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## Family Functioning and Posttraumatic Stress Disorder in Adolescent Survivors of Childhood Cancer

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### Abstract

The purpose of this study was to investigate family functioning and relationships between family functioning and posttraumatic stress disorder in adolescent survivors of childhood cancer. To assess family functioning, 144 adolescent cancer survivors 1 to 12 years post-cancer treatment ( $M=5.3$  years) and their parents completed the Family Assessment Device (FAD). To assess Posttraumatic Stress Disorder (PTSD), adolescents were administered a structured diagnostic interview. Nearly half (47%) of the adolescents, one-fourth (25%) of mothers, and one-third (30%) of fathers reported poor family functioning, exceeding the clinical cut-off on four or more FAD subscales. Families in which the cancer survivor had PTSD (8% of the sample) had poorer functioning than other families in the areas of problem-solving, affective responsiveness and affective involvement. Three-fourths of the adolescents with PTSD arose from families with categorically poor family functioning. A surprisingly high rate of poor family functioning was reported in these families of adolescent cancer survivors. Adolescents with PTSD were over five times as likely to emerge from a poorly functioning family compared to a well-functioning one. This study provides evidence that family functioning is related to cancer-related posttraumatic reactions in adolescent survivors.

### Keywords

cancer survivors; adolescents; family functioning; posttraumatic stress

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Children with cancer and their family members experience childhood cancer as a highly distressing event. When a child is diagnosed with cancer, it is quickly understood that he or she will die without treatment. Current treatments, while accompanied by high overall success rates (Reis et al., 2008), are very intensive. Typically, treatment protocols require hospitalization, painful and invasive diagnostic and monitoring procedures, and surgery, chemotherapy, and/or radiation therapy. Side effects of the treatment and possible complications (e.g., nausea, loss of appetite, severe fatigue, mouth sores, rashes, infections)

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may make the child feel and appear more ill during treatment than they were prior to treatment (Keene, 1999). Even if the child does well and establishes remission quickly, treatment is rarely routine and may involve frequent transitions and periods of uncertainty regarding long-term prognosis. Even after remission is achieved, fears about relapse persist.

While most children and families adjust well to cancer over time, an important subset of survivors of childhood cancer continue to experience cancer-related distress long after cancer treatment ends (Brown, Madan-Swain & Lambert, 2003; Kazak et al., 2004). A posttraumatic stress model provides a useful framework for understanding the nature of this long-term distress (Kazak et al., 2006). This model recognizes the life threat inherent in cancer and explains symptoms such as intrusive thoughts, physiological arousal, hypervigilance and avoidance. Most studies find that between 5 and 10% of adolescent survivors of childhood cancer qualify for a diagnosis of Posttraumatic Stress Disorder (Butler, Rizzi & Handwerker, 1996; Erickson & Steiner, 2002; Kazak et al., 2004); however, rates of sub-clinical posttraumatic stress symptoms are higher (Kazak et al., 1997; 2004; Langeveld, Grootenhuis, Voûte, De Haan, & Van Den Bos, 2004).

Although only a subset of adolescents experience persistent cancer-related distress, it is important to determine what factors may be associated with this severe disruption of adjustment. Previous research has demonstrated that greater levels of general anxiety, a history of other stressful experiences, and subjective perceptions of greater life threat and more severe treatment intensity are predictive of posttraumatic stress symptomatology in samples of childhood cancer survivors (e.g., Stuber et al., 1997). However, time elapsed since treatment and objective measures of medical severity are usually not predictive of persistent posttraumatic stress symptoms (e.g., Taieb, Moro, Baubet, Revah-Levy, & Flament, 2003).

Family factors may also predict posttraumatic reactions in adolescent survivors of cancer. It is widely recognized that a child's response to a traumatic event is greatly influenced by family context (Kiser & Black, 2005). In fact, some evidence suggests that disruptions in family functioning following a traumatic event predict the development of posttraumatic stress better than characteristics of the traumatic event itself, such as extent of loss or duration of the event (Pfefferbaum, 1997).

