Investigated the incidence and severity of Posttraumatic Stress Disorder (PTSD) in childhood cancer using informant methodology. The parents of pediatric cancer patients (n = 30) and off-treatment survivors (n = 42) completed a modified version of the Posttraumatic Stress Disorder Symptom Scale (PSS) on their children (M age = 8.8; SD = 4.0), in addition to the Child Behavior Checklist (CBCL) and the Personality Inventory for Children (PIC). Medical treatment and demographic data were also collected for each child. The only variables that significantly identified the presence of symptoms of PTSD were being on treatment at the time of the evaluation or in the preparatory phase prior to bone marrow transplantation and not having received cranial irradiation. Results indicate that a full constellation of PTSD symptoms can occur in children over the course of cancer treatment. Within the off-treatment pediatric cancer survivors, however, the incidence of PTSD was no greater than epidemiological estimates from the general population. The concurrent validity of the PSS received support, and the results, while preliminary, suggest that extended periods of medical trauma during which emotional support is present may not excessively predispose children to PTSD.

KEY WORDS: post-traumatic stress disorder; childhood cancer; bone marrow transplantation.
periencing, arousal, and avoidance (American Psychiatric Association [APA], 1994). To receive a diagnosis of PTSD, one must have been exposed to a traumatic event, defined as imminent threat to life or a serious injury. Furthermore, the person must have manifested some psychological reaction, usually fear, to this event. Subsequently, a constellation of symptoms develops, such as nightmares, intrusive memories of the event, avoidance of trauma-related stimuli, constricted affect, anger, and an exaggerated startle response. While the emergence of these symptoms can be delayed, they most commonly present within 3 months of the trauma (Rothbaum & Foa, 1993).

The experience of childhood cancer meets the traumatic event diagnostic criteria for PTSD. Pediatric cancer typically involves a definite threat to life and is also associated with a host of invasive and painful medical procedures. Very few studies have directly assessed these children for the presence of PTSD. Nir (1985) described several qualitative characteristics of PTSD in children being treated for cancer, but presented no empirical data to support the existence of the disorder in this population. Stuber, Christakis, Houskamp, and Kazak (in press) reported a 12% incidence of PTSD in pediatric cancer survivors, but only 52% of eligible patients responded to the self-report questionnaires. The current study was undertaken to (a) document the presence and frequency of PTSD in a sample of both on- and off-treatment pediatric cancer patients, (b) determine the level of symptom severity, and (c) investigate possible factors that mediate/moderate the development of PTSD symptoms in these patients, such as being on or off treatment, pre- or post-bone marrow transplantation and whether or not cranial irradiation was administered.

METHOD

Subjects

The parents of 72 pediatric cancer patients or survivors completed questionnaires on their children. Over 95% of approached parents were mothers who agreed to complete the questionnaires. Thus, the sample is reasonably representative of, but not randomly selected from, a pediatric cancer population. A wide range of cancer diagnoses was represented in the current sample. Patients were accrued from four general treatment conditions: (a) cranial irradiation (CRT) with intrathecal methotrexate ($n = 10$), (b) intrathecal methotrexate (IT-MTX) without CRT ($n = 20$), (c) central nervous system (CNS) cancer ($n = 28$), and (d) non-CNS cancer or treatment ($n = 14$). Patients from the first three treatment conditions were referred for routine neuropsychological evaluations without known selection bias. Parents of children in the fourth condition were volunteers who completed measures after informed consent. For all patients, data were collected on dosage of CRT, IT-MTX and systemic methotrexate (SYS-MTX),
months since last treatment, age at diagnosis, gender, socioeconomic status (SES; Hollingshead, 1965), and total time on treatment. Patients were between the ages of 3 and 16 years ($M = 8.8$, $SD = 4.0$), and spoke English as their primary language. Forty-two of the children had completed all treatment for cancer (months since last treatment: $M = 35.7$, $SD = 34.0$). Additionally, 14 patients were being prepared for a bone marrow transplant (BMT) and 10 had received a BMT (3 after a cancer treatment relapse).

