Published in final edited form as:

Child Health Care. 2016 ; 45(3): 303–322. doi:10.1080/02739615.2014.996883.

Effects of Time since Diagnosis on the Association between Parent and Child Distress in Families with Pediatric Cancer

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Abstract

Although parental distress and child distress have been linked in families of children with cancer, how these associations change over time is unknown. The present study examined how the amount of time elapsed since the child's diagnosis moderates the associations between self-reported parent and child symptoms of depression, anxiety, and post-traumatic stress in 255 parent-child dyads. Time since diagnosis moderated the associations between parental symptoms and child-reported anxiety and post-traumatic stress. Dyads farther out from diagnosis exhibited stronger associations between parental and child symptoms. Findings suggest the importance of monitoring the psychological adjustment of parents and children over time.

Keywords

parent; child; cancer; oncology; time since diagnosis; psychological symptoms

The event of a child's cancer diagnosis represents a period of significant stress that requires families to adapt to sudden changes in roles, routine, and configuration (McCubbin, Balling, Possin, Friedrich, & Bryne, 2002). However, its impact on child and parental psychological functioning can be quite variable. Many children diagnosed with cancer adapt quickly, and their levels of psychological distress [e.g., anxiety, depression, and/or post-traumatic stress symptoms (PTSS)] are comparable to those of healthy peers (Noll et al., 1999; Patenaude & Kupst, 2005; Phipps, Long, Hudson, & Rai, 2005; Trask et al., 2003). In contrast, many parents show elevated distress relative to norms and controls (Dolgin et al., 2007; Grootenhuis & Last, 1997; Pai et al., 2007; Phipps et al., 2005; Vrijmoet-Wiersma et al., 2008), with some maintaining elevated distress over time (Grootenhuis & Last, 1997; Sloper, 2000).

According to some cross-sectional (Lavigne & Faier-Routman, 1993; Trask et al., 2003) and prospective (Sawyer, Streiner, Antoniou, Toogood, & Rice, 1998) studies, such elevations in parental distress may increase risk for child maladjustment to the pediatric cancer

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experience. For example, one study found a relatively strong association ($r = .62$) between parental distress and self-reported youth distress in families of youth assessed 1 month to 1 year post diagnosis (Trask et al., 2003). Longitudinal studies have also found links between parent and child symptoms. For example, maternal maladjustment measured at 5 to 6 weeks post-diagnosis was significantly predictive of youth's self-reported maladjustment 1 year post-diagnosis (Landolt, Ystrom, Sennhauser, Gnehm, & Vollrath, 2012). When maternal and child symptoms were both assessed using maternal reports, maternal and child symptoms have been linked prospectively across a period of 2 years post-diagnosis (Sawyer et al., 1998).

The transmission of distress from the parent to the child may occur due to parenting difficulties in providing the child with an appropriate amount of emotional and behavioral support that facilitates adaptation. For instance, parents of children diagnosed with cancer may experience difficulty managing the parenting role (McGrath, 2001; Stewart & Mishel, 2000) and increase their overprotection and indulgence of the child (Long & Marsland, 2011). Such changes in parenting are associated with increased child distress (McLeod, Wood, & Weisz, 2007; Pynoos, Steinberg, & Piacentini, 1999). Additionally, parenting that models or reinforces maladaptive coping strategies and distress may also increase child anxiety and PTSS (Fisak & Grills-Tauchel, 2007; McLeod et al., 2007; Pynoos et al., 1999; Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Although the influence of parental distress on child distress may be bi-directional, such that child distress would also increase parental distress, at least one study has found that parental symptoms predict child symptoms rather than vice versa (Garber & Cole, 2010).