The experience of childhood cancer poses many challenges to the functioning of families (see Alderfer & Kazak, 2006 for a review). Upon learning of the diagnosis, families may pull together emotionally to support one another and mobilize for the challenges of treatment. As treatment starts the family may need to renegotiate roles and responsibilities to care for the child with cancer at the hospital or attend outpatient appointments while ensuring that important responsibilities and routines are not abandoned. The child with cancer may become the center of the family. After treatment ends the patterns developed within the family may persist, even if no longer appropriate for the successful development of individual family members.

Research supports many of these theoretically-predicted changes in family functioning. Around the time of diagnosis families pull closer together (e.g., McGrath, 2001; Varni, Katz, Colegrove & Dolgin, 1996). The time and physical demands of treatment prompt strain and disorganization; Horwitz and Kazak (1989) found that families of children with cancer 6 to 41 months post-diagnosis were more likely to fall into the chaotic and rigid ranges of flexibility when compared to community controls. Families who have completed treatment have been found to be better functioning than those on treatment (Brown et al., 2003; Streisand, Kazak & Tercyak, 2003). However, even off-treatment, there seems to be some long-term disruptions. For example, Cohen and colleagues (Cohen, Friedrich, Jaworski, Copeland, & Pendergrass, 1994) found that significantly more families of children with cancer up to 4 years post-diagnosis scored in the enmeshed range when compared to norms (21% vs. 14%).

Research specifically concerning family functioning and posttraumatic reactions in survivors of childhood cancer is scant. The few studies that exist provide conflicting results. Barakat and colleagues (Barakat, Kazak, Meadows, Casey, Meeske & Stuber, 1997) investigated factors predicting self-reported posttraumatic stress (PTS) reactions in 8 to 20 year old survivors of childhood cancer and found that mother-reported family adaptability, cohesion, and family satisfaction were not significant predictors of child PTS. Similarly, Brown and colleagues (2003) in a study of 12 to 23 year old childhood cancer survivors found adolescent-reported family support and conflict to be unrelated to their self-reported PTS symptoms. Pelcovitz and colleagues (Pelcovitz, Libov, Mandel, Kaplan, Weinblatt & Septimus, 1998) used adolescent-reports of family functioning and a structured clinical interview to assess PTSD in survivors of childhood cancer (13 to over 20 years of age) and found that those meeting criteria for lifetime PTSD reported more chaos within their families than those who did not have a history of PTSD. Finally, Ozono and colleagues (Ozono, Saeki, Mantani, Ogata, Okamura & Yamawaki, 2007) in an investigation of 12 to 20 year old survivors of childhood cancer found that those reporting PTS symptoms in the severe range also reported poorer family roles and affective responsiveness within their families.

In summary while it is widely recognized in the general trauma literature that a child's response to a traumatic event is greatly influenced by family context (Kiser & Black, 2005), the evidence linking family functioning and cancer-related PTSD in adolescent survivors is weak. Studies isolating adolescents with definitive adjustment problems (e.g., severe PTS or PTSD) seem more likely to find associations with family functioning compared to studies investigating PTS as a continuous variable, suggesting a possible threshold effect. However, in the past investigations finding significant linkages, the adolescent was the only reporter of family functioning. The presence of severe PTS or PTSD might alter or bias perceptions of family functioning. Furthermore, all of these studies examined broad age ranges without attention to possible developmental variation in family functioning or possible developmental differences in the relationship between family functioning and PTS.

The purpose of this investigation was to examine the functioning of families with an adolescent cancer survivor and to explore relationships between family functioning and adolescent cancer-related PTSD. Based upon past findings, we decided to compare and contrast adolescents with and without a history of cancer-related PTSD as opposed to examining PTS as a continuous variable. To improve upon past research, we utilized multiple informants of family functioning and considered the developmental level of the adolescent in our analyses. We also investigated the relative risk of adolescent cancer-related PTSD when the family is poorly functioning. We hypothesized that adolescent survivors with PTSD and their parents would report poorer family functioning than families without adolescent cancer-related PTSD and that adolescents with PTSD would be more likely to come from poorly functioning families.

## Method

### Procedure

Data for this report are drawn from a randomized clinical trial of an intervention developed to reduce posttraumatic stress symptoms and improve family functioning for families of adolescent survivors of childhood cancer (SCCIP: Surviving Cancer Competently Intervention Program, Kazak et al., 1999; 2004). Pre-intervention, pre-randomization data are reported here.

