indicate their cognitive appraisal of their risk of a recurrence, threats of injury or thinking about them can elicit uncomfortable cognitions and emotions including fear, anxiety, and worry, all of which could potentially influence one's risk appraisal. Hence, it would be fruitful to evaluate the proportion of variance that fear versus cognitive appraisals of perceived threat contribute to PTS symptoms in future studies.

The use of a volunteer, nonreferred sample also limits its generalizations to other populations. Although the

confidential recruitment process precluded comparisons between participants and nonparticipants, the response rate was comparable to rates reported in similar studies (Barakat et al., 1997; Kazak et al., 1997, 1998; Weller et al., 1991). Because generalizations of the findings are also largely restricted to Caucasians and females, future studies should include a more diverse sample. It was also noted that more of the breadwinners in the bereaved group were employed in professional positions, suggesting a potential bias. Yet, the bereaved children reported more PTS symptoms. Hence, any economic advantages that they might have possessed did not necessarily shield them from experiencing PTS symptoms.

A final limitation noted was that the frequency of other stressful life events including the loss or injury of other family members or a peer was not assessed. The continuity of care, providing a stable home environment, disruptions caused by a parent's fatal illness, and secondary adversities after the death of a parent (e.g., relocating) likely contribute to bereaved children's risk of stress-related symptoms and should be considered (Clark et al., 1994; Rotheram-Borus, Stein, & Lin, 2001). Stressful life events could produce either an indirect effect on adjustment (Stuber et al., 1997) or account for as much variance as the traumatic event. Future studies might examine whether stressful life events or the accumulation of events affect perceived future threat or mediate the relation between exposure to a traumatic event and PTS symptoms.

Clinical Implications

Although the families were not psychosocially impaired, it is important to recognize that PTS symptoms can be distressing and interfere with interpersonal relations. Hence, clinical interventions may be warranted in some cases. As suggested by these findings, assessing for perceived risk of threat might help with identifying such families in medical and school settings. A treatment program that focuses on reducing a heighten sense of risk for future threats and reinforces one's sense of competence could prove to be especially therapeutic. Likewise, children who perceive their risk for a future threat as low might be reinforced for their adaptive perception. However, clinicians might be wary of youth who are so unrealistically optimistic about their risk that they put themselves in harm's way. Finally, it is important to remember that overall, most families surviving cancer and parental loss appear to be coping well.

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