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ARTICLE

Anxiety and its correlates among young adults with a history of parental cancer

Christina A. Metcalf, MA^a, Joanna J. Arch, PhD^{a,b}, and Joseph A. Greer, PhD^c

^aDepartment of Psychology and Neuroscience, University of Colorado Boulder, Boulder, CO, USA; ^bCancer Prevention and Control, University of Colorado Cancer Center, Aurora, CO, USA; ^cCenter for Psychiatric Oncology and Behavioral Sciences, Massachusetts General Hospital, Boston, MA, USA

ABSTRACT

Purpose: We assessed whether experiencing parental cancer during childhood was associated with anxiety levels during young adulthood—and whether parental survival status moderated anxiety or related psychosocial outcomes. *Methods:* Young adults who experienced parental cancer during their childhood ($n = 68$) and those who did not ($n = 298$) completed measures of current anxiety and family functioning. The parental cancer group completed measures of social support and life changes during the parental cancer and posttraumatic growth. *Results:* Young adults who experienced parental cancer endorsed higher state and trait anxiety than matched controls. Higher anxiety correlated with less current family cohesion and lower past social support satisfaction. Parental cancer outcome moderated the relationship between current anxiety and dimensions of posttraumatic growth and predicted the number of cancer-related life changes. *Conclusion:* Experiencing parental cancer during childhood predicted higher reported anxiety during young adulthood. Anxiety levels were partially moderated by parental survival status.

KEYWORDS

adolescent/young adult;
anxiety/depression;
behavioral health; family;
quality of life

Background

An individual's cancer affects his or her entire family, often including youth; about 14% of adult survivors report living with a minor (Weaver, Rowland, Alfano, & McNeel, 2010). For many, cancer's impact is psychological. Greater than expected percentages of patients and their family members endorse clinically significant anxiety and depression symptoms (Compas et al., 1994), and cancer survivors and their spouses evidence elevated anxiety symptoms more than a decade after diagnosis (Mitchell, Ferguson, Gill, Paul, & Symonds, 2013).

Both severity and outcome (fatal versus nonfatal) of parental cancer appear to moderate youths' psychological outcomes (Krattenmacher et al., 2012). On average

and compared to noncancer reference groups, both children and adolescents are at slightly increased risk for internalizing—but not serious psychosocial—problems when their parent has an *early* stage cancer diagnosis (Osborn, 2007). Research on youths' experience of parental cancer of ranging stages yields mixed results. Most data indicate that anxiety and depression symptom levels are comparable for children, but elevated for adolescents, relative to those of controls or normative samples (Visser, Huizinga, van der Graaf, Hoekstra, & Hoekstra-Weebers, 2004). Youths whose parents have terminal or recently diagnosed *advanced* cancer exhibit higher anxiety, depression, and psychological distress than their peers (Phillips, 2014; Siegel et al., 1992; Siegel, Karus, & Raveis, 1996).

Findings from studies measuring anxiety in youth around the time of their parents' cancer diagnosis in comparison with a normed population sample (Heiney et al., 1997) or a control group (Harris & Zakowski, 2003) differ depending on the type of anxiety measured. Higher state anxiety was evident among children who had parents in cancer treatment compared to normative data, though levels of trait anxiety were comparable (Heiney et al., 1997). Similarly, chronic anxiety levels were similar to a control group among adolescents whose parents had cancer (Harris & Zakowski, 2003). Elevated youth *state* anxiety in response to the acute threat of a parent diagnosed with (or treated for) cancer is a reasonable expectation. One could hypothesize that these short-term elevations in state anxiety would generalize to more sustained elevations in both state and trait anxiety as youth mature into young adults. Consistent with this possibility, meta-analytic findings demonstrate long-term elevated anxiety in cancer patients *and* their spouses (Mitchell et al., 2013). This suggests that chronically elevated anxiety may represent a legacy of cancer for the entire family system.

Investigators have examined the long-term emotional impact of maternal breast cancer on adult daughters in particular across a range of ages. Adult daughters, on average around 40 years old, of breast cancer patients have endorsed similar levels of psychological symptoms as a matched comparison group (Wellisch, Gritz, Schain, Wang, & Siau, 1991) and reported decreases in state anxiety over three breast cancer surveillance visits (Wellisch, Ormseth, & Aréchiga, 2015). However, daughters who were younger at their mothers' breast cancer diagnosis reported alterations in their long-term life plans more often than daughters who were older (Wellisch, Gritz, Schain, Wang, & Siau, 1992). Thus, while state anxiety and psychological symptoms were not elevated across these groups whose parents had breast cancer, daughters reporting changing her life direction could indicate a longer term impact of parental cancer for those who are younger at the time of diagnosis.