One question that has not yet been explored in the pediatric psychology literature is whether the impact of parental distress on the child changes over time. This may be an important question to address in order to identify families at greatest risk for maladjustment. With regard to parental distress and its changes over time, multiple studies indicate that parents experience higher levels of depression, anxiety, and PTSS closer to diagnosis (Kazak, Boeving, Alderfer, Hwang, & Reilly, 2005; Klassen et al., 2007; Norberg & Boman, 2008; Norberg, Lindblad, & Boman, 2005; Pai et al., 2007). How these symptoms fluctuate over time, however, is still an area with limited research. Most studies indicate that declines in parental distress after the child's cancer diagnosis occur over multiple years. For instance, compared to parents of healthy children, parents of children with cancer report greater distress for at least 1 year post-diagnosis, when the differences between these two groups of parents begin to disappear (Pai et al., 2007; Sawyer, Antoniou, Toogood, Rice, & Baghurst, 2000). Among parents of children with cancer, parents who are assessed five or more years after their child's diagnosis have reported lower PTSS compared to parents assessed within five years of their child's diagnosis (Jurbergs, Long, Ticona, & Phipps, 2009; Phipps et al., 2005). Overall, existing research suggests that the event of a child's cancer diagnosis may generate a transition period during which many parents experience increased psychological distress, with their distress declining over time.

Children with cancer, though not distressed as a group, also appear to be most susceptible to the development of psychosocial difficulties immediately following their diagnosis, with these difficulties diminishing over time. For example, a sample of children ages 2 to 12 years

exhibited significantly higher parent-reported internalizing symptoms compared to healthy peers immediately following their diagnosis of cancer, and these symptoms decreased over a four-year time frame to levels that were not significantly different from children without a serious health condition (Sawyer et al., 2000). Similarly, PTSS were higher in children and adolescents recently diagnosed with cancer compared to long-term cancer survivors (Phipps, Larson, Long, & Rai, 2006). Taken together, existing research suggests that both parental and child psychological functioning may vary based on time elapsed since the child's diagnosis. Difficulties with psychological adjustment are likely to occur immediately following the cancer diagnosis, but symptoms appear to decrease over time for the majority of both parents and children.

In sum, parental distress and child distress have been linked in families with pediatric cancer, and both parental and child symptoms appear to typically decrease over time. However, as of yet, there is very limited research available on how the link between parent and child distress changes based on the amount of time that has elapsed since the child's diagnosis. Thus, it is as of yet unclear whether any increases in parental distress following the child's diagnosis could pose risk for the child's long-term adjustment, and whether parent-child dyads most at risk for long-term maladjustment can be identified, based on the amount of time elapsed since diagnosis. Such information would be important for the identification of parents and children who would benefit from intervention. As the associations between self-reported parent and child symptoms have not yet been compared across time specifically within a pediatric cancer sample, the present study sought to fill this gap. An existing study within the broader pediatric literature suggests an absence of concurrent associations between self-reported parent and child symptoms, both within 5–6 weeks and at 1 year post-diagnosis of a serious pediatric condition, including but not limited to pediatric cancer (Landolt et al., 2012). However, these findings are not consistent with findings in a pediatric cancer sample that showed concurrent associations between self-reported parental and child symptoms (Trask et al., 2003). More studies are needed to specify how the link, if found, between parent and child distress may differ as a function of the passage of time since the diagnosis of childhood cancer, assessed across a longer time frame.

To continue to explore whether the link between parent and child distress changes over time in parent-child dyads with a pediatric cancer experience, the present study aimed to provide a first-cut look at the potential moderating effects of time on the association between parent and child distress. The present sample was recruited to obtain a wide range of distribution in time elapsed since diagnosis, ranging from one month post-diagnosis to approximately 17 years past diagnosis. To minimize inflated findings due to shared method variance, self-reported symptoms of depression, anxiety, and post-traumatic stress were obtained for both the parent and the child. Having self-reports of child distress is particularly important, as parental distress could influence parental reports of child distress and, consistent with this possibility, parental reports have typically indicated higher child distress than child reports of the same (Pinquart & Shen, 2011a, 2011b).

Based on existing research, we hypothesized that: 1. There would be a negative or inverse association between parent and child self-reported symptoms and the amount of time

elapsed since diagnosis; and 2. Parent and child symptoms would be positively related. As little research is available regarding the moderating effects of time on the link between parent and child symptoms, we drew from existing research indicating that symptoms may peak for both parents and children shortly after diagnosis, with heterogeneity in the trajectories of both parent (e.g., Dolgin et al., 2007) and child (e.g., Sawyer et al., 2000) symptoms thereafter. These findings suggest that passage of time may potentially weaken the associations between parent and child symptoms. This led to our hypothesis that: 3. Time elapsed since the child's cancer diagnosis would negatively moderate the associations between parent and child symptoms, such that these associations would be weaker in parent-child dyads with greater amounts of elapsed time since diagnosis.