English-speaking families with an adolescent between the ages of 11 and 18 who had completed treatment for cancer 1 to 10 years previously and remained disease-free were eligible for the study. In accord with Institutional Review Board-approved procedures, names and contact information were gathered from our hospital's tumor registry. The survivor and his or her parents were contacted by mail inviting participation. Families were not screened or invited to

participate based upon their level of family functioning or the presence of posttraumatic stress symptoms among family members. The families were asked to participate in a study of an intervention that “brings families of cancer survivors together to share their experiences and build on their strengths.” Follow-up phone calls ensured eligibility, explained the full study, answered questions, secured enrollment, and scheduled a time to complete data collection in the families' homes.

## Participants

A total of 150 families (45% of approached, eligible participants) agreed to participate in the full study. As detailed elsewhere (Kazak et al., 2004), participants were similar to non-participants with regard to demographic variables and the most common reasons for non-participation were lack of time and scheduling difficulties (61% of non-participants) and resistance to revisiting the cancer experience (46% of non-participants). Across these families, 144 of the 150 adolescent survivors, 144 of the 147 mothers, and 104 of the 124 fathers provided complete data on the measures of interest for this report. Of the 124 two-parent families, 98 (79%) provided complete data from all family members; of the 26 single parent families, 25 (96%) provided complete data.

Survivors were between the ages of 11 and 19 ( $M=14.7$ ,  $SD=2.4$ ) at the time of data collection, equally distributed across this age range with 32% ( $n=49$ ) being preteens, 34% ( $n=51$ ) between the ages of 13 and 15, and the remainder ( $n=51$ ) being 16 and older. Approximately half (52%) were female. The majority of the sample (86%) was Caucasian with 9% African American, 4% Hispanic, and 1% Asian. Median household income was in the \$50,000 to \$75,000 range, consistent with census tract data for the hospital's catchment area (U.S. Census Bureau, 2002). Educational attainment of the parents completing the study was as follows: 22.6% of mothers and 17.0% of fathers completed grades 9–12; 24.0% of mothers and 17.9% of fathers completed some college and/or vocational school; 48.0% of mothers and 52% of fathers received at least a degree from a 4-year college.

The survivors were between the ages of 3 months and 16.4 years ( $M=7.79$ ,  $SD=4.28$ ) at the time of diagnosis and between 1 and 12 years from the end of cancer treatment ( $M=5.3$ ;  $SD=2.9$ ) at the time of data collection with 26% ( $n=39$ ) 1 to 2 years, 26% ( $n=40$ ) 3 to 4 years, 24% ( $n=36$ ) 5 to 7 years, 22% ( $n=33$ ) 8 to 10 years, and the remaining 2% ( $n=3$ ) being more than 10 years post-treatment. Nearly one third (31%) had been diagnosed with leukemia, 22% had solid tumors, 22% had lymphoma, 8% had bone tumors and the remaining 17% had various other cancer diagnoses.

## Measures

**Family Assessment Device (FAD)**—The FAD (Epstein, Baldwin & Bishop, 1983) is an extensively used 60-item questionnaire based on the McMaster Model of Family Functioning and is applicable for use in families experiencing chronic illness (Bishop, Epstein, Keitner, Miller, & Srinivasan, 1986). The FAD assesses seven dimensions of family functioning: Problem solving, Communication, Roles, Affective Responsiveness, Affective Involvement, Behavior Control, and General Functioning. Adolescents, their mothers and fathers completed this measure, rating the extent to which each statement described their family on a four-point scale ranging from 1 (strongly disagree) to 4 (strongly disagree). Higher scores indicate poorer functioning and clinical cut-off points for “unhealthy” family functioning have been established (Miller, Epstein, Bishop, & Keitner, 1985; Miller, Ryan, Keitner Bishop & Epstein, 2000). Research supports the reliability of the FAD and its factor structure (Kabacoff, Miller, Bishop, Epstein, & Keitner, 1990). Our data revealed the following coefficient alphas for the subscales summarized across respondents: Problem Solving, .63 to .82; Communication, .65 to .75; Roles, .68 to .72; Affective Responsiveness, .64 to .80; Affective Involvement, .71 to .

