**Brief Report: Does Posttraumatic Stress Apply to Siblings of Childhood Cancer Survivors?**

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**Objective** To investigate whether adolescent siblings of childhood cancer survivors experience posttraumatic stress (PTS).

**Methods** Participants included 78 adolescent siblings of adolescent cancer survivors who completed self-report measures of anxiety, PTS, and perceptions of the cancer experience.

**Results** Nearly half (49%) of our sample reported mild PTS and 32% indicated moderate to severe levels. One fourth of siblings thought their brother/sister would die during treatment; over half found the cancer experience scary and difficult. These perceptions were related to PTS. Siblings reported more PTS symptoms than a reference group of nonaffected teens but had similar levels of general anxiety.

**Conclusions** Levels of PTS are elevated for siblings of childhood cancer survivors. Thus, PTS may be a useful model for understanding siblings' long-term reactions to cancer. Future research and clinical efforts should consider the needs of siblings of childhood cancer survivors in a family context.

**Key words** siblings; cancer survivors; adolescents; posttraumatic stress.

Childhood cancer in a brother or sister is one of the most challenging diseases for siblings to face (Sharpe & Rossiter, 2002). During cancer treatment, a healthy sibling may witness the physical and emotional pain of an ill brother or sister, along with the parents' distress. Those siblings who understand the life threat inherent in cancer may be disturbed by the uncertainty of the future. They may also need to endure sudden and extended separations from the ill child and their parents and negotiate changes in family members' roles and responsibilities (Shannon, Barbarin, McManus, & Freeman, 1994b). Given the family disruption concomitant with diagnosis and treatment for childhood cancer, it is important to understand short- and long-term consequences of these diseases for siblings.

Research into the short-term consequences of childhood cancer for healthy siblings has shown that during the treatment period, some siblings feel guilt, powerlessness, loneliness, anxiety, depression, anger, and jealousy (Barbarin et al., 1995; Martinson, Gilliss, Collaizzo, Freeman, & Bossert, 1990). Some exhibit poor academic achievement, difficulties in social relationships, mood disturbances, and conduct problems (Barbarin et al., 1995; Sahler et al., 1994). Others show enhanced socialization, taking on a role of helping the ill child and their parents (Horwitz & Kazak, 1990). Despite the variation in responses, the challenges faced by siblings during cancer treatment may put them at risk for long-term psychological difficulties.

Unfortunately, the long-term adjustment of siblings of children with cancer has been rarely investigated. Our review of the literature found only one such study. In that investigation, no differences were noted between 60 siblings and a comparison group on internalizing and externalizing problems, self-esteem, or depression (Van Dongen-Melman, De Groot, Hahlen, & Verhulst, 1995). Though most siblings adjust well posttreatment, general measures of adjustment may not capture the distinctive, traumatic aspects of facing a life-threatening illness in a sibling.

One model of adjustment that captures the traumatic nature of childhood cancer is a posttraumatic stress (PTS) model. This model has been applied to adolescent and young adult cancer survivors and their parents. Most adolescent survivors display rates of PTS similar to those of nonaffected comparison children, with 14.2% scoring in
the moderate to severe range on the Posttraumatic Stress Disorder Reaction Index (PTSD-RI; Kazak et al., 1997). However, young adult survivors are at increased risk for posttraumatic stress disorder (PTSD), with 20.5% qualifying for the diagnosis at some time since their cancer treatment and many more showing subclinical levels of PTSD (Hobbie et al., 2000). Parents of childhood cancer survivors also show elevated rates of PTSD and PTS. Rates of PTSD among mothers of childhood cancer survivors have been found to range across studies from 6.2% to 11% (Kazak et al., 1997; Manne, DuHamel, Gallelli, Sorgen, & Redd, 1998), with 40.2% scoring in the moderate to severe range on the PTSD-RI (Kazak et al., 1997). Fathers are investigated less frequently, but about 31.2% reach the moderate to severe range on the PTSD-RI (Kazak et al., 1997). Although siblings of cancer survivors may also be exposed to traumatic aspects of the cancer experience and develop PTS, their long-term adjustment in this regard has not been previously investigated.

The purpose of this study was to explore PTS in siblings of childhood cancer survivors. Data on sibling PTS and anxiety were collected and compared to those of a reference group. Perceptions of life threat and cancer-related hardship were measured as correlates of PTS. Last, differences in PTS were examined according to gender and age at diagnosis, as these variables have been found to moderate adjustment (Houtzager, Grootenhuis, & Last, 1999).