Method

Participants

Pediatric patients with a history of cancer were selected at random using a number generator and approached during routine medical appointments by trained research assistants. Of the approached dyads, 68% agreed to participate, resulting in a sample of 255 children (51.8% male) and their guardian who was most involved in their medical care (83.1% mothers; 12.2% fathers; 4.7% other adult figure). Eligible participants were between ages 8–17 years (mean age = 12.61 years, $SD = 2.88$), with a diagnosis of malignancy, at least 1 month past diagnosis, able to speak and read English, and without significant cognitive or sensory deficits. In order to obtain a broadly heterogeneous and balanced sample in terms of time since diagnosis, children were recruited into one of four strata based on time elapsed since their diagnosis: 1–6 months ($n = 64$; 25.1%); 6 months–2 years ($n = 63$; 24.7%); 2–5 years ($n = 65$; 25.5%); and 5 years or more ($n = 63$; 24.7%). Time since diagnosis was calculated by subtracting the date of diagnosis from the date of study participation, rounded to the closest number of months. On average, participants were 9.39 years of age ($SD = 4.74$ years, minimum = 3 months, maximum = 17.42 years) at the time of diagnosis, resulting in an average of 45.41 months since diagnosis ($SD = 51.51$ months, range = 1–203 months). Participants were predominantly White (72.5%) in race/ethnicity (22.7% Black; 4.7% Other). Family socio-economic status (SES) as measured by the Barratt Simplified Measure of Social Status (Barratt, 2006), an updated version of the Hollingshead scale (Hollingshead, 1975), indicated that 27.5% of the families were in SES levels I & II, 31.9% in level III, and 40.6% in levels IV & V. All cancer diagnoses were included, and a representative sample was obtained in terms of diagnostic categories, including acute lymphoblastic leukemia (ALL; 23.1%), acute myeloid leukemia (AML; 7.3%), lymphoma (13.0%), solid tumors (39.3%), and brain tumors (17.4%). Roughly half of the children ($n = 118$; 46.3%) were on treatment at the time of study. A small minority ($n = 33$, 13.4%) of the children had experienced a relapse, and these children had a significantly longer elapsed time since diagnosis ($M = 64.76$ months, $SD = 50.12$) compared to those without a relapse history ($M = 42.54$ months, $SD = 51.21$), $F(1, 253) = 5.44$, $p = .02$. However, a similar proportion of these children (45.5%) were on treatment as the remainder of the sample (46.4%), $\chi^2(1, N = 255) = .01$, $p = .92$.

Of the 255 children enrolled in the study, eight were excluded from analysis due to concerns about the validity of their responses (e.g., random or uniform responding; concerns raised by research assistants that the child did not seem to understand the measures being administered). These children were significantly younger than the remaining sample of 247 children (mean age = 10.38 years, $SD = 2.83$), $F(1, 253) = 5.04$, $p = .03$, but otherwise did not differ from the rest of the sample in demographic or medical characteristics or time since diagnosis.

Procedures

All participants were interviewed and assessed in the outpatient Psychology Clinic of the hospital. After informed consent/assent was obtained, children and their guardians completed survey questionnaires in separate rooms. Trained research assistants were available during data collection to assist and read items aloud if needed. For the assessment of post-traumatic stress, participants spontaneously identified their most stressful or traumatic event, about which they provided information regarding their post-traumatic symptoms regardless of whether or not the event met the DSM-IV A1 criterion for Post-Traumatic Stress Disorder (i.e., “experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others”; American Psychiatric Association, 2000). Participating parents and children each received a \$25 gift card as compensation for their time, effort, and travel. Procedures were approved by the Institutional Review Board at the authors’ home institution.

Measures

Parental Distress—Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) is a 53-item measure based on the SCL-90-R that assesses psychological symptoms. Parents rated the degree to which they were distressed by each symptom (e.g., “Feeling blue”) in the past week on a 5-point Likert scale, ranging from 0 (*not at all*) to 4 (*extremely*). Scores were normed by gender, using the adult non-patient normative sample, to obtain T-scores for the Depression and Anxiety subscales and for the Global Severity Index (GSI). Subscales have good internal consistency (Chronbach’s $\alpha = .81$ for anxiety; $.85$ for depression), test-retest reliability ($.79$ for anxiety, $.84$ for depression, and $.90$ for GSI), and convergent and divergent validity (Derogatis & Melisaratos, 1983). In our present sample, Chronbach’s α was $.76$ for anxiety, $.83$ for depression, and $.95$ for GSI.