.79; Behavioral Control, .73 to .76; and General Functioning, .87 to .90. The adolescent respondents consistently produced data with the lowest internal consistencies.

**Structured Clinical Interview for DSM-IV, PTSD section (SCID-NP)**—Adolescent cancer survivors were administered the PTSD section of the SCID-NP (First, Spitzer, Gibbon & Williams, 1995) and were asked to consider the items in the context of their cancer experience. This interview includes items assessing each of the DSM-IV diagnostic criteria for PTSD. Interviews were conducted by graduate students and post-doctoral fellows trained in the administration of the SCID. Each interview was audiotaped and rated by a second interviewer to ascertain and ensure accuracy and consistency across raters and time. Kappa for presence versus absence of PTSD was .71, indicative of good agreement (Altman, 1991).

### Data Analysis Plan

First, to characterize the functioning of the participating families, descriptive statistics and cut-scores were applied to the adolescent and parent reports separately and also, as recommended by the authors of the FAD, to the “family mean,” an average of FAD scores calculated across members of the same family (Miller et al., 1985). Families scoring in the clinical range on four or more FAD subscales were identified, as recommended by Akister and Stevenson-Hinde (1991), and classified as poorly functioning families.

SCID data were used to identify the survivors in the sample qualifying for a diagnosis of PTSD at some time since their cancer experience. Adolescents with and without cancer-related PTSD were compared on age at diagnosis with independent samples t-tests and on distribution of cancer diagnoses with Pearson Chi-Square analysis to characterize the sample. We specifically investigated PTSD as opposed to PTS because previous research has not found reliable relationships between family functioning and sub-threshold PTS (Barakat et al., 1997; Brown et al, 2003).

Two MANOVAs were calculated to determine if family functioning was related to PTSD in adolescent survivors. The first MANOVA was limited to two-parent families with complete data and included respondent (adolescent, mother, father) as a within-family repeated measures factor and PTSD status and developmental level of the adolescent (early adolescence [11 through 14] and later adolescence [15 through 18]) as between-family variables. The seven FAD subscales served as dependent variables. Next, so as to not dismiss single parent families, a second MANOVA was applied using the family mean data, calculated for families providing complete data across all members. This MANOVA included PTSD status and developmental level of the adolescent as factors. Follow-up ANOVAs and post-hoc pairwise comparisons with Sidak adjustments were used to follow-up significant effects in the MANOVAs. On the suggestion of a reviewer, both of these MANOVAs were run with time since treatment as a covariate, but as this variable was not significantly related to outcomes and did not alter the pattern of our findings we did not include it for the sake of simplicity. Finally, to determine if poorly functioning families predisposed adolescents to developing PTSD, a Pearson Chi-square analysis was conducted and odds ratios calculated estimating the relative risk of developing PTSD when ones' family is classified as poorly functioning.

## Results

### Family Functioning

The Table presents means and standard deviations for each of the FAD subscales for adolescent survivors, mothers, fathers and the family mean calculated for all families providing complete parent and adolescent data. Scores on the individual subscales ranged between a low score of 1.00 to 1.18 (Median=1.0) and a high score of 2.56 to 4.00 (Median=3.33) and were not



significantly skewed. The clinical cut-offs for the FAD subscale scores are listed in the Table, as well as the percentage of the sample exceeding this clinical cut-off for each subscale.

According to the adolescent survivors, 50% of their families had poor general functioning, scoring above the cut-score of 2.0 (see Table). More than half of the survivors indicated that their family engaged in “unhealthy” patterns of communication, affective involvement, and behavioral control. Nearly half (47%) of the adolescents indicated that their families were poorly functioning on four or more of the seven FAD subscales. Among the mothers, approximately one-third (35%) indicated that general family functioning fell into the clinical range. Similar percentages indicated that their families had poor communication patterns and role distributions with 44% indicating difficulties with affective involvement. One-fourth of mothers indicated that their families exceeded the clinical cut-off on four or more of the seven FAD subscales. More than one-third of fathers reported poor general functioning, communication patterns and affective responsiveness within their families. Thirty percent of fathers indicated that their families were poorly functioning on four or more of the seven FAD subscales.