Other researchers have described the relationship between parental cancer and later struggle for young adults specifically. Grenklo et al. (2013) observed an association between parental cancer and subsequent risky behaviors. Specifically, cancer-bereaved teenagers and young adults were twice as likely to self-injure than non-bereaved controls, even after controlling for other risk factors (Grenklo et al.,

2013). Parental cancer has also been linked to increased specialized psychiatric care use relative to peers in the period leading up to young adulthood (Niemelä et al., 2012). Young adults with a history of parental cancer are at higher risk to experience mental health challenges, and other family members with this history (i.e., spouses of cancer survivors) report chronically elevated anxiety (Mitchell et al., 2013). Because of this, it is plausible that anxiety levels specifically are elevated in young adults who have experienced parental cancer.

Perceiving a loss of control over potentially negative childhood experiences has been theorized to increase the risk of anxiety symptoms and disorders (Chorpita & Barlow, 1998). By interpreting a loss of control over their environment, children can learn a cognitive style through which they interpret subsequent life events as also being out of his or her control (Chorpita & Barlow, 1998). Barlow (2002) has proposed that a loss of perceived control puts individuals at risk for developing a neurotic temperament and subsequent anxiety disorders. Supporting this model, meta-analytic findings include large negative associations between self-reported perceived control and trait and disorder-specific anxiety measures in both children and adults (Gallagher, Bentley, & Barlow, 2014). Parental cancer or death due to cancer is likely a negative event involving a loss of control for children, as the illness represents an acute threat that they cannot predict, change, or dictate. Based on developmental theory regarding the relationship between perceived control and anxiety (Barlow, 2002; Chorpita & Barlow, 1998), children may interpret this and subsequent life events as being out of their control, leading to elevated anxiety over the long term. This cognitive style represents a general psychological vulnerability—an element of the triple vulnerability model (Barlow, 2002)—that could contribute to increased risk for developing anxiety symptoms or traits even significantly after the parent's diagnosis or death. Development of this cognitive style might be particularly salient for those experiencing fatal parental cancer, as the death of a parent represents a more permanent and likely more impactful loss than nonfatal parental cancer.

Correlates of parental cancer are not limited to psychopathology and psychosocial problems; children of cancer patients have also reported positive outcomes. Most (93%) adult daughters with a history of parental cancer as youth reported at least one positive life change related to this experience, despite reporting significant difficulties during the acute illness phases (Leedham & Meyerowitz, 1999). A similar sample reported concurrent benefits and difficulties, as well; nearly half (44%) reported at least one or more forms of posttraumatic growth, despite a majority (59%) also reporting at least one long-term negative effect of the parental illness (Wong, Cavanaugh, Macleamy, Sojourner-Nelson, & Koopman, 2009). Thus, the legacy of cancer on survivors' children evidences both negative and positive long-term consequences. Yet, to our knowledge, work in this area on the specific population of young adults who experienced parental cancer during their youth is limited to these two studies.

As noted, Mitchell et al. (2013) found that relative to community controls, cancer survivors and their spouses showed an increased risk for elevated anxiety over one decade following cancer diagnosis. Specifically, 40% of spouses of long-term cancer survivors reported elevated anxiety—a substantially higher rate than among community controls whose spouses were not cancer survivors (Mitchell et al., 2013). Depression symptoms did not show long-term elevations in this sample. Thus, anxiety potentially represents a more enduring emotional burden of cancer experienced by long-term cancer survivors and their spouses.

Integrating these empirical and theoretical findings, we first tested whether young adults who experienced parental cancer during youth would report elevated current anxiety levels compared to a control group that did not experience serious parental illness or loss. We predicted that the parental cancer group would report significantly elevated state and trait anxiety compared to the control group. Second, we investigated whether perceived family environments differed between these two groups, hypothesizing that negative family environments would be associated with higher current anxiety levels across groups. Third—among young adults with a history of parental cancer—we explored how current anxiety levels related to current posttraumatic growth, past perceived social support, and past life changes secondary to parental cancer. We hypothesized that greater social support and fewer life changes would be associated with lower trait and state anxiety levels. Relationships with posttraumatic growth remained exploratory. Fourth, we investigated whether parental cancer outcome (fatal versus nonfatal parental cancer) moderated these outcomes, predicting that those who experienced fatal parental cancer as youths would report higher current trait anxiety than those who experienced nonfatal parental cancer.