**Measures**

Three parent-report inventories were administered: the PTSD Symptom Scale (PSS; Foa, Riggs, Dancu, & Rothbaum, 1993), the Personality Inventory for Children-Revised (PIC; Wirt, Lachar, Klinedinst, & Seat, 1984), and the Child Behavior Checklist (CBCL; Achenbach, 1991). Parents completed an altered version of the PSS in order to rate presence or absence, and severity of PTSD symptoms in the patients. The original PSS was developed using adult subjects, and is a 17-item self-report measure of PTSD. We modified the instrument, as is suggested by the authors, to identify PTSD symptoms in a cancer population. We replaced the generic trauma of the original scale with the specific trauma of cancer and its treatment. In addition, an informant-response format was used instead of the self-report format of the original instrument. The internal consistency of the PSS for the current sample was acceptable ($\alpha = .86$).

**RESULTS**

Of the 72 patients that received ratings on the PSS, 15 (21%) met criterion for PTSD. There were no significant differences in the incidence of PTSD or symptom severity across the four treatment subgroups. In addition to obtaining a binary diagnostic criterion for PTSD, the PSS yields a symptom severity index which ranges from 0 to 51. The PTSD positive (PTSD+) subjects had a significantly higher mean severity rating ($M = 16.3$, $SD = 7.3$, range = 7–33) than the non-PTSD (PTSD-) patients ($M = 3.8$, $SD = 3.5$, range = 0–14), $t(70) = 6.45, p < .0001$. PTSD+ and PTSD- subjects were compared on all demographic and treatment variables. The PTSD+ group was characterized by a significantly greater proportion of subjects both on treatment, $\chi^2 (1, N = 72) = 4.87, p = .03$, and awaiting a BMT, $\chi^2 (1, N = 72) = 5.11, p = .02$. With the exception of having received a significantly lower dose of mean CRT, $t(42.3) = 2.14, p = .04$, none of the remaining PTSD+ group differences were statistically significant.

2 Four of the PSS items address reexperiencing the trauma, 7 have avoidance content, and 6 deal with arousal symptoms. Each item is scored on a 0 (not at all) to 3 (five or more times per week/very much/almost always) Likert-type scale. A PTSD diagnosis is given if one or more reexperiencing, three or more avoidance, and two or more arousal items receive ratings of 1 or greater.
significant. All demographic, disease, and treatment variables were entered into a backward elimination logistic regression equation in an attempt to predict group membership. None of the variables remained in the model as significantly associated with the presence of PTSD. The backward elimination technique was also used in a multiple regression equation where the symptom severity index was the designated dependent variable. Increased intensity of stress symptoms was significantly predicted, \( F(2, 68) = 4.47, p = .02 \), by a combination of increased age and being on treatment.

The concurrent validity of the PSS was evaluated by the parental completion of both the PIC and CBCL. Backward elimination logistic regression analyses were computed to identify diagnostic group membership, and backward elimination continuous regression analyses were used to determine the PIC and CBCL scales that were significantly related to symptom severity. Three of the PIC scales identified membership in the PTSD+ group: Social Incompetence \( (p = .001) \), Family Discord \( (p = .03) \), and Social Skills \( (p = .003) \). The overall regression equation for symptom severity was significant, \( F(4, 60) = 19.48, p < .0001 \), and the PIC independent variables were Social Incompetence, Depression, and Social Skills. Of the CBCL independent variables, only Anxious/Depressed significantly identified PTSD+ group membership \( (p = .002) \). Symptom severity, on the other hand, was significantly associated, \( F(6, 45) = 10.19, p < .0001 \), with the Withdrawn, Social Problems, Somatic Complaints, Anxious/Depressed, and Attention Problems scales.