For a family to be defined as having a problem on any one scale, the “family mean” should exceed the established cut-off (Miller et al., 1985). These data are also presented in the Table. Approximately 30 to 40% of the families fell into the problematic range across the individual subscales. Using the family mean, 45% of the families in this sample had no or only one subscale in the clinical range; however, 36% had four or more subscales in the problematic range indicative of overall poor family functioning.

### PTSD in Adolescent Survivors

Twelve (8.3%) of the 144 survivors in this sample qualified for a diagnosis of PTSD at some time since their cancer diagnosis. Only 8 of these twelve families provided complete data across all family members. Exploratory statistical tests indicated that this discrepancy in complete data between families including an adolescent with and without PTSD was marginally significant ( $\chi^2[1, N=144]=3.3, p=.07$ ). Ten of the families with an adolescent with PTSD were two-parent families and four of these were missing father data. Adolescents with and without cancer-related PTSD did not differ with regard to age at diagnosis ( $t[147]=-1.09, p=.28$ ) or cancer diagnosis distribution ( $\chi^2[4, N=149]=5.58, p=.23$ ).

### PTSD and Family Functioning

The repeated measures MANOVA with respondent (adolescent, mother, father) as a within-family variable and developmental level of the adolescent and PTSD status as between-family variable revealed a main effect for respondent (Wilks'  $\lambda=.71; F[14, 79]=2.35, p=.009$ , partial  $\eta^2=.29$ ) and PTSD status (Wilks'  $\lambda=.81; F[7, 86]=2.83, p=.011$ , partial  $\eta^2=.19$ ) and non-significant effects for developmental level (Wilks'  $\lambda=.80; F[14, 172]=1.43, p=.145$ ) and all interactions ( $ps>.20$ ). Follow-up tests indicated significant variability across families members in their ratings of Communication ( $F[2, 184]=4.53, p=.012$ , partial  $\eta^2=.05$ ), Affective Responsiveness ( $F[2, 184]=5.49, p=.005$ , partial  $\eta^2=.06$ ) and Affective Involvement ( $F[2, 184]=5.88, p=.003$ , partial  $\eta^2=.06$ ) with adolescents consistently rating their family as more poorly functioning than their mothers ( $ps<.01$ ). Follow-up tests also indicated that families in which the adolescent qualified for a diagnosis of PTSD at some time since their cancer diagnosis had poorer family functioning in the domains of Affective Responsiveness ( $F[1, 92]=5.53, p=.021$ , partial  $\eta^2=.06$ ) and Affective Involvement ( $F[1, 92]=6.81, p=.011$ , partial  $\eta^2=.07$ ).

To broaden the sample to include single-parent families, a second MANOVA was conducted comparing families with and without an adolescent with PTSD on the family mean for FAD subscale scores. Again, developmental level of the adolescent was included in the analysis but

that main effect (Wilks'  $\lambda=.84$ ;  $F[14,220]=1.46$ ,  $p=.127$ ) and the interaction of developmental level and PTSD status (Wilks'  $\lambda=.84$ ;  $F[14,220]=1.44$ ,  $p=.138$ ) were not significant. A significant main effect for PTSD status (Wilks'  $\lambda=.84$ ;  $F[7,110]=3.04$ ,  $p=.006$ , partial  $\eta^2=.16$ ), however, indicated that these two groups differed in family functioning. Follow-up tests showed significant differences between the groups on Problem Solving ( $F[1,116]=3.95$ ,  $p=.049$ , partial  $\eta^2=.03$ ), Affective Responsiveness ( $F[1,116]=8.03$ ,  $p=.005$ , partial  $\eta^2=.07$ ), and Affective Involvement ( $F[1,116]=7.51$ ,  $p=.007$ , partial  $\eta^2=.06$ ) with the families with an adolescent with a history of PTSD demonstrating poorer functioning. The Figure displays the estimated marginal means from this analysis for each FAD subscale by group.