Impact of Events Scale, Revised (IES-R; Weiss, 2004) is a 22-item measure of post-traumatic stress associated with the event identified by parents as their most traumatic. Parents rated the amount of distress associated with each symptom (e.g., “I found myself acting or feeling like I was back at that time”) in the past seven days, using a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Items were summed to obtain a score reflecting PTSS ($\alpha = .94$ in our present sample). IES-R has adequate internal reliability and test-retest reliability (Weiss, 2004).

Child Distress—Children’s Depression Inventory (CDI; Kovacs, 1992) is a 27-item, child-report measure of depressive symptoms. Children chose among 3 statements that best

describe them (e.g., “I am sad once in a while / many times / all the time”) in the past two weeks. Items were scored on a 3-point scale ranging from 0–2, with higher scores indicating greater symptoms of depression, and summed. The measure has adequate internal reliability (Chronbach’s $\alpha = .86$; $\alpha = .82$ in the present sample), and 6-week test-retest reliability ranges from .59 to .67 (Kovacs, 1992).

Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997) is a 41-item self-report measure of anxiety symptoms. Children rated how much each item described them over the past 3 months (e.g., “I am nervous”) using a 3-point scale ranging from 0–2 (*Not/hardly ever true; somewhat/sometimes true; very/often true*). The full scale, reflecting the sum of those scores, has adequate internal reliability (Chronbach’s $\alpha = .90$; $\alpha = .91$ in the present sample) and good convergent and divergent validity (Birmaher et al., 1999).

UCLA PTSD Reaction Index for DSM-IV (PTSDI; Pynoos, Rodriguez, Steinberg, Stuber, & Frederick, 1998) is a 22-item self-report measure assessing DSM-IV PTSD criteria based on a target event. Asking about symptoms relative to a specific event has been found to create a focusing effect such that the event becomes more salient and its importance more exaggerated (Kahneman, Krueger, Schkade, Schwartz, & Stone, 2006). Thus, to avoid overestimating children’s distress, they self-identified their most traumatic, stressful event, regardless of whether or not it met the A1 criterion, and reported their symptoms relative to that event. Children rated the frequency of each item (e.g., “I watch out for danger or things that I am afraid of”) occurring within the past month on a 5-point Likert scale ranging from 0 (*none*) to 4 (*most*), and the scores were summed. Excellent internal reliability and test-retest reliability have been reported (Steinberg, Brymer, Decker, & Pynoos, 2004), and in the present sample, Cronbach’s α was .88.

Analytic Plan

First, descriptive analyses were conducted. To identify potential confounding variables, or covariates, the effects of demographic and medical variables on outcome variables were examined using ANOVA (Welch’s ANOVA, if the assumption of the homogeneity of variances is violated) and bivariate correlations. Second, partial bivariate correlations were run, controlling for the identified covariates, to examine the associations between parental and child symptoms. Finally, the moderation of these associations by time elapsed since diagnosis was examined with hierarchical multiple regression. Separate regression models were run for each pair of parent and child symptoms that were significantly linked. To reduce multicollinearity, the predictor (parental anxiety, depression, or PTSS) and the moderator (time since diagnosis, in months) variables were centered. For each analysis, covariates were entered as a block, followed by the centered predictor (parental anxiety, depression, or PTSS), centered moderator (time since diagnosis), and the interaction term between the centered predictor and the centered moderator, each entered in a separate block. Post-hoc probes of the moderation effect were conducted using the Johnson-Neyman technique (Hayes & Matthes, 2009), which identifies the value of the moderator at which the moderation effects become significant. Power analysis using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009) suggested that the current sample of 247 produced

sufficient power (.87) to detect small to medium moderation effects ($f^2 = .04$). Analyses were run using PASW Statistics 18.