Methods

Participants

Young adults 18 to 25 years of age who reported either a history of parental cancer or no serious parental illness were eligible for the study. Recruitment methods are described in the Procedures section. Participants who reported having a parent die from noncancer related reasons were excluded. A total of $N = 366$ young adults enrolled, including a group ($n = 68$) with a history of parental cancer (PC) and a comparison group ($n = 298$) with no history of parental cancer or other serious illness (no parental cancer or other serious illness control group; NPI). Within the PC group, the majority of young adults ($n = 51$) had a parent with nonfatal cancer (NF-PC), whereas 17 had a parent with fatal cancers (F-PC).

Procedure

We recruited participants primarily from a university in the Northeastern United States through campus-wide email listservs, student body websites, and

psychology classes. The study was listed on the class websites of introductory, social, educational, clinical psychology classes as an optional extra-credit study; students were made aware of this extra credit opportunity by direct email to the class from the first author. Participants recruited through university psychology classes, email listservs, and student websites (97% of the total sample) could self-select into either the parental cancer group or control group and receive identical study credit or monetary compensation, thus incentivizing truth telling.

Amazon's Mechanical Turk is a website that serves as a micro-task market, connecting employers to workers. Employers post jobs that they need done and workers voluntarily sign up to do small tasks for pay (see Kittur, Chi, & Suh, 2008). Participants recruited through Amazon's Mechanical Turk (3% of the total sample) first completed a screening questionnaire and were compensated for answering those screening questions. We then sent information about the study to those participants who met study criteria based on the screening questions and who agreed to be recontacted. Studies have demonstrated that the accuracy of patient self-report of cancer diagnosis is quite high, on average, when compared to registry-documented cancer (Bergmann et al., 1998; Klein, Lee, Moss, Trentham-Dietz, & Klein, 2010). Furthermore, Mechanical Turk has been shown to offer one of the largest, diverse, and most stable and efficient sources of potential research participants (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012; Paolacci & Chandler, 2014), with the quality of data comparable to that of laboratory-based studies (Mason & Suri, 2012; Paolacci, Chandler, & Ipeirotis, 2010) and pencil-and-paper measures (Behrend, Sharek, Meade, & Wiebe, 2011).

After consenting to participate in this Institutional Review Board-approved study, individuals received a link to the online questionnaires. Remuneration included either psychology course extra credit, \$10 in payment, or a gift card for an equivalent amount.

Measures

Questionnaires for entire sample

Self-reported anxiety was measured with the well-validated State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), which is a widely used scale that inquires about current state anxiety (current $\alpha = .93$) and trait anxiety (e.g., a more consistent tendency toward anxiety, current $\alpha = .88$). The family relationship index (FRI) (Holahan & Moos, 1983) measured dimensions of family environment, including cohesion, expressiveness, and conflict; however, only the cohesion and conflict scales showed acceptable internal reliability in this sample ($\alpha = .78$ and $.76$, respectively) and thus, we report only on these subscales. Finally, we collected basic demographic information from all participants.

Additional questionnaires for those with parental cancer histories only

The validated posttraumatic growth inventory (PTGI) (Tedeschi & Calhoun, 1996) assesses the degree to which participants experienced positive outcomes as a result of a traumatic life event, in this case, parental cancer. The measure contains five subscales: new possibilities (current $\alpha = .87$), relating to others (current $\alpha = .91$), personal strength (current $\alpha = .82$), spiritual change (current $\alpha = .89$), and appreciation of life (current $\alpha = .85$). The 6-item Social Support Questionnaire-Short Form (SSQ-SF) (Sarason, Sarason, Sheerin, & Pierce, 1987) assessed the size of participants' social network during the time of their parent's cancer diagnosis and treatment as well as their satisfaction with this support (current $\alpha = .94$). A final study-specific questionnaire gathered information on the nature, severity, duration, timeline, and outcome of the parent's cancer, as well as participant's age at and significant life changes as a result of their parent's diagnosis (e.g., changes in finances, moving schools).