To attempt to determine if poor family functioning predisposed adolescents to PTSD, a Chi-square analysis was conducted in which the distribution of adolescents with PTSD was examined as a function of categorically "poor functioning." As mentioned above, using the family mean, 36% ( $n=44$ ) of the families in our sample scored in the clinical range on four or more subscales. These were designated as overall poorly functioning families. Adolescents with PTSD were more likely to be found in these poorly functioning families ( $\chi^2[1, N=122] = 5.63$ ,  $p=.018$ ). In fact 75% of the adolescents with PTSD originated from families designated as poorly functioning. Adolescents with PTSD were 5.32 times as likely to originate from families with poor functioning (95% CI: 1.28–22.72).

## Discussion

These analyses reveal a high rate of self-reported family functioning difficulties in the families of adolescent survivors of childhood cancer. The mean subscale scores derived from the adolescent data place these families somewhere between community-based families with adolescent children and those with adolescents referred for mental health services, however, parent data places our families near the means of the community sample (Sawyer, Sarris, Baghurst, Cross & Kalucy, 1988). Across the subscales of the FAD, 35–62% of the adolescent survivors in our sample and 17–44% of parents reported poor family functioning. Approximately 20–35% of typical families are expected to manifest poor functioning on any given FAD subscale (Epstein & Bishop, 1981; Miller et al., 1985). Over half of the adolescent survivors indicated that their families engage in a communication style that is vague and has masked intent (Communication) and that family members do not show interest in and value the activities of other family members (Affective Involvement). A full 44% of mothers and 42% of fathers indicated "unhealthy" levels of affective involvement. Approximately half of the adolescent survivors reported that their family does not respond with the appropriate quantity and quality of emotions (Affective Responsiveness); does not have appropriate ways to express and maintain standards of behavior for family members (Behavioral Control), and has general problems of family functioning. Approximately one third of mothers and fathers indicated that tasks are inappropriately assigned and not carried out responsibly within their families. Our data further indicate that nearly half of the adolescent survivors, one quarter of mothers and one third of fathers reported poor family functioning on four or more subscales of the FAD.

While the FAD has been used repeatedly in chronic illness populations (Alderfer et al., 2007), it is rare to have all subscales reported and all family members provide data. Our inclusion of all available family members is a strength of our methodology. We did achieve internal consistencies below .70 for four of the seven FAD subscales when completed by adolescents, raising questions about the reliability and validity of these subscales when completed by adolescents, however, our methodology allowed us to create a family mean for each family providing complete data. It has been argued that this approach increases the reliability and validity of family functioning assessment (Holmbeck, Li, Verrill Schurman, Friedman, & Millstein Coakley, 2002; Mathijssen, Koot, Verhulst, De Bruyn & Oud, 1997)

and it is the methodology recommended by the authors of the FAD (Miller et al., 1985). Using the family mean, 30–45% of families scored in the clinical range across the subscales and 36% of families scored in the clinical range on four or more subscales indicative of problematic functioning. This level of difficulty is somewhat concerning given that reports of community samples typically uncover less than 10% of families endorsing poor functioning on this many subscales (Akister & Stevenson-Hinde, 1991).

It is important to note that the published cut-off scores for “unhealthy” functioning on the FAD have not been validated for families of children with chronic illness. We could not uncover any other studies utilizing the FAD cut-scores when characterizing the functioning of families with children with cancer to contextualize our findings. Given the rates of problematic functioning that we uncovered, we would guess that these cut-scores may overestimate the rates of difficulties in these families. One study of adolescents with diabetes found that these families were no more likely than families with healthy children to fall into the clinical range on the general functioning subscale of the FAD (Gowers et al., 1995). However, adolescents with well-controlled diabetes were more likely than healthy adolescents and adolescents with poorly-controlled diabetes to rate themselves in the unhealthy range of general functioning. This finding suggests that some family behaviors that may be adaptive for managing chronic conditions may seem dysfunctional. The lack of a comparison group of families with healthy adolescents is a limitation of our study. Further research is needed to validate the FAD cut-scores in families of children with chronic conditions.