Results

Descriptive analyses indicated that, while parents reported levels of distress consistent with those of the normalization sample, children reported relatively low levels of distress (Table 1). To determine potential confounding variables, effects of demographic and medical factors on the study variables were first examined. The demographic variables that showed significant associations with study variables were child age at diagnosis, child and parent gender, and family SES. The child's age at diagnosis was not associated with child symptoms but was associated with higher parental depression symptoms, [$r(245) = .15, p = .02$], and PTSS [$r(244) = .21, p = .001$]. Female child participants reported significantly higher levels of anxiety ($M = 20.71, SD = 10.39$) than male child participants ($M = 16.55, SD = 12.65$), $F(1, 243) = 7.85, p = .005$. Furthermore, children whose participating parents were mothers reported higher anxiety symptoms ($M = 19.43, SD = 11.87$) than those whose participating parents were fathers ($M = 13.27, SD = 9.70$), $F(1, 243) = 8.24, p = .004$. However, there was no significant interaction effect between parent and child gender for child-reported anxiety symptoms. Finally, family SES was negatively associated with child depression [$r(245) = -.19, p = .003$], anxiety [$r(243) = -.22, p = .001$], and PTSS [$r(242) = -.24, p < .001$], as well as lower parental GSI score [$r(245) = -.17, p = .007$]. Child race did not significantly affect any of the study variables.

When medical factors were examined as potential covariates, diagnostic category and intensity of treatment were not associated with parental or child distress. However, relapse status and whether or not the child was currently on treatment were associated with study variables. Surprisingly, children in the sample who had experienced a relapse ($n = 33$; 13% of the sample) reported significantly lower levels of anxiety ($M = 14.51, SD = 7.56$) compared to those who had not relapsed ($M = 19.18, SD = 12.18$), Welch's $F(1, 58.60) = 8.80, p = .004$. Although being on current treatment did not affect child symptoms, parents of children on treatment reported higher depressive symptoms ($M = 54.21, SD = 9.13$) and PTSS ($M = 28.05, SD = 17.05$) than those whose children were off treatment ($M = 49.68, SD = 9.17$), $F(1, 245) = 15.02, p < .001$, and ($M = 20.67, SD = 17.12$), $F(1, 244) = 11.39, p = .001$, respectively.

Hypothesis 1: Child and parent symptoms show negative associations with time

Hypothesis 1 posited that there would be a negative association between time elapsed since diagnosis and psychological distress reported by parents and children. Table 1 shows the partial bivariate correlations among the parent and child distress variables and time since diagnosis, controlling for demographic and medical covariates identified in the previous analyses (child age at diagnosis, child and parent gender, family SES, relapse status, and current treatment). There was limited support for our first hypothesis that parent and child-reported symptoms would be negatively related to time elapsed since diagnosis. Only parental depression [$r(239) = -.13, p = .04$] and child anxiety [$r(237) = -.22, p = .001$] showed such effects, whereas other symptoms showed minimal associations with time since

diagnosis. Thus, parental anxiety, child depression, and parental and child PTSS did not differ based on when those symptoms were assessed relative to the time of child diagnosis. The correlations showed consistency among symptoms reported by each rater (parent or child), as measures completed by each reporter were strongly inter-correlated ($r_s = .54-.81$ among parents; $r_s = .51-.67$ among children).

Hypothesis 2: Parent and child symptoms are associated

There was stronger support for the second hypothesis, that parent and child symptoms would be positively linked. Seven of the twelve correlations between parent and child symptoms (Table 1) were significant, though most of the correlations were small ($r_s = .13-.27$). Parental depression and GSI were associated with multiple types of child symptoms, whereas parental anxiety and PTSS were associated only with the same type of symptoms in the child.

Hypothesis 3: Time weakens the associations between parent and child symptoms

To test the third hypothesis that time since diagnosis would negatively moderate (i.e., weaken) the associations between parent and child symptoms, hierarchical multiple regression was run for the seven significant associations that were found between parental and child symptoms (Table 2). Significant moderating effects were found for five of those associations. Contrary to our hypothesis, time since diagnosis positively moderated the impact of parental symptoms on child anxiety and PTSS, such that parental and child symptoms were more strongly linked in families with greater amount of time elapsed since diagnosis. Furthermore, time since diagnosis had no effect on the associations between parental and child depressive symptoms or between parent and child PTSS. Thus, the hypothesis that parental symptoms and child symptoms would be more strongly linked closer to diagnosis was not supported. In fact, the opposite effect was found, such that parent-child dyads assessed closer to diagnosis exhibited the least amount of concordance in their self-reported distress. Figure 1 depicts the moderating effect of time since diagnosis. To facilitate interpretation, simple slopes for each study stratum are presented, so that each line represents a group of participants with similar amounts of time elapsed since diagnosis.