Statistical approach

All analyses were performed in SPSS Version 23. To reduce type I error in the between-group analyses, we used orthogonal contrast coding to simultaneously compare the following groups in linear regression on full-sample outcomes: (1) PC versus NPI, and (2) F-PC group versus NF-PC group. A single item ("I feel rested") on the trait scale of the STAI was omitted due to clerical error. Analyses were completed by generating the total trait anxiety scores without this item, based on the remaining 19 scale items.

Results

Sample demographic characteristics

As presented in Table 1, the PC versus NPI group demographics were similar but evidenced small differences in age and education levels. Therefore, between-group analyses are reported first without and then with covarying age and education.

History of parental cancer and current anxiety

As presented in Table 2 and as hypothesized, the PC group reported higher trait anxiety, $b = -1.02$, $p = .02$, and approached reporting higher state anxiety, $b = -1.02$, $p = .06$, than the NPI group, though effect sizes were small, $\Delta R^2 = .01$ for each. While the STAI does not have valid established clinical cutoffs in this population, 51.47 and 54.41% of the PC group versus 40.60 and 53.69% of the NPI group reported higher trait and state anxiety, respectively, than the mean college student norm (Spielberger et al., 1983). Within the PC group, the F-PC versus NF-PC groups did not differ in state anxiety, $b = -1.73$, $p = .24$ but showed a marginally significant difference in trait anxiety, $b = -2.18$, $p = .08$, $\Delta R^2 = .04$, such that those participants whose parent

Table 1. Sample demographic characteristics.

	Parental cancer group (n = 68)	No parental cancer (or serious illness) group (n = 298)	t-Test or χ^2 value (cancer vs. non-cancer groups)
Age (years), Mean (SD)	19.80 (1.63)	19.32 (1.29)	$t(364) = -4.77^{**}$
Education level, % (n)			$\chi^2(1) = 7.74^{**a}$
High school or less	44.8% (30/67)	62.1% (185/298)	
2-year college	23.9% (16/67)	19.1% (57/298)	
4-year college or graduate degree	31.8% (21/67)	18.8% (56/298)	
Gender, % (n)			$\chi^2(1) = 1.09$
Female	58.2% (39/67)	65.0% (193/297)	
Male	41.8% (28/67)	35.0% (104/297)	
Ethnicity, % (n)			$\chi^2(1) = .002$
Hispanic or Latino/a	7.6% (5/66)	7.7% (23/297)	
Reported race, % (n)			$\chi^2(4) = 4.03$
Asian	6.1% (4/66)	13.8% (41/297)	
Black/African American	7.6% (5/66)	7.1% (21/297)	
Native Hawaiian, other Pacific Islander	0% (0/66)	0.3% (1/297)	
White	80.3% (53/66)	72.1% (214/297)	
Other	6.1% (4/66)	6.7% (20/297)	

* $p < .05$; ** $p < .01$

^aAlthough education level was technically a categorical variable, we also conducted a t-test and found the same significant result. In analyses, we merged high school and less than high school, as well as a 4-year college degree and graduate school, due to the very small number of participants in the less than high school or graduate degree categories.

died from cancer reported somewhat higher trait anxiety than those whose parent survived the illness. Within the PC group, neither time since diagnosis nor age at diagnosis correlated with trait ($r(62) = -.07, p = .59$; $r(62) = .03, p = .84$, respectively) or state anxiety ($r(62) = -.09, p = .47$; $r(62) = .02, p = .86$, respectively). Covarying age and education, the PC versus NPI difference in state anxiety became statistically significant, $b = -1.03, p = .02$, but did not change the other findings.

Group differences in perceived family environment and relationships with anxiety

Group differences emerged in perceived family environment (FRI) such that the PC group reported lower family cohesion, $b = 1.86, p = .02, \Delta R^2 = .02$, but not greater conflict, $b = -.72, p = .68, \Delta R^2 = .00$, than the NPI group. Although it did not interact with group (PC vs. NPI) to predict anxiety, $ps > .43$, greater family

Table 2. Anxiety differences by parental cancer status.