In our sample, eight percent of the adolescent survivors of childhood cancer qualified for a diagnosis of cancer-related PTSD at some time since their cancer treatment, consistent with past research (e.g., Butler, Rizzi & Handwerker, 1996; Erickson & Steiner, 2002). Our findings indicate that family functioning is associated with this disorder. Adolescents qualifying for a diagnosis of PTSD since being diagnosed with cancer had families that are less able to solve problems, respond inappropriately to one another in either the quality or quantity of expressed emotion, and are either over- or under-involved in the activities and interests of one another, compared to families of adolescent cancer survivors without a history of PTSD. This pattern of results was found across reporters suggesting that the noted differences in family functioning are reliable and not just an artifact of the perceptions of the adolescents with a history of PTSD. Linkages between poor affective responsiveness/involvement and PTSD have also been found in one other study of childhood cancer survivors (Ozono et al., 2007) and in research involving families of kidnapped children (Navia & Ossa, 2003) and Israeli combat veterans (Solomon, Mikulincer, Freid & Wosner, 1987). Family cohesiveness and opportunities to express and process emotional reactions seem particularly important in the context of PTSD.

We also explored whether the rates of adolescents with PTSD were higher among poorly functioning families. Three-fourths of the adolescents with PTSD originated from poorly functioning families. These findings may indicate that poor family functioning predisposes an adolescent to developing PTSD after cancer or that the presence of PTSD may have a negative impact on the functioning of the family. Given the high rates of poor family functioning in this sample, family functioning does not have a strong positive predictive value for PTSD (.14); however, well-functioning families rarely had adolescents with a history of PTSD (negative predictive value=.97).

Because we did not examine families without childhood cancer experience, we cannot be sure if these findings are specific to families with adolescent cancer survivors or if they are generalizable to families facing other traumatic experiences. The trauma literature suggests that family functioning does play a role in traumatic stress reactions across a range of events including natural disasters, assaults and motor vehicle accidents (Meiser-Stedman, Yule,



Dalgleish, Smith & Glucksman, 2006; Proctor, Fauchier, Oliver, Ramos, Rios & Margolin, 2007; Uruk, Sayger & Cogdal, 2007).

The findings from this study must be considered within the scope of its limitations. First, the data were drawn from baseline data of a randomized clinical trial attempting to reduce PTS through a family-based intervention. Although families were not explicitly told that this was the purpose of the intervention study, one could argue that families choosing to enroll in this study may have had greater rates of difficulty adjusting to cancer in the long-term than those declining participation. We have no way to assess this possibility. Additionally, the data are cross-sectional in nature, so we cannot assert the direction of the associations between family functioning and PTSD as alluded to above. Also, the families in our sample had children representing a broad range of ages and expected variation in family functioning as a function of developmental level was not uncovered in our sample.

Additional limitations of this study are related to the small number of adolescents qualifying for a diagnosis of PTSD. Post-hoc power analyses based upon the total sample size and percentage of adolescents with PTSD in our sample indicated that in our follow-up univariate tests, we only had approximately 60% power to detect large effect size differences in family functioning between the groups as statistically significant with an alpha of .05. Therefore, important differences between these groups may not have been detected in our sample. Given the small number of adolescents with PTSD, it is possible that they did not accurately represent all families with adolescents with cancer-related PTSD. Furthermore, the size of the effects we did uncover as statistically significant were small and the confidence interval around the odds ratio was large, suggesting that factors other than family functioning contribute greatly to the development of PTSD in adolescent survivors. Based upon the trauma and cancer-related trauma literatures, these factors may include dispositional characteristics of the adolescents such as trait anxiety or coping style, attributions about event (e.g., perceptions of life threat), the experience of other stressful life events, medical sequelae of the cancer and functional status of the adolescent, and parental distress (Barakat et al., 1997; Brown et al., 2003; Lack & Sullivan, 2008; Landolt, Vollrath, Ribl, Gnehm & Sennhauser, 2003; Meiser-Stedman et al., 2006; Ozono et al., 2007; Robinson, Gerhardt, Vannatta, & Noll, 2007).

Given the rates of problematic family functioning found in this sample and associations found between PTSD and family functioning, these data suggest that childhood cancer survivors and their families may benefit from interventions that incorporate multiple family members and/or target family functioning as an outcome. While relatively little is known about the developmental trajectory for youth who survived cancer, the data are supportive of the potentially complex relationships that may develop over time between individual and family functioning. Childhood cancer survivors grow up in family systems where the potentially traumatic aspects of the disease and treatment experiences impact their parents and can alter the course of family development. Interventions that address the beliefs of family members about cancer and its treatment and how these beliefs continue to effect subsequent developmental changes may be helpful (e.g., Kazak et al., 2004).