Post-hoc probes of the significant moderating effects using the Johnson-Neyman technique (also presented in Table 2) suggested that most of these moderation effects were significant for families who were more than one year past the child's diagnosis (15.33 to 44.02 months post-diagnosis). Only one exception was found: For the association between parental depression and child PTSS, the moderation effects were already significant for families fairly close to diagnosis (at least 3.29 months past diagnosis). Thus, parent-child dyads that were assessed closer to the child's diagnosis did not, as a group, evidence significant associations between parent and child distress. However, past the amounts of time since diagnosis (in months) indicated by the Johnson-Neyman values, those associations between parent and child symptoms strengthened with increasing time.

Discussion

The present study examined the associations between parent and child symptoms of depression, anxiety, and post-traumatic stress in families of children with cancer and how these symptoms were affected by passage of time since diagnosis. To minimize inflation of findings due to shared method variance, symptoms were assessed via self-report by parents and children. We found that, contrary to our hypothesis, the amount of time elapsed since diagnosis was not associated with most types of parent and child symptoms. Only symptoms of parental depression and child anxiety showed significant and negative associations with time since diagnosis. Consistent with existing literature that documents decreasing levels of distress in both children with cancer and their parents over time (Sawyer et al., 2000; Vrijmoet-Wiersma et al., 2008), these symptoms appeared to decline over time as families adjusted to the child's diagnosis and treatment. Surprisingly, other types of symptoms, including parental anxiety, child depression, and parental and child PTSS, did not show a relationship with time since diagnosis. It is possible that, especially for children in the sample, low levels of and limited variability in symptoms contributed to the absence of their associations with time. Also, as the present study is cross-sectional, longitudinal follow-up of the sample is needed in order to control for cohort effects and examine potential predictors of fluctuations in symptoms other than the child's diagnosis and treatment.

Even after accounting for demographic factors and medical factors, including any relapse history or ongoing treatment, parental symptoms of depression were associated with multiple types of child symptoms (depression, anxiety, and PTSS). Furthermore, parental anxiety was linked to child anxiety, and parental PTSS was linked to child PTSS. These findings are consistent with existing research suggesting that parental depression may be a risk factor for multiple types of child psychopathology, possibly through its contribution to harsh or inconsistent parenting or disturbances in attachment that impede the child's development of emotion regulation capacities (Cummings & Davies, 1994). It is unclear why parental anxiety and PTSS were linked only to the same type of child symptoms. Parental anxiety and PTSS may pose specific risk for child symptoms through such mechanisms as the transmission of genetic vulnerability for anxiety (Hettema, Neale, & Kendler, 2001) or PTSS (Cornelis, Nugent, Amstadter, & Koenen, 2010), or through parental over-control or modeling of anxious behaviors that specifically increase child anxiety (Murray, Creswell, & Cooper, 2009) and possibly PTSS (Pynoos et al., 1999).

When we examined how associations between parental and child symptoms differed based the amount of elapsed time since diagnosis, we found that time since diagnosis positively moderated the links between parental symptoms and child anxiety as well as PTSS. No moderation effect was found on the links between parent and child depression or between parent and child PTSS. Given the existing findings that both parents and children are more likely to be distressed shortly after diagnosis, we were quite surprised by our finding that, on the whole, parent and child symptoms were more strongly linked in families farther out from the child's diagnosis. In conducting additional literature review to understand our results, we found another study with similar findings in parent-child dyads whose children were diagnosed with insulin-dependent diabetes mellitus. Chaney et al. (1997) found that, in parent-child dyads assessed with a wide range of elapsed time since diagnosis (1 month to

12.7 years), self-reported parent and child distress did not show concurrent associations at the initial assessment, but at a subsequent follow-up one year later, a significant concurrent association was found between paternal and child distress. Moreover, findings reported by Landolt et al. (2012) that parent and child PTSS do not show concurrent associations within the first year since diagnosis are consistent with our present findings. Thus, the findings that parental distress and child distress are not related shortly after diagnosis but strengthen several years after diagnosis may be robust across pediatric samples.