	Parental cancer group (n = 68)		No parental illness group (n = 295 ^a)	
	Mean (SD)	Median	Mean (SD)	Median
State anxiety	41.17 (11.13)	39.50	38.97 (10.48)	39.00
Trait anxiety	40.19 (9.67)	40.00	38.21 (8.61)	37.00

^aNote that three no parental illness group participants had missing data on both of these variables.

cohesion was associated with lower trait and state anxiety across the entire sample, $b = -.21, p < .001, \Delta R^2 = .14$ and $b = -.15, p < .001, \Delta R^2 = .05$, respectively. Covarying age and education did not significantly change these findings. In the PC group, the F-PC versus NF-PC groups did not differ on family environment variables, $ps > .34$.

Young adults with a history of parental cancer: Differences by parental outcome

Next, we compared the parental cancer groups on measures that were assessed exclusively between the F-PC and NF-PC groups.

Cancer-specific clinical characteristics

Across the entire cancer sample, breast cancer was the most common parental diagnosis (22/68 or 32.35%). More generally, however, the pattern of cancer diagnoses differed by group, $p = .03$: the F-PC group reported more colorectal and lung cancers, and the NF-PC group reported more melanoma, thyroid, breast, prostate, and bladder cancers. Medical treatments for cancer differed by group, with parents in the F-PC group more often undergoing chemotherapy, 82.35 versus 40.82%, Fisher's $p = 0.003$, Cramer's $V = .36$, and less often undergoing surgery, 52.94 versus 83.67%, Fisher's Exact Test $p = 0.01$, Cramer's $V = .31$, relative to the NF-PC group. Rates of radiation treatment did not differ by group, 52.94% for F-PC versus 48.98% for NF-PC, $p = .78$.

Group averages for age at parental cancer diagnosis, time since the parent's cancer diagnosis, and length of cancer are represented in Table 3. The parent(s) diagnosed with cancer by participant gender are represented in Table 4.

Life changes associated with parental cancer

To explore the concrete life consequences of having a parent die from (F-PC) versus survive cancer (NF-PC), we compared these groups on life changes that occurred as a result of having a parent diagnosed with cancer, with results reported

Table 3. Differences in age, time since parental diagnosis, and length of parental cancer by parental cancer outcome.

	Fatal parental cancer group ^a ($n = 17$)		Nonfatal parental cancer group ^a ($n = 51$)		Between-group t -test
	Mean (SD)	Median	Mean (SD)	Median	
Youth's age at time of parental diagnosis (years)	10.50 (6.13)	11.00	12.96 (5.49)	14.00	$t(62) = -1.51$
Time since parental cancer diagnosis (years)	9.88 (5.55)	9.50	7.12 (5.43)	6.50	$t(62) = 1.75$
Duration of parent's fight with cancer (years)	3.88 (2.18)	4.00	2.80 (2.23)	2.00	$t(64) = 1.74$

^aNote that two nonfatal parental cancer group participants had missing data on all of these variables, 1 nonfatal parental cancer group participant had missing data on the age and time since diagnosis variables, and 1 fatal parental cancer group had missing data on the age at and time since diagnosis variables.

Table 4. Parent(s) with cancer by young adult gender.

	Female (n = 39)	Male (n = 28)
Mother ^a	51.28% (20/39)	50.00% (14/28)
Father	23.08% (9/39)	32.14% (9/28)
Mother and Father	7.70% (3/39)	10.71% (3/28)
Did not report	17.95% (7/39)	25.00% (7/28)

^aOne participant did not report gender, but reported having a mother with cancer.

in Table 5. Contrary to predictions, the total number of life changes predicted neither state nor trait anxiety levels, $ps > .15$.

Perceived social support and anxiety

The F-PC versus NF-PC groups did not differ in number ($M = 4.76, SD = 2.18$ vs. $M = 4.97, SD = 1.75$) or satisfaction with social supports at the time of diagnosis ($M = 4.52, SD = 1.31$ vs. $M = 4.92, SD = 1.24$), $ps > .25$. Across both groups, greater numbers of social supports predicted lower trait anxiety, $b = -1.39, p = .04, \Delta R^2 = .07$, and approached predicting lower state anxiety, $b = -1.33, p = .10 [0.97], \Delta R^2 = .05$. The support satisfaction variable was highly skewed; therefore, we performed a median split on this variable. Social support satisfaction was significantly associated with lower state, $b = -7.47, p = .009, \Delta R^2 = .11$, and trait anxiety, $b = -7.93, p = .001, \Delta R^2 = .16$.