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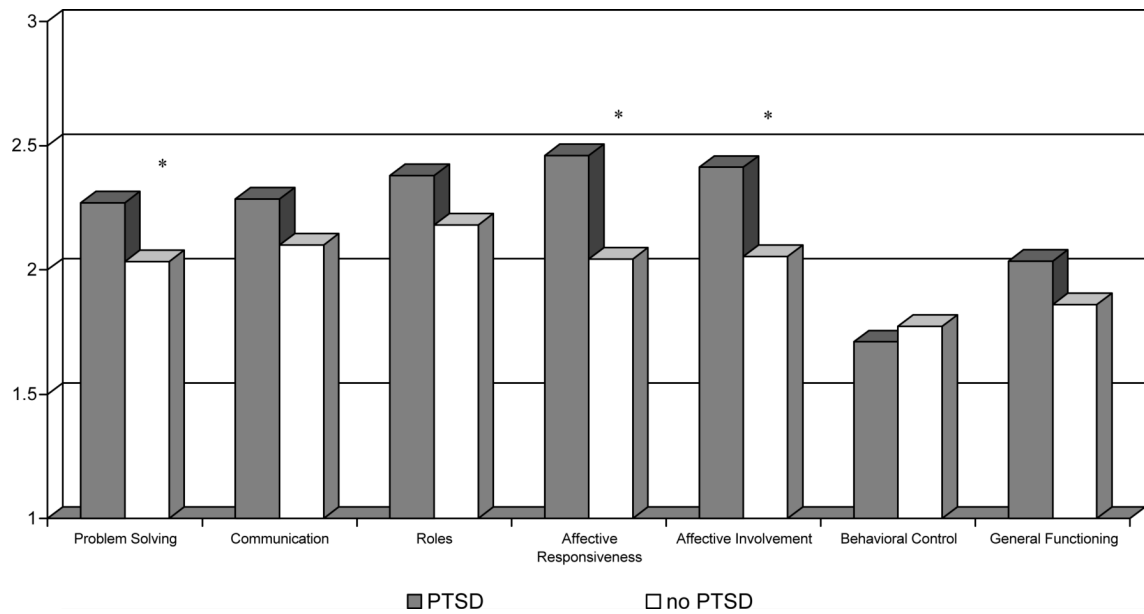
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**Figure.** Family Mean Functioning ratings in Families with and without an Adolescent with Cancer-related PTSD (Possible scores range from 1 to 4 with higher scores indicating poorer functioning; \*indicates a statistically significant difference)



Family Functioning as reported by Adolescent Cancer Survivors, Mothers, Fathers and Averaged across Family Members

	McMaster Cut-off	Adolescent Report N=144		Mother Report N=144		Father Report N=104		Family Mean N=122	
		Mean (SD)	% above Cut score	Mean (SD)	% above Cut score	Mean (SD)	% above Cut score	Mean (SD)	% above Cut score
FAD Subscale:									
Problem Solving	2.2	2.17 (.38)	39%	1.95 (.39)	17%	2.06 (.43)	19%	2.05 (.28)	29%
Communication	2.2	2.27 (.38)	62%	2.00 (.39)	34%	2.11 (.28)	37%	2.11 (.28)	39%
Roles	2.3	2.21 (.35)	35%	2.18 (.36)	36%	2.20 (.25)	30%	2.20 (.25)	37%
Affective Responsiveness	2.2	2.23 (.44)	47%	1.88 (.49)	20%	2.06 (.35)	36%	2.06 (.35)	31%
Affective Involvement	2.1	2.15 (.46)	60%	1.99 (.44)	44%	2.07 (.31)	42%	2.07 (.31)	45%
Behavioral Control	1.9	1.93 (.41)	54%	1.64 (.38)	22%	1.77 (.26)	28%	1.77 (.26)	31%
General Functioning	2.0	1.97 (.46)	50%	1.78 (.42)	35%	1.87 (.33)	38%	1.87 (.33)	35%

NOTE: Scores on the FAD subscales range from 1 to 4 with higher scores indicative of poorer functioning.