There are several potential explanations for the unexpected finding that parents and children farther out from diagnosis exhibited greater associations in their levels of distress. It is possible that the families assessed shortly after the child's diagnosis are still in a period of transition and have not yet established a stable pattern of adjustment. One prior study found that parent and child symptoms are significantly related in families of children with cancer but not in families of healthy, demographically matched comparison children (reference omitted for blind review). Thus, families assessed shortly after the child's diagnosis may be exhibiting similar levels of divergence between parental symptoms and child symptoms as those found in a healthy comparison sample, whereas families with more cancer-related experience show greater convergence.

Although causal effects cannot be established due to the cross-sectional nature of our study, the experience of child cancer diagnosis and treatment may have long-term effects that increase the concordance between parental and child functioning. For example, many parents report increased distress (Dolgin et al., 2007; Grootenhuis & Last, 1997; Pai et al., 2007; Phipps et al., 2005; Vrijmoet-Wiersma et al., 2008) as well as overprotection and indulgence of the child (Davies, Noll, DeStefano, Bukowski, & Kulkarni, 1991; Long & Marsland, 2011) after their child's diagnosis. For some families, the impact of these changes in parental functioning, especially if chronic, on the child may become more observable over time (McLeod et al., 2007; Pynoos et al., 1999). Because children with cancer frequently identify their parents as key sources of their social support (Trask et al., 2003), they may be susceptible to parental distress and difficulties in modeling effective coping behaviors (Suzuki & Kato, 2003). Longitudinal research is needed to identify potential causal or lagged effects contributing to the effects found in this study, to help identify families at greatest risk for long-term maladjustment.

However, it is important to note that most families do successfully adjust to the demands and changes in family roles posed by the child's cancer experience (McCubbin et al., 2002). Thus, the strengthening of the symptom associations found in families farther out from the child's diagnosis may reflect the trend over time for families to establish a more clear and stable pattern of adjustment, with some families exhibiting maladjustment but many other families showing good adjustment. It is also important to note that, because parent-child dyads are less likely to be on treatment the farther out they are from the child's diagnosis, the associations in distress found in parent-child dyads assessed several years since diagnosis may reflect the effects of stressors other than the child's diagnosis and treatment. Such stressors may include challenges posed by cancer survivorship, including late effects or sequelae of treatment and difficulties with school re-entry (Kahalley et al., 2013; Stam,

Grootenhuis, & Last, 2001), as well as stressful life events exogenous to the cancer experience.

There are a few important caveats to our findings. As a group, our sample was not distressed. On average, parents reported levels of symptoms that are comparable to those found in normative samples, and children reported levels of symptoms that are lower than the mean levels of symptoms found in normative samples. The limited distress level of the sample likely contributed to the weak findings in the study. Moreover, of the total variance in child anxiety (21–23%) and PTSS (13–17%) that were explained by our regression models, parental symptoms, time since diagnosis, and their interaction together accounted for a fairly small proportion (8–10% of child anxiety; 5–9% of child PTSS). Thus, on the whole, demographic factors, whether or not the child had experienced a relapse, and ongoing treatment were at least as important in explaining child symptoms.

Limitations and Future Directions

The present study has several limitations. Findings need to be replicated using samples from other pediatric cancer treatment sites and regions, as the sample in this study was recruited from a single site. Also, because our sample is cross-sectional, we cannot yet conclude that the association between parent and child symptoms would decline over time in the same families followed longitudinally and prospectively. There may also have been sampling biases. For example, a smaller proportion of families approached within the first year of diagnosis agreed to participate, compared to those who were approached five years or more past diagnosis, though the participation rate did not differ significantly. It is possible that families with greater levels of distress, especially early in their cancer experience, did not enroll in the study. Finally, research identifying the specific processes that lead to change in the associations between parent and child symptoms is still needed. Future studies might examine such factors as changes in family cohesiveness and expressiveness, or deterioration in parenting quality, as potential sources of change over time.