Posttraumatic growth and anxiety

Due to the large number of PTGI subscales, we conducted these analyses in multivariate linear regression to reduce the number of tested models. Although the multivariate F-PC versus NF-PC group test was significant across the PTGI subscales, $p = .001$ and $np^2 = .28$, the groups differed significantly on only one of the five PTGI subscales, personal strength, $p = .006$ and $np^2 = .12$. Specifically, the F-PC group reported greater personal strength as a result of parental cancer, $M = 13.12$ and $SD = 4.82$, relative to the NF-PC group, $M = 8.70, SD = 5.70$. We next evaluated whether posttraumatic growth (PTGI subscales) predicted anxiety levels and found that the personal strength subscale significantly and positively predicted

Table 5. Differences in experiences of major life events by parental cancer outcome.

	Fatal parental cancer group (n = 17)	Nonfatal parental cancer group (n = 51)	Cramer's V
Report at least one major life change secondary to parent's cancer	76.47% (13/17)	38.78% (19/49)	.33*
Financial stress	64.71% (11/17)	22.45% (11/49)	.39*
Change residences	35.29% (6/17)	4.08% (2/49)	.42*
Change schools	23.53% (4/17)	2.04% (1/49)	.36*
Extracurricular activity changes	17.65% (3/17)	12.24% (6/49)	.07
Mental health counseling	41.18% (7/17)	4.08% (2/49)	.48*

* $p < .05$, ** $p < .01$, *** $p < .001$ for Fisher's exact test (2-sided).

state anxiety, $b = .77$, $p = .04$, but not trait anxiety, $b = .48$, $p = .16$; no other subscales were associated with trait or state anxiety levels.

Finally, we evaluated whether group status (F-PC vs. NF-PC) moderated the relationship between the PTGI subscales and anxiety levels. The direction of the relationship between young adults' reported life appreciation and state anxiety depended on, or was moderated by, parental survival status. As [Figure 1](#) presents, the PTGI appreciation of life subscale interacted with PC group in predicting state anxiety, $b = -2.01$, $p = .01$, and $\Delta R^2 = .09$, with a similar marginally significant association for trait anxiety, $b = -1.24$, $p = .08$, and $\Delta R^2 = .05$. For young adults with nonfatal parental cancer, greater reported life appreciation predicted *higher* state anxiety, $p = .04$. For those experiencing fatal parental cancer reported life appreciation approached predicting *lower* state anxiety, $p = .08$. Furthermore, as [Figure 2](#) illustrates, the spiritual change subscale interacted with group to predict state anxiety, $b = -2.13$, $p = .04$, and $\Delta R^2 = .07$. In the NF-PC group, greater spiritual change predicted *higher* state anxiety, $p = .006$. However, in the F-PC group nonsignificant pattern was found such that greater reported spiritual change approached predicting *lower* state anxiety, $p = .20$. The spiritual change subscale did not interact with group to predict trait anxiety, $b = -.78$, $p = .37$, and $\Delta R^2 = .01$. The other three PTGI subscales (new possibilities, relating to others, and personal strength) did not interact with group status to predict anxiety levels. In sum, greater life appreciation and spiritual posttraumatic growth were related to a pattern of lower anxiety among young adults whose parent died from cancer but higher anxiety among young adults whose parent survived cancer.

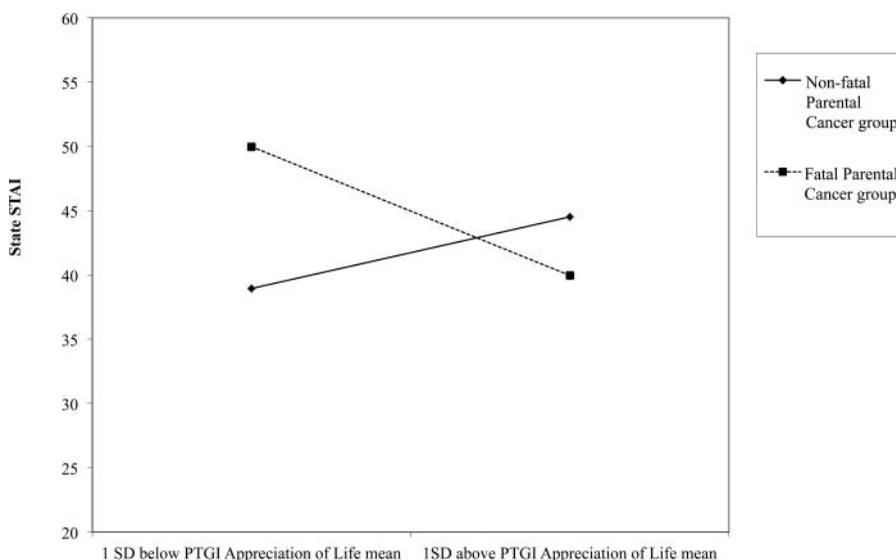


Figure 1. Interaction between appreciation of life and parental cancer outcome in predicting state anxiety.