**Method**

**Sample Recruitment and Procedure**

Sibling data were collected during a preintervention home visit as part of an institutional review board–approved randomized clinical trial of an intervention to reduce symptoms of PTS and improve family functioning for families of adolescent survivors of childhood cancer (Surviving Cancer Competently Intervention Program [SCCIP]; Kazak et al., 1999). Names and contact information of childhood cancer survivors between 11 and 18 years of age and 1 to 10 years posttreatment were gathered from our oncology tumor registry. The survivor and his or her parents and siblings were contacted by mail inviting participation. Through follow-up phone calls, we ensured eligibility, gathered names and ages of siblings, explained the study, answered questions, secured enrollment, and scheduled data collection. Siblings giving informed consent completed self-report questionnaires including measures of anxiety, PTS, and perceptions of the cancer experience. We compared our sample to a reference group of children with no familial illness on measures of PTS and anxiety collected in a previous study (Kazak et al., 1997).

**Participants**

A total of 151 families enrolled in the randomized clinical trial; 113 siblings between the ages of 10 and 20 were identified across 81 of these families and were invited to participate; 99 siblings (88%) from 78 families agreed. In families where multiple siblings participated, one data packet was randomly chosen for analyses. Thus, the final number in the analyses was 78.

The average age of the siblings was 14.2 years (SD = 2.2). About half (55.6%) were older than their sibling who had survived cancer; three (3.1%) were twins of survivors. At diagnosis these siblings ranged in age from 4.9 months to 15.8 years (M = 7.9 yrs, SD = 3.8). Cancer diagnoses included solid tumors (32%), lymphomas (23%), ALL (28%), and other cancers (17%). At the time of data collection, the families were, on average, 5.3 years post-treatment (SD = 3.3). The majority of the sample (88.0%) was Caucasian, with 10.7% African American and 1.3% Hispanic. Roughly a third (30.6%) reported an annual income below $50,000, 44.4% between $50,000 and $100,000, and 23.6% above $100,000.

The preexisting reference sample included 134 children drawn from hospital-based pediatric practices (Kazak et al., 1997). These children had no family members with serious chronic medical or psychiatric conditions. The mean age was 13.2 years (SD = 2.2), and roughly half (54.2%) of the children were female. The majority of the sample was Caucasian (61%), with 17% African American, 13% Hispanic, and 7% Asian. Roughly a third (37%) reported annual incomes below $50,000, 30% between $50,000 and $100,000, and 33% above $100,000. This group was similar to the sibling group in terms of gender distribution, \( \chi^2(1) = .03, p = .86 \), and annual income, \( \chi^2(2) = 4.95, p = .08 \), but was, on average, one year younger, \( t(206) = 3.27, p < .005 \), and included a greater number of ethnic minorities, \( \chi^2(4) = 17.17, p < .001 \).

**Measures**

**Revised Children’s Manifest Anxiety Scale (RCMAS).** The RCMAS is a 37-item self-report inventory of anxiety (Reynolds & Richmond, 1985). Subscales include physiological anxiety, worry, and social anxiety. Internal consistency, test-retest reliability, and construct and discriminate validity are adequate. Among our sample of siblings, alpha was .84.

**Impact of Events Scale-Revised (IES-R).** Siblings of cancer survivors completed the 22-item IES-R (Weiss & Mar-
Posttraumatic Stress Disorder Reaction Index (PTSD-RI). The PTSD-RI (Pynoos, Frederick, Nader, & Arroyo, 1987) is a 20-item self-report measure with items paralleling the diagnostic criteria for PTSD. Each item is rated for frequency of occurrence on a 5-point scale. Total scores are calculated and can be categorized into severity of posttraumatic stress reaction based on the following scores: 12 to 24 = mild reaction; 25 to 39 = moderate reaction; above 40 = severe reaction. Internal consistency in our sibling sample was alpha = .74.

Assessment of Life Threat and Treatment Intensity Questionnaire (ALTTIQ). The ALTTIQ (Stuber et al., 1997) has respondents rate agreement with two statements assessing perceptions of life threat (i.e., I thought my brother/sister would die when he/she had cancer; My brother/sister could still die from his/her cancer) and two items assessing cancer-related hardship (i.e., My brother/sister's cancer was scary [hard] for me) on 5-point Likert scales. Ratings of hardship items were highly correlated (\(r = .79, p < .001\)) and so were averaged to form one score.