Implications for Practice

The present study found that children with cancer and their parents, on the whole, appear to be well-adjusted. However, parental depression and child anxiety were negatively associated with time. These symptoms may increase temporarily in response to the child's diagnosis and then decline in many families. Moreover, parental symptoms of depression were linked to multiple types of child symptoms, and parental anxiety and PTSS were linked to the same type of symptoms in the child. Thus, interventions targeting parents with chronic or marked distress may help prevent the child's maladjustment to cancer diagnosis and treatment. Because parental symptoms were more strongly related to child anxiety and PTSS in families assessed farther out from the child's diagnosis, clinicians may need to screen and monitor parents and children separately for maladjustment in the months immediately following diagnosis and during treatment. However, for parent-child dyads assessed well after the child's diagnosis, assessment of either the parent or the child may help provide an indication of the family's adaptation overall, as their symptoms appear to be more strongly related. Nonetheless, ongoing and long-term assessments of adjustment in parents and children with pediatric cancer experience, even after the completion of treatment, are

warranted. Screening for major life events and any difficult transitions (e.g., return to school; functional interference due to late effects of treatment) may also be important, to best serve these families' needs over time.

Acknowledgments

This research was supported in part by grants from the NIH (CA136782), and the American Lebanese-Syrian Associated Charities (ALSAC).

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Figure 1. Moderating Effect of Time Since Diagnosis, by Study Strata

A graphic representation of the moderating effect of time since diagnosis on the association between parental depression and child anxiety. To facilitate interpretation, the lines represent groups of families recruited into the four study strata based on the amount of time elapsed since the child's diagnosis (1–6 months, 6 months–2 years, 2–5 years, and 5+ years). All of the significant moderation effects had a similar effect, with slopes becoming more positive with increasing time since diagnosis.

Table 1
Descriptive Statistics and Partial Correlations for Self-Reported Parent and Child Symptoms

	<i>M(SD)</i>	Range	1	2	3	4	5	6	7	8
1. BSI Depression	51.77 (9.41)	42–80	-	.59***	.76***	.49***	.18**	.24***	.27***	-.13*
2. BSI Anxiety	51.66 (10.00)	38–80		-	.81***	.54***	.09	.13*	.09	-.03
3. BSI Global Severity Index	52.88 (10.78)	33–80			-	.63***	.10	.17**	.19**	-.10
4. IES-R Post-Traumatic Stress	24.06 (17.45)	0–85				-	.07	.10	.16*	-.08
5. CDI Depression	6.29 (5.22)	0–27					-	.67***	.61***	-.01
6. SCARED Anxiety	18.57 (11.77)	0–82						-	.51***	-.22***
7. UCLA Post-Traumatic Stress	17.84 (13.42)	0–63							-	.01
8. Time Since Diagnosis (in months)	45.63 (51.96)	1–203								-

Note. Partial correlation coefficients, controlling for child age at diagnosis, child and parent gender, family socio-economic status, relapse status, and current treatment status (on or off treatment), are reported. Diagonals indicate the range. BSI and IES-R are parent self-report measures, and CDI, SCARED, and UCLA are child self-report measures.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2
Hierarchical Multiple Regression Models Examining the Moderation Effects of Time Since Diagnosis

Predictor	Child Outcomes / Parent Symptom											
	Anxiety				Post-Traumatic Stress				Depression			
	R^2	β	R^2	β	R^2	β	R^2	β	R^2	β	R^2	β
Step 1: Covariates	.13***		.13***		.08**		.08**		.06*		.06*	
Step 2: Parent Symptom	.05***		.02*		.07***		.02*		.03**		.03**	
		.21***		.12*		.15*		.28***		.17**		.19**
Step 3: Time Since Diagnosis	.03**		.04***		.04**		.001		.00		.00	
		-.25*		-.34**		-.30**		.17		.07		.10
Step 4: Interaction	.01*		.02*		.03**		.02*		.01		.02*	
Parental Distress x Time		.13*		.14*		.16**		.14*		.11		.13*
Total R^2	.23		.21		.22		.17		.12		.13	
N	245		245		245		244		243		244	
Cohen's f^2	.01		.03		.04		.02		.01		.02	
Johnson-Neyman Value	15.33		44.02		35.95		3.29		N/A		21.72	
												N/A

Note. Standardized regression coefficients from the final model, which simultaneously modeled all steps, are reported. Demographic and medical covariates included in Step 1 were child age at diagnosis, child and parent gender, family SES, relapse status, and current treatment. Cohen's f^2 refers to the effect size for the moderation effect. Johnson-Neyman significance value indicates the value of time since diagnosis, in months, at or above which the moderation effect is significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.