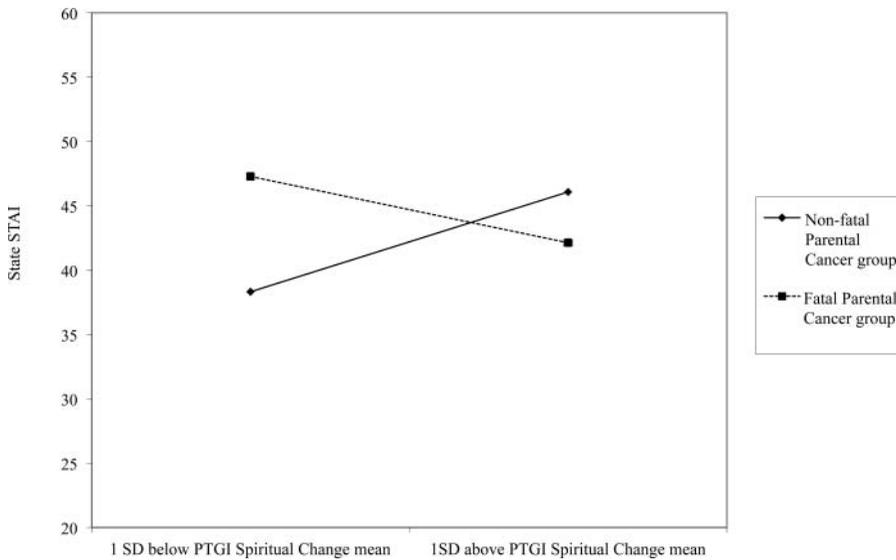


Figure 2. Interaction between spiritual change and parental cancer outcome in predicting state anxiety.

Discussion

This represents the first known study to investigate whether the experience of parental cancer of various types during childhood is associated with elevated anxiety during young adulthood. We found that young adults with parental cancer (PC) reported higher state and trait anxiety relative to a control group of young adults who had not experienced serious parental illness or disease (NPI), though group differences were small in magnitude. Elevated anxiety similarly has been reported by long-term cancer survivors and their partners (Greer et al., 2011; Hodgkinson et al., 2007; Mitchell et al., 2013), suggesting that anxiety may represent an enduring sequela of cancer for the broader family. This current finding and its magnitude are consistent with the finding that children of parents with cancer are at slightly increased risk for internalizing problems, including anxiety-related problems (Osborn, 2007). Our study extends these previous findings by illustrating that youth who experienced parental cancer report slightly elevated state and trait anxiety levels in young adulthood. In that parental cancer can be conceptualized as an acute threat that signifies a loss of control for the child, the current finding is consistent with theory (Barlow, 2002; Chorpita & Barlow, 1998) that loss of control in childhood can contribute to increased vulnerability to elevated anxiety later in life. Although not explicitly measured in this study, based on Barlow's (2002) triple vulnerabilities model, it is possible that experiencing and thus interpreting parental cancer events as being out of one's control contributed to a psychological vulnerability among the young adults who experienced parental cancer in their childhood.

This study also investigated whether the outcomes for young adults experiencing varying types of parental cancer during childhood differed as a function of parental cancer outcome. Parental cancer outcome status (fatal versus nonfatal) was associated with medium to large differences in cancer-related life changes and personal strength-related posttraumatic growth for young adults. State anxiety and social support were not different by parental cancer outcome. However, we predicted that young adults who experienced fatal parental cancer during youth would evidence higher trait anxiety than those who experienced nonfatal parental cancer. Findings were in the predicted direction and approached, though did not reach, the threshold for statistical significance, likely limited by the relatively small size of the fatal parental cancer group. Indeed, young adults whose parent died from cancer also reported greater financial stress as well as more frequent changes in schools and residences related to their parent's cancer relative to young adults whose parent survived cancer. Such group differences document the greater loss of economic status and life disruption in broader social networks for those whose parent died from cancer. We imagined that such significant life changes would compound the effects of parental cancer, exacerbating the sense of loss of control in these children's lives, but the associations of these changes with reported anxiety levels did not reach statistical significance.