Results

Nearly half (n = 37; 49.3%) of the siblings had mild posttraumatic stress reactions and almost a third (n = 24; 32.0%) had moderate to severe reactions on the PTSD-RI. To interpret IES-R scores, we examined correspondence between the IES-R items and DSM-IV PTSD criteria. When an item corresponding to a criterion occurred at least “sometimes” in the past 7 days, we considered the criterion fulfilled. When more than one IES-R item loaded onto a single criterion, endorsement of any one of the items at least “sometimes” fulfilled the criterion. Some PTSD criteria were not represented on the IES-R; thus, the following rates may underestimate the true level of PTS in our sample. Per IES-R responses, 38.7% (n = 29) of the siblings reported one or more symptoms of reexperiencing, 21.3% (n = 16) indicated three or more symptoms of avoidance, and 22.7% (n = 17) endorsed two or more symptoms of arousal, fulfilling DSM-IV PTSD symptom cluster criteria. Despite these levels of PTS, the average anxiety score was in the normal range (M = 47.42, SD = 10.21).

To assess if these rates of PTS were elevated, we compared the siblings’ data to those of a preexisting reference group. Although the groups differed on age and ethnic composition, correlational analyses revealed that these variables were not related significantly to PTS; thus, they were not controlled in the analyses. The siblings reported more intrusion (Ms [SDs] = 7.01 [7.48] vs. 4.60 [5.99]; \(t_{[197]} = 2.50, p < .02\)) and avoidance symptoms on the IES-R (11.53 [9.96] vs. 6.80 [8.22]; \(t_{[131]} = 3.45, p < .001\)) and more PTS on the PTSD-RI (20.48 [9.21] vs. 19.40 [10.18]; \(t_{[196]} = 3.53, p < .01\)). The groups did not differ on anxiety (47.42 [10.21] vs. 48.78 [11.56]; \(t_{[199]} = -.83, p = .41\)).

Over a fourth (n = 20, 27%) of siblings indicated on the ALTTIQ that they thought their brother/sister would die during cancer treatment. Over half (n = 42, 56.8%) reported that cancer treatment was scary and hard. These beliefs were correlated with PTS scores (r ranged from .32 to .41, ps < .01). A few siblings (n = 12, 16%) believed their sibling could still die from cancer.

For the sibling sample, two 2 × 2 analyses of variance (ANOVAs) were calculated with gender and age at diagnosis (dichotomized at age 6) as independent variables and PTSD-RI and IES-R scores as dependent variables. Age 6 was chosen as the point of dichotomization because children beyond this age tend to have more advanced cognitive skills and thus a clearer understanding of cancer. Despite unequal cell sizes, assumptions of homogeneity of variance were met. Female siblings, F(1, 69), and those older than 6 at diagnosis, F(1, 69), p < .05, endorsed more PTS symptoms on the IES-R. There were no significant interactions or differences on the PTSD-RI (see Table I for means).

Discussion

Adolescent siblings of childhood cancer survivors were found to report symptoms of posttraumatic stress. Nearly a third of the sample indicated moderate to severe PTS on the PTSD-RI. Previous data show a strong association between scores in this range and clinical diagnosis of PTSD (Pynoos et al., 1993). When we compared our group to a reference group of nonaffected teens, striking differences emerged in levels of PTS. These results offer evidence that PTS may be a useful model for understanding the long-term adjustment of siblings of cancer survivors.

Although these results are preliminary, it is not surprising that siblings of childhood cancer survivors report symptoms of PTS. A PTS model has been used effectively as a framework for conceptualizing the ongoing cancer-related distress of childhood cancer survivors and their parents. Although siblings of childhood cancer survivors may not have the same level of exposure as parents, who are at the hospital and involved in decision making, or
the survivors themselves, who endure invasive cancer treatments, siblings still experience traumatic aspects of the cancer. As described earlier, siblings are often exposed to the physical and emotional suffering of their brother or sister, some (nearly a third of our sample) think their brother or sister will die, and many (over half of our sample) feel fear. Indeed, our results showed that siblings with these perceptions were more likely to endorse symptoms of PTS.