**DISCUSSION**

The incidence of PTSD in the general community is estimated at 1–14%, and the epidemiological rates range from 3–58% in at-risk populations (APA, 1994; Davidson & Fairbank, 1993). While the current results indicate that pediatric cancer patients and survivors manifest PTSD, it does not appear to occur at an increased incidence in survivors. Of all the demographic-, disease-, and treatment-related variables that were investigated, only being currently on treatment for childhood cancer, in the preparatory stages for a BMT, and having not received CRT were associated with significant arousal, intrusive, and avoidant/dissociative symptomatology, as assessed by parental, most commonly mother, report. More intense levels of stress were experienced in older children. Very few subjects (7%) who had completed all treatments, including BMT, exhibited a full spectrum of PTSD symptoms. Furthermore, the severity of the PTSD symptoms in the childhood cancer sample was generally quite low. Finally, none of the treatment (e.g., BMT, CNS treatments, time on treatment) or disease (e.g., CNS cancer) variables were significantly predictive of the emergence of a PTSD symptom complex. We believe that the data reflect a slightly increased incidence of stress-related psychological
symptoms during childhood cancer treatment, but no significantly increased incidence of PTSD in off-treatment pediatric cancer survivors, above and beyond that found in the general population.

The absence of a significant incidence or severity index of PTSD following childhood cancer treatment may have implications for the etiology of PTSD in children. A review on documented causes of PTSD in children (McNally, 1993) reported that warfare, criminal violence, burns, and serious accidents commonly result in the disorder, but sexual abuse, which can be a more chronic or subchronic stressor, inconsistently resulted in PTSD. Foa, Zinbarg, and Rothbaum (1992) have theorized that the traumas most likely to result in PTSD will be characterized by two factors: uncontrollability and unpredictability. If this is true, stressful events that last for extended periods of time and involve expected or forewarned traumatic episodes might be less likely to cause PTSD after their cessation. The childhood cancer experience may place within this category, and it is typically accompanied by a high degree of emotional and psychological support from the caregivers of the child. Interestingly, one of the psychological measures that was predictive of PTSD symptoms in the current study was an indication of decreased familial cohesiveness. An intriguing hypothesis is that adequate emotional support over the course of an extended period of trauma will act as an inoculation against the eventual emergence of PTSD.

The association of PTSD symptoms with the preparatory stages of BMT may also have important implications. A study on adult BMT patients indicated that pretransplant psychological status had a significant influence on long-term outcome and quality of life indices in the posttransplant period (Meyers et al., 1994). This research needs to be replicated with children and adolescents, especially in light of the current results. Given that PTSD symptoms are amenable to psychological interventions, a brief period of pretransplant therapy might have far-reaching positive benefits for some individuals.

The concurrent validity of the PSS received considerable support. The existence of PTSD symptoms was associated with increased anxiety, depression, withdrawal, and attentional problems on the CBCL, but not thought problems or delinquent/aggressive behavior. There were also suggestions in the PIC data that PTSD symptoms coexist with socialization difficulties in children. The possible coexistence of social deficits in children with a psychological reaction to stress may warrant further investigation. Furthermore, why older children were more likely to experience increased stress symptoms is unclear and should be explored. The PSS was originally developed using adult subjects, and this is the first study to adapt the measure as an informant scale for children. Further validity studies are needed, but the fact that diagnostic criteria for PTSD do not change over the developmental span supports the potential usefulness of the PSS in this manner.

The current results are hampered by several weaknesses, the most glaring
being the absence of a structured diagnostic interview with the child and the parents, the failure to obtain self-report measures, and the lack of normal control subjects. The relationship between self- and parental-report in childhood PTSD is unknown and this type of study is needed. Additionally, while the sample size was adequate, statistical power was reduced by the large number of statistical analyses. Thus, while Type I errors are not likely to be a major confound, the possibility of false negatives is present. The fact that there were no clear nonsignificant trends in the data tends to support our conclusions, but the results remain preliminary until they can be replicated and extended. The current sample was heterogeneous; however, this was necessary in order to explore a full range of associated variables. Of final note, given the suggestion that familial disruption may increase the probability of psychological adjustment reactions in children, the objective psychological evaluation of parents may provide additional pertinent data.

REFERENCES