Across both cancer groups, we also examined correlates between contextual support variables (i.e., social support and family environment) and current anxiety levels (state and trait), hypothesizing that greater support would buffer young adults against state and trait anxiety. We found that having a larger and more satisfying social support network predicted or marginally predicted lower state and trait anxiety. These findings highlight the importance of young adults' perceptions of being well-supported socially during the time of their parent's cancer diagnosis—regardless of cancer outcome. Similarly, across the entire sample of young adults—those with and without a history of parental cancer—higher family cohesion correlated with less state and trait anxiety. Family cohesion was lower in the PC group than the control group. Although the finding is correlational and its effect size small, this may indicate that the experience of parental cancer may strain family cohesion—even years after the diagnosis. Previous research demonstrated positive correlations between poorer family cohesion and more emotional and behavioral problems for youth whose parent had cancer (Huizinga, van der Graaf, Visser, Dijkstra, & Hoekstra-Weebers, 2003; Watson et al., 2006). Children from families with lower family cohesion prior to his or her parent's cancer diagnosis may fare worse after the diagnosis regarding anxiety. Additional longitudinal research is needed to determine the temporal patterns and their causes regarding family cohesion for these families. Personal strength also correlated with lower state anxiety across both parental cancer groups.

Individuals whose parent died from cancer reported greater personal strength than those whose parent survived cancer, which is consistent with the broader finding that more serious life disturbances are associated with greater post-

traumatic growth (Tedeschi & Calhoun, 1996). Parental cancer outcome moderated the relationship between post-traumatic growth and anxiety levels in unexpected directions, such that greater appreciation of life and spiritual change was associated with a pattern of lower anxiety for those young adults whose parent died from cancer, but *higher* anxiety for those whose parent survived cancer. Other research mirrors these findings: among young adults who have a family member with an ongoing illness, those reporting more posttraumatic stress symptoms also reported more posttraumatic growth (Loiselle, Devine, Reed-Knight, & Blount, 2011). These preliminary findings echo reports of simultaneous pain and found benefit from this experience among children with a history of parental cancer (e.g., Wong et al., 2009). These findings support additional research specifically about moderators between posttraumatic growth and anxiety. Results from such research would have implications for intervention targets and higher risk groups.

Clinical implications

The present study may be of interest to clinicians who work with children of cancer patients and survivors, young adults who have experienced parental cancer in their past, or cancer patients with children. Regarding the children of cancer patients, the findings of this work suggest that clinicians should evaluate anxiety symptoms in their clients regardless of how long ago the client went through this experience and the parental cancer outcome. Furthermore, especially for clients whose parents died of cancer, it may be of benefit for clinicians to assess and provide support around the contextual life changes that might have occurred as a result of that loss. Social support and family cohesion were negatively correlated with anxiety levels in this correlational study and may be important variables and potentially protective factors that clinicians can consider addressing in individual or family therapy either during or after the cancer experience. Again, while this study did not directly assess a loss of perceived control, it may be of value to focus specifically on related cognitions.

Strengths and limitations

A strength of this study was the direct comparison of young adults whose parents died from versus survived cancer during childhood. Studying these groups together increases our knowledge of the relative impact of different parental cancer outcomes. Another strength was its linking current state and trait anxiety to contextual variables, which informs theory regarding the potential causes of elevated anxiety among those experiencing parental cancer during childhood.

In the present study, we were unable to calculate consent rates from the various recruitment sources. To inform outcome generalizability, future studies would benefit from calculating consent rate statistics. This study was further limited by collecting information from participants about experiences that took place years

ago, and thus, some data were retrospective. The associations between anxiety levels and familial and posttraumatic growth variables were exploratory; the latter reflected a large number of analyses and thus should be interpreted with caution pending replication. Future studies also are needed to assess the *content* of anxiety experienced by these young adults; for example, health anxiety may be particularly salient. In addition, we did not include measures of sense of control or posttraumatic stress symptoms. Longitudinal studies are needed to test whether loss of control in children whose parents have cancer predict the development of negative cognitive styles and subsequent elevated