Although we cannot directly compare the siblings in our sample to their family members on rates of PTS, it is interesting to note that rates of PTS in our sample (32% scoring in the moderate to severe range on the PTSD-RI) seem to fall below previously reported rates for mothers (40%), near rates for fathers (30%), and above rates for the survivors themselves (14%). We speculate that our sample had this rate of PTS because, like parents, in addition to witnessing the effects of cancer and its treatment and feeling fear and helplessness, some siblings adopt a caregiving role with the survivor (Horwitz & Kazak, 1990). However, like many fathers, siblings are not as involved as most mothers in hospital-based caregiving. Additionally, the rates of PTS in siblings may exceed that of the survivors because, unlike most survivors, most siblings are distanced from their most common source of social support: their parent(s). Shifts in family role responsibilities, possible long parental absences, and the intense distress of parents may interfere with successful adaptation of siblings to this severe stressor.

Despite these clinically significant levels of PTS, we found no elevations in general anxiety, and anxiety scores did not differ between siblings and our reference group of nonaffected teens. There were significant correlations between anxiety scores and some measures of PTS (PTSD-RI: $r = .39$, $p < .001$; IES arousal subscale: $r = .28$, $p < .02$), but these correlations were modest at best and, despite elevations of PTS, did not result in elevations of anxiety across our sample. These findings contribute to our argument that general measures of adjustment and models of general distress may not be sensitive enough to capture the specific psychological consequences of facing childhood cancer that are consistent with a trauma model.

Female siblings reported more PTS than male siblings. This finding may reflect the increased family responsibilities many girls encounter following diagnosis of cancer, including caring for the ill child (Shannon, Barbarin, McManus, & Freeman, 1994a). Such responsibilities may expose girls more directly to the trauma of cancer. Gender differences in PTS may also be explained by higher levels of empathy in girls (Lennon & Eisenberg, 1987). Siblings who are more emotionally attuned to their brother or sister may be more vulnerable to the negative impact of cancer (Houtzager et al., 1999). Finally, girls are frequently found to exhibit more PTS than boys, even given the same level of exposure (Foia & Street, 2001).

Children who were older than 6 at diagnosis indicated more PTS symptoms than those 6 and younger at diagnosis. The older children’s better memory of the event and greater understanding of the realities of cancer may contribute to their higher levels of symptoms. Older children may also be more involved in family discussions about cancer (Shannon et al., 1994a), which may increase their level of stress, by increasing their level of exposure.

There are limitations of this study. First, the siblings were drawn from an intervention study. Families with more symptoms may have been more likely to participate, contributing to a possible overestimation of PTS. Additionally, while the reference group provided some useful comparative data, there were demographic differences between the groups. Although the discrepant variables, age and ethnicity, were not related to PTS, other, unmeasured differences may exist between the groups that may relate to PTS. Finally, this study relied heavily upon self-report questionnaires. The use of structured clinical interviews, the gold standard for assessing PTS, is warranted in future investigations.

This preliminary evidence of PTS symptoms in sib-

<table>
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<th>Measure</th>
<th>Male (n = 32)</th>
<th>Female (n = 42)</th>
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<td>PTSD-RI</td>
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<td>6 and younger (n = 29)</td>
<td>19.83 (2.61)</td>
<td>20.41 (2.20)</td>
<td>20.12 (1.71)</td>
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<td>17.40 (2.02)</td>
<td>23.68 (1.81)</td>
<td>20.54 (1.36)</td>
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<td>22.05 (1.42)</td>
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<td>IES-R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 and younger</td>
<td>12.46 (5.58)</td>
<td>21.00 (4.49)</td>
<td>16.73 (3.58)</td>
</tr>
<tr>
<td>Older than 6</td>
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<td>31.92 (3.70)</td>
<td>26.04 (2.78)</td>
</tr>
<tr>
<td>Column total</td>
<td>16.30 (3.48)</td>
<td>26.46 (2.91)</td>
<td>21.38 (2.27)</td>
</tr>
</tbody>
</table>

PTSD-RI scores could range from 0 to 80; IES-R scores could range from 0 to 110.
lings of childhood cancer survivors is novel and contributes to the scant empirical literature in this area. Additional research is needed to further delineate subgroups of siblings at greatest risk for long-term symptomatology. Given that PTS is also found in parents of survivors, it may be important to examine familial patterns of adjustment and to develop family-based interventions to ameliorate or prevent PTS symptoms.

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