Posttraumatic Stress Disorder Among Mothers of Pediatric Cancer Survivors: Diagnosis, Comorbidity, and Utility of the PTSD Checklist as a Screening Instrument

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Objective: To examine posttraumatic stress disorder (PTSD) in mothers of survivors of childhood cancer. Comorbidity of anxiety and depressive disorders, prevalence of subclinical PTSD, and the utility of a self-report measure as a screening instrument for PTSD were also investigated.

Method: Mothers (n = 65) completed a questionnaire self-report PTSD checklist (PCL-C). Mothers were administered several modules of the SCID: nonpatient edition by telephone, including the PTSD, Generalized Anxiety, and Major Depressive Disorder modules.

Results: We diagnosed 6.2% of the sample with current PTSD. An additional 20% had subclinical PTSD. One of four mothers with PTSD diagnoses had a comorbid diagnosis of an anxiety and depressive disorder. The PCL-C evidenced diagnostic utility as a screening instrument. However, a moderate number of false-positives would result if the recommended cut-off on the instrument was used.

Conclusions: The PCL-C had diagnostic utility in screening mothers of childhood cancer survivors. The presence of comorbid diagnoses such as anxiety and depression should be examined.

Key words: posttraumatic stress disorder; childhood cancer; mothers; survivorship.

Recent evidence has suggested that life-threatening diseases such as cancer may meet DSM-IV criteria for a traumatic stressor and that these experiences are associated with the occurrence of posttraumatic stress disorder (PTSD; American Psychiatric Association, 1994). Identification of PTSD symptoms and diagnoses in cancer survivors is a growing area of research. Cordova and colleagues (1995) assessed the presence of PTSD symptoms in 55 breast cancer survivors using a self-report instrument, the civilian version of the PTSD checklist (PCL-C; Weathers, Huska, & Keane, 1991). Using the recommended screening criteria for the PCL-C, they reported that 5%–10% of the sample would likely meet diagnostic criteria for current PTSD. Cordova, Andrykowski, and Jacobsen (1997) used the PCL-C to determine presence of PTSD in a larger sample of breast cancer survivors.
survivors. Results of this study indicated that 8.5% of the sample was likely to merit a PTSD diagnosis.

Parents of children with cancer are also at risk for developing PTSD. Indeed, learning that one's child has a life-threatening disease, as well as witnessing one's child undergoing repeated aversive medical procedures such as lumbar puncture or venipuncture (Manne et al., 1992), enduring chemotherapy side effects, and undergoing sometimes painful and disfiguring surgery, can be traumatic for parents. Using self-report instruments, Stuber and colleagues (1994, 1996) as well as others (Butler, Rizzi, & Handwerger, 1996; Heiney, Neuberg, Myers, & Bergman, 1994; Kazak et al., 1997) have found that between 10% (Kazak et al., 1997) and 40% (Stuber et al., 1996) of parents of pediatric cancer survivors report significant levels of traumatic stress symptoms.

Other studies of posttraumatic symptoms associated with cancer have focused on posttraumatic stress symptoms in pediatric cancer survivors, using self-report instruments. Stuber and colleagues (1996) used the PTSD Reaction Index (Frederick, 1985), and found that 12.5% of pediatric leukemia survivors reported symptoms indicative of a severe posttraumatic stress disorder. Studies using the Reaction Index (Kazak et al., 1997) or the PTSD Symptom Scale (Butler et al., 1996) have documented a range between 14.2% (Kazak et al., 1997) and 21% (Butler et al., 1996) of children that were likely to meet criteria for PTSD.

The studies reviewed above do not formally assess the presence of PTSD diagnosis using DSM-IV criteria. To accomplish this, the Structured Clinical Interview for PTSD (SCID; Gibbon, Williams, & Janet, 1996; Spitzer, Williams, Gibbon, & First, 1992; Williams, Gibbon, First, et al., 1992) is considered a robust method of assessing PTSD (Watson, 1990). Alter and colleagues (1996) employed this instrument to assess PTSD in a small sample (n = 27) of women who had completed breast cancer treatment at least three years prior to the interview. Results indicated that one woman met criteria for current PTSD (4%). Andrykowski, Cordova, Studts, and Miller (in press) used the SCID to diagnose PTSD in 82 stage I to IIIA breast cancer survivors and found that current PTSD was present in 6% of the sample.

To date, only one study has formally assessed the occurrence of PTSD in parents of childhood cancer survivors. Pelcovitz and colleagues (1996) used the SCID to formally assess PTSD in a small sample of 24 mothers of pediatric cancer survivors who had been off treatment up to 11 years. Results indicated that 25% of mothers were diagnosed with current PTSD.

For parents of pediatric cancer survivors, several issues require empirical attention. First, little is known about the comorbidity of other psychiatric diagnoses likely to be present among parents of pediatric cancer survivors. Of particular interest are depressive disorder and generalized anxiety disorder. General population studies (Breslau, Davis, Peterson, & Schultz, 1997) and studies of Vietnam combat veterans (Penk et al., 1989) and disaster victims (Green, Lindy, Grace, & Leonard, 1992; McFarlane & Papay, 1992) have suggested that the risk for major depression and anxiety disorders is higher among individuals with PTSD. Second, no psychometric information on the PCL-C is available in a population of parents of pediatric cancer survivors. Validity information on this scale has been presented for Vietnam veterans (Weathers et al., 1993), motor vehicle accident victims (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996), and recently for breast cancer survivors (Andrykowski et al., in press). Such validity information is important, because self-administered scales are less time-consuming and costly to administer, and thus can be used as a screening method for identifying individuals who might require more intensive assessment or psychological services.

Third, studies of parents of pediatric cancer survivors have not assessed subclinical or partial PTSD, which is defined as two of three of the diagnostic criteria (Cluster B, C, or D). In studies of individuals who have undergone other traumatic events, partial PTSD is more common than full PTSD (Carlier & Gersons, 1995; Weiss et al., 1992). Similar findings have recently been reported among breast cancer survivors (Cordova et al., 1997). Subclinical PTSD is associated with more occupational impairment among community samples (Stein, Walker, Hazen, & Forde, 1997) and a reduced quality of life for adult cancer survivors (Smith et al., under review).

The purposes of the present study were threefold. The first aim was to examine the prevalence of formal PTSD and subclinical PTSD diagnoses in mothers of children posttreatment for cancer with a larger sample than was employed in the Pelcovitz et al. (1996) study. The second aim was to evaluate the efficacy of the PCL-C in the screening and diagnosis of PTSD by comparing its results with diagnos-
tic outcomes derived from a structured interview for PTSD, the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Nonpatient version (SCID-NP, Spitzer et al., 1990). The third aim was to examine the comorbidity of depression and anxiety disorders with PTSD, using the SCID.

Method

Participants

Sixty-five mothers of children who had survived cancer participated. Potential participants were identified from a list of children and parents who participated in a longitudinal (6-month) study of treatment adherence of newly diagnosed children and the psychological adjustment of their primary caregivers (Manne et al., 1995, 1996, in press). Eligibility criteria for inclusion in the original study were (1) child was between 3 and 18 years of age; (2) child was diagnosed with a first occurrence of a nonbrain cancer within the prior month; (3) parent was able to read and speak English; and (4) parent was the primary caregiver to the child during cancer treatment (accompanied the child to all clinic appointments and primarily responsible for the delivery of the child’s medical care). Children were identified from outpatient clinic lists of new outpatient visits from the years 1990 through 1994. For the current study, the additional eligibility criteria were (1) child had successfully completed cancer treatment; (2) child was living; (3) the child’s cancer had not recurred since the initial diagnosis (e.g., the initial treatment was successful); (4) the family currently resided in the United States; (5) a currently valid address or phone number could be obtained; and (6) the parent who participated in the initial study was a mother.

From the initial list of 171 potential participants, 112 mothers met the eligibility criteria (65%). Of these 112 eligible mothers, 65 mothers agreed to participate in the study (58%). The most common reasons given for nonparticipation were that the questionnaire was too upsetting or lack of time. Of the 47 mothers who refused participation, 26 mothers returned the questionnaire but refused the SCID phone interview.

A comparison of the 47 eligible mothers who did not return the questionnaire or participate in the phone interview with participants indicated no differences in terms of available demographic (child gender, child age) and medical (diagnosis, time off treatment) variables. A comparison of the 26 mothers who returned the questionnaire but did not complete the phone interview with the 65 participants did not indicate any differences in terms of demographics or self-reported traumatic stress symptoms.

The mean maternal age was 40 years (SD = 7.59, range = 22-54 years). Most of the mothers were White (83.1%), with 4.6% Black, 7.7% Hispanic, and 4.6% Asian. Forty-eight (74%) of the mothers were married, nine (14%) were divorced, two (3%) were separated, four (6.2%) were never married, and two (3.1%) were widowed. Forty-one percent of the mothers had completed high school and the remainder had completed at least a partial college education. Twenty-three percent of parents had a self-reported annual household income of less than $20,000 and 53% had an annual income of greater than $50,000. The children ranged in age from 6 to 25 years (M = 14.5 years, SD = 5.2) and had completed treatment a mean of 3.2 years before participation (SD = 3.02; range = 4 months–7 years). The average amount of time since the children had been diagnosed was 5 years (range = 2–7 years). The most frequent children’s cancer diagnoses were leukemia (n = 15), lymphoma (n = 8), sarcoma (n = 24), and neuroblastoma (n = 13). Eleven children had undergone a bone marrow transplant. On average, children were in cancer treatment for 1.5 years. At the time of diagnosis, children ranged from 3 to 18 years of age.

Procedures

A letter describing the study in detail and a questionnaire containing self-report measures were mailed to potential participants. Mothers were asked to return the packet in a postage-paid envelope. Mothers who did not wish to participate in the phone interview portion (diagnostic interview for PTSD) were asked to return a postcard to the investigator declining participation. Mothers who did not return the postcard within a 2-week time period were contacted and a telephone interview was arranged. Interviews were conducted by two doctoral-level graduate students in psychology who were not involved in the patient’s medical care. During the interview, parents completed the SCID-NP for DSM-
IV, including the PTSD, Generalized Anxiety, and Major Depressive Disorder modules (Spitzer et al., 1990). Forty-seven interviews were audiotaped. Not all interviews were tape-recorded due to either recorder dysfunction or interviewer error.

**Dependent Measures**

The SCID-NP-PTSD (Spitzer et al., 1990) assesses whether the stressor criterion has been met (Criterion A) and the presence of 17 different PTSD symptoms. Although there is no "gold standard" for assessing PTSD, this instrument has demonstrated substantial sensitivity in detecting PTSD (e.g., proportion of true PTSD correctly identified), strong specificity (e.g., proportion of true non-PTSD correctly identified) and a robust kappa (Davidson, Smith, & Kudler, 1989; Kulka et al., 1988).

Criterion A assesses whether the symptoms occur after exposure to an event involving actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The response to the event must involve intense fear, helplessness, or horror. Criterion B symptoms assess a persistent reexperiencing of the traumatic event. Criterion C assesses avoidance of stimuli associated with the stressor and a numbing of emotional responsiveness. Criterion D assesses physiologic arousal occurring after the event. A diagnosis of PTSD requires a presence of at least one Criterion B, three Criterion C, and two Criterion D symptoms. Symptoms must have been present for at least one month (Criterion E) and be associated with impaired social and occupational functioning (Criterion F). The responses are rated using a 4-choice rating: inadequate information, absent, subthreshold, and threshold. Only responses rated as meeting “threshold” are considered having met the criterion for each symptom. All questions were specifically linked to the child's cancer. It should be noted that all items were asked, even if the parent did not endorse both symptoms for Criterion A.

The SCID-Major Depressive Episode module (Spitzer et al., 1990) assesses the presence of nine depressive symptoms (depressed mood, diminished interest, weight loss/gain, insomnia, psychomotor agitation, fatigue, worthlessness, concentration problems, suicide ideation). Responses are rated using a 4-choice rating described above. Subjects must endorse five of nine symptoms in order to meet criteria for Major Depressive Disorder. The SCID-Generalized Anxiety Disorder module assesses the presence of excessive anxiety and worry about two or more life circumstances. If the subject endorses excessive worry, the subject must also endorse three of six possible symptoms (restlessness, fatigue, difficulty concentrating, irritability, muscle tension, or sleep disturbance) in order to meet criteria for Generalized Anxiety Disorder.

Interviews were conducted by one of two interviewers. Both interviewers were trained in the administration of the SCID using the SCID manual and videotaped sample interviews, with practice interviewing. Training was conducted by one of the authors of the instrument (M. Gibbon). One interviewer (KG) had extensive experience in administration of the SCID. Additional training and supervision of the interviewers was accomplished in three individual training sessions conducted during the time the interviews were being completed. The supervision was provided by a psychiatrist with extensive training in the diagnosis of PTSD and the SCID. During these sessions, the psychiatrist evaluated audiotaped interviews with the interviewer present. Symptom endorsement and PTSD diagnosis for each participant was discussed, to guard against interviewer drift and ensure accuracy of scoring. Interviewers were blind to the PCL-C scores for each subject.

To establish interrater reliability, a subset of 18 audiotapes (38% of taped interviews) were independently reviewed and scored by a second rater, a doctoral-level graduate student in health psychology. The second rater did not administer the SCID. This rater was trained in SCID administration using the SCID manual and videotaped sample interviews, and this rater had extensive supervised experience in the administration of the SCID (including the PTSD module) with burn patients. This rater also received additional training sessions with the psychiatrist in order to ensure accurate ratings. The rater was blind to the PCL-C responses and any other identifying information about the parent and child. Interrater reliabilities, both percent agreement and coefficient kappa (Cohen, 1960) are shown in Table I. There are no standard criteria for acceptable kappa levels. Bakeman and Gottman (1986) use a kappa of .70 as an acceptable level, and Fleiss (1981) characterizes kappas of .40 to .60 as fair, .60 to .75 as good, and over .75 as excellent. Using Fleiss's criteria, results indicated that kappa was excellent for the PTSD diagnosis, Criteria A, B, C, D, and F, and for the majority of individual symptoms. Criterion E evidenced fair reliability. Several symp-
PTSD in Mothers

Table I. Interrater Agreement for PTSD Criteria and Symptoms

<table>
<thead>
<tr>
<th>Criterion/Symptom</th>
<th>k</th>
<th>% agreement</th>
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<tbody>
<tr>
<td>Stressor Severity (Crit. A)</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Witness event/life threat</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fear/horror</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Reexperiencing (Crit. B)</td>
<td>.82</td>
<td>.94</td>
</tr>
<tr>
<td>Disturbing memories</td>
<td>.66</td>
<td>.81</td>
</tr>
<tr>
<td>Disturbing dreams</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Act/feel like happening</td>
<td>.61</td>
<td>.88</td>
</tr>
<tr>
<td>Upset by reminders</td>
<td>.44</td>
<td>.69</td>
</tr>
<tr>
<td>Physical reaction to reminders</td>
<td>.85</td>
<td>.93</td>
</tr>
<tr>
<td>Avoid/Numb (Crit. C)</td>
<td>.82</td>
<td>.93</td>
</tr>
<tr>
<td>Avoid thoughts/feelings</td>
<td>.34</td>
<td>.83</td>
</tr>
<tr>
<td>Avoid activities or places</td>
<td>.77</td>
<td>.93</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>.77</td>
<td>.93</td>
</tr>
<tr>
<td>Loss of interest</td>
<td>.72</td>
<td>.89</td>
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<tr>
<td>Feeling distant/cut-off</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Feeling emotionally numb</td>
<td>.77</td>
<td>.93</td>
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<tr>
<td>Foreshortened future</td>
<td>.62</td>
<td>.83</td>
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<tr>
<td>Arousal (Crit. D)</td>
<td>.77</td>
<td>.88</td>
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<tr>
<td>Difficulty sleeping</td>
<td>.89</td>
<td>.93</td>
</tr>
<tr>
<td>Irritable/angry outbursts</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Difficulty concentrating</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Hypervigilance</td>
<td>.87</td>
<td>.94</td>
</tr>
<tr>
<td>Exaggerated startle</td>
<td>.77</td>
<td>.94</td>
</tr>
<tr>
<td>Duration (Crit. E)</td>
<td>.56</td>
<td>.83</td>
</tr>
<tr>
<td>Impairment (Crit. F)</td>
<td>1.00</td>
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Interrater Agreement for PTSD Criteria and Symptoms. Symptoms evidenced good reliability, but one symptom evidenced poor reliability (efforts to avoid conversations, thoughts about the trauma).

The Posttraumatic Symptom Disorder Checklist-Civilian Version (PCL-C; Weathers et al., 1991, 1993) is a 17-item Likert scale. Items correspond to the DSM-IV symptoms of PTSD. Items were keyed to the diagnosis and treatment for the child's cancer. Scoring procedures on the PCL-C result in three subscale scores that correspond to DSM-IV PTSD symptom clusters B, C, and D, as well as a total symptomatology score. The PCL-C can be used to identify individuals who are likely to merit a diagnosis of PTSD in two ways. The cut-off score method recommends a total score of 50 or more as meriting a formal diagnosis. The symptom cluster method suggests that individuals are likely candidates for PTSD if they report having been at least moderately bothered by one or more reexperiencing symptoms, three or more avoidance symptoms, and two or more arousal symptoms over the past month. In Weathers's studies on Vietnam veterans, PCL-C scores had a coefficient alpha of .97, a test-retest reliability of .96, and convergent validity with the Mississippi scale of .93 and the MMPI-2 PK Scale (.77) (Weathers et al., 1993). Using the cut-off score method, the PCL-C had diagnostic sensitivity of .82 and a specificity of .83 (Weathers et al., 1993).

Results

Prevalence of PTSD

Based on SCID-NP-PTSD responses, 4 of 65 mothers were diagnosed with current PTSD (6.2%). Partial PTSD, which is defined as meeting the stressor criterion and criteria for two of three PTSD symptom clusters, was present in an additional 13 mothers (20%). Criterion A was met by 95.4% of parents (n = 62), but 100% of the sample endorsed item 1, “witnessed an event which involved death/injury to self or others.” Criterion B was met by approximately half of the mothers (51%; n = 33), Criterion C was met by nine mothers (13.8%; n = 9), and Criterion D was met by 19 mothers (29.2%; n = 19). The most frequently endorsed symptoms were “recurrent and distressing recollections about the event,” (37%), “intense distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event” (34%), and “being watchful or on guard when there was no reason to be” (32%). The least endorsed symptoms were “recurrent or distressing dreams of the event,” and “restricted range of affect” (both endorsed by 6.2% of the sample).

Mothers reported a mean PCL-C score of 33.5 with a standard deviation of 13.56. Using a 50 or greater total score on the PCL-C, we found that 10 mothers met criteria for PTSD (15.4%). One mother with a total score of 53 did not meet criteria based on the symptom cluster method. Ten mothers met symptom cluster criteria (15.4%). One parent who met cluster criteria had a total symptom score of 44. An additional 13 mothers (20%) met criteria for subclinical PTSD (i.e., two of three symptom clusters were present). Eleven of these 13 mothers met criteria for Cluster B and 10 mothers met criteria for Cluster D. Only 5 of 13 mothers met criteria for Cluster C (avoidance and numbing).

Validity of the PCL-C

We compared the results of the PCL-C scoring with the diagnosis on the SCID to determine the utility of the PCL-C as a screening method. Sensitivity,
specificity, positive and negative predictive power, and diagnostic efficiency were computed for the recommended PCL-C cut-off scores, as well as two additional lower cut-off scores. The lowest cut-off score was reached when 100% sensitivity of the PCL-C was achieved. Results are shown in Table II. Use of the cut-off score of 50 resulted in a sensitivity of .75 and a specificity of .89. Seven false-positive and one false-negative diagnoses were found. A cut-off score of 40 resulted in a sensitivity of 1.00 and a specificity of .77 with 14 false-positive and no false-negative diagnoses of PTSD.

Using the symptom cluster method, we found that the sensitivity was 1.00 and the specificity was .92, with a positive predictive power of .44, a negative predictive power of 1.00, and a diagnostic efficiency of .92.

Conclusions

There are few life experiences as horrifying and difficult as coping with the diagnosis and treatment of cancer in one’s child. The results of the current study indicate that the prevalence of current PTSD, as measured by a formal structured clinical interview, was 6.2%. Partial or subclinical PTSD was documented in a higher percentage of mothers (20%). Comorbid anxiety and depression was present in a small subset of mothers with PTSD. With regard to the validity of the self-administered PCL-C, our data suggest that the instrument has utility in screening parents of childhood cancer patients, but that a number of false-positives would result if the recommended cut-off was used. We will discuss these findings and their clinical implications.

The prevalence of PTSD was not as high as figures reported in a previous study of mothers of childhood cancer survivors that employed the SCID interview (25%, Pelcovitz et al., 1996) or studies employing self-report inventories to assess posttraumatic symptomatology (39.7%, Stuber et al., 1996; 10.2%, Kazak et al., 1997), but similar to the prevalence rate reported in a recent study of adult breast cancer survivors using the SCID (6%, Andrykowski et al., in press). Differences between the Pelcovitz sample and the current sample might explain the higher prevalence in the Pelcovitz study. Eligibility criteria for the Pelcovitz study included patients who were entering maintenance therapy and thus were still on medical treatment.

In comparison to formal PTSD diagnoses, partial or subclinical PTSD was documented in a higher percentage of parents (20%). These data are consistent with findings from adult breast cancer survivors using the PCL-C (meeting criteria for two of the symptom clusters on the PCL-C), which have found an additional 13% of patients have partial PTSD (Cordova et al., 1997). Our data are consistent with Cordova et al. and studies of other trauma vic-

### Table II. Utility of the PCL-C Cut-Off Scores vs. the SCID in Diagnosing Current PTSD

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<tr>
<td>50 or more</td>
<td>.75</td>
<td>.89</td>
<td>7</td>
<td>1</td>
<td>.30</td>
<td>.98</td>
<td>.88</td>
</tr>
<tr>
<td>45 or more</td>
<td>.75</td>
<td>.82</td>
<td>11</td>
<td>1</td>
<td>.21</td>
<td>.98</td>
<td>.82</td>
</tr>
<tr>
<td>40 or more</td>
<td>1.0</td>
<td>.77</td>
<td>14</td>
<td>0</td>
<td>.22</td>
<td>1.00</td>
<td>.79</td>
</tr>
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Sens. = proportion of true PTSDs correctly identified; true positives/(true positives + false negatives). Spec. = proportion of true non-PTSDs correctly identified; true negatives/(true negatives + false positives). Positive pred. power = proportion of true cases among scale identified PTSD's; true positives/(true positives + false positives). Negative pred. power = proportion of true negatives among scale-identified non-PTSDs; true negatives/(true negatives + false negatives). Diagnostic efficiency = (true positives + true negatives)/total sample size.
tims (Stein et al., 1997) that have suggested that subthreshold forms of PTSD may be more common. It is interesting to note that the avoidance symptom cluster, Criteria C, was the criterion least likely to be met among individuals with subclinical PTSD.

Identification of a cost-effective method of screening for PTSD in the parents of pediatric cancer survivors is important, since conducting diagnostic interviews with parents of all childhood cancer survivors would be costly and time-consuming for researchers and clinicians interested in providing services to distressed parents. An accurate diagnosis of PTSD is clinically important because it is associated with impaired quality of life (e.g., Stein et al., 1997). Previous research has supported the use of the PCL-C as a screening tool with combat veterans (Weathers et al., 1993) and victims of sexual abuse and motor vehicle accidents (Blanchard et al., 1996), and most recently for adult breast cancer survivors (Andrykowski et al., in press). Our data suggest that the PCL-C has utility in screening mothers of childhood cancer patients, but that a moderate number of mothers would be falsely identified as having the disorder when in fact they either had a subclinical PTSD or no PTSD. The suggested cut-off score of 50 or greater on the PCL-C resulted in a specificity of .89 and a sensitivity of .75. That is, it correctly classified 89% of mothers. There was only one false-negative. These data suggest that if the PCL-C were administered to a group of 65 mothers and then followed by a diagnostic clinical interview for those mothers scoring over 50, the PCL-C would identify 10 mothers for follow-up. Upon diagnostic interview, six mothers would be found not to have a formal PTSD diagnosis. However, two of these six mothers would be found to have subclinical PTSD. One additional mother would have another psychiatric disorder, specifically anxiety or depression. Thus, three mothers would have been identified by the screening instrument that were not actually experiencing significant posttraumatic distress, anxiety, or depression. One mother with PTSD would have been missed using the PCL-C as a screening instrument and a cutoff of 50. In comparison, Studts and colleagues (1996) reported a 98% rate of accurate diagnosis using the PCL-C, which was higher than the 89% accuracy rate in the current study.

The sensitivity of the PCL-C was greatest (no individuals with PTSD were missed) when a lower cutoff score of 40 was used. However, this cut-off resulted in a greater number of false-positives; an additional 14 mothers would be identified for follow-up interviews when they did not evidence full PTSD.

Using the symptom cluster method, we found that the utility of the PCL-C was slightly better. Ten mothers would have been identified by the PCL-C, with four mothers subsequently diagnosed with PTSD and two mothers with subclinical PTSD. No mothers with PTSD would have been missed completely. When compared, the symptom cluster method yielded a slightly better outcome relative to the cut-off method, as the specificity was .92 and the all individuals with PTSD were identified (sensitivity was 1.0).

The choice of method of identifying PTSD diagnoses depends on the goal (research or clinical work) and available resources. In a research setting where identification of all potential diagnoses is important, a lower cut-off is appropriate. However, in a clinical setting, the choice will depend on resources and values. Clinical settings with fewer clinicians might consider the higher cut-off of 50 or the symptom cluster method, because relatively few individuals with PTSD would be missed.

Consistent with other studies of individuals who have undergone other traumatic events (Green et al., 1992), ours showed an overlap of PTSD with anxiety and depressive disorders. Given the relatively small sample size and the relatively low prevalence of PTSD, the actual number of individuals with comorbid symptoms was rather small (4%). Thus, the percentage of the current sample with PTSD accompanied by anxiety or depression (20%) may not be a representative figure for comorbid symptoms. Future studies should examine comorbid symptoms with a much larger sample, so that a larger number of individuals with comorbid diagnoses might be identified. Thus, these findings should be interpreted with some caution.

Several authors have suggested that one reason for the comorbidity with depression and anxiety is that a number of symptom criteria on Cluster D overlap (e.g., Breslau & Davis, 1987). Although these findings might be interpreted as suggesting that PTSD places an individual at greater risk of developing anxiety and depression, without prospective data we cannot conclude that the PTSD existed prior to the anxiety and depression. If these psychiatric problems were present prior to the child's cancer, anxiety and depression may have been a vulnerability factor predicting the development of PTSD. The explanation that an anxiety disorder
may be a pre-existing problem contributing to vulnerability to PTSD is consistent with recent findings reported by Kazak and colleagues (in press). In their study of mothers of childhood cancer patients, they found that parents of survivors and parents of children differed in posttraumatic stress symptoms, but not in trait anxiety, suggesting a normative distribution of trait anxiety in the parents of survivors sample (Kazak et al., 1997). In another analysis of the survivor sample, the stable characteristic of trait anxiety was positively associated with posttraumatic stress symptoms (Kazak et al., in press). The current findings indicate that clinicians should take care to differentiate other emotional disorders not associated with the child's cancer when interviewing mothers. Effective treatments should address coexistent emotional problems such as anxiety and depression.

There are a number of limitations of the present study that should be noted. First, the sample was somewhat atypical in terms of diagnostic make-up, particularly in comparison with other pediatric cancer settings. This sample had a greater proportion of neuroblastoma and sarcoma patients than leukemia patients and a greater proportion of children receiving bone marrow transplant. In other pediatric cancer settings, leukemia is a more common diagnosis. The atypical diagnostic make-up of this sample may affect the generalizability of the findings. In addition, bone marrow transplant and treatment for neuroblastoma are likely to be more severe and demanding, with a less optimistic prognosis. More demanding treatments associated with poorer prognoses may lead to a higher degree of traumatic exposure and perceived life threat for mothers and result in higher incidence of traumatic symptoms. Thus, the prevalence of PTSD in the current sample may not be representative. Second, the amount of time off treatment was also quite varied. Although this variable has not been shown to have direct effects on posttraumatic symptoms in some studies (Stuber et al., 1996), other recent studies have shown that time off treatment indirectly predicts symptoms by influencing mothers' appraisals of life threat and treatment intensity (Kazak et al., in press). Third, the sample was heterogeneous with regard to current child age and child age at diagnosis. These factors might influence the prevalence of PTSD, since the interference with family functioning or child distress might differ for older children. Each of these factors might be better controlled with more homogeneous sample.

Fourth, all parents participated in a prior psychosocial study. This recruitment strategy might have resulted in a selection bias. For example, these parents might have been more aware of, or willing to disclose, psychological problems since they had completed measures of psychological distress in the first 6 months of their child's treatment. A sample of parents who had chosen to initiate their children's cancer treatment at a comprehensive cancer center might perceive more life threat associated with the child's cancer diagnosis when compared with parents who transferred the child's medical care at a later point in time, thereby influencing the level of psychological distress experienced. As consecutively eligible patients were approached for participation in the original study, no specific sampling bias within the outpatient population (other than the fact that children with brain tumors were not eligible) would be expected.

Fifth, SCID interviews were conducted by telephone. Although prior research on diagnostic interviews for other psychiatric instruments administered by telephone has suggested that this method is comparable to face-to-face interviews (Burke et al., 1995; Sobin et al., 1993; Wells, Burnam, Leake, & Robins, 1988), there is no published comparison of the SCID telephone versus face-to-face administration. Thus, the validity of the telephone administered SCID has not been established.

The sixth limitation regards the validity of the SCID in detecting posttraumatic stress disorder. This instrument has empirically demonstrated substantial sensitivity, strong specificity, and a robust kappa (Kulka et al., 1988) in previous studies, and the kappa for the PTSD diagnosis was excellent in the current study. However, as the kappas for several symptoms in the current study demonstrate, the threshold ratings made by the interviewer are subjective and may not be completely valid. Finally, the focus on mothers in the current study prevented any comparisons of symptom levels between mothers and fathers.

Despite its limitations, the current study suggests that witnessing one's child undergoing cancer treatment can serve as a traumatic stressor potentially leading to the development of PTSD. Although mothers are not themselves diagnosed with cancer, the processing of this experience appears to be similar when compared with the processing engaged in by adult cancer survivors. The perceived threat to the child's life, ongoing fears of cancer recurrence, intrusive memories, and flashbacks about
cancer and its treatment that might be cued by minor physical complaints (e.g., colds, body aches) suggest that mothers and adult cancer survivors may engage in similar ways of cognitive processing of this experience. In our future work, we will be examining mothers' cognitive (e.g., attempts to find meaning) and social (e.g., attempts to talk with others) processing of the childhood cancer treatment experience, to delineate adaptive and maladaptive processing and its association with the formation and persistence of PTSD. For a subset of these parents, co-occurring anxiety and depressive disorders are likely to be present. These results suggest that future empirical and clinical attention to the psychological sequelae to pediatric cancer treatment is warranted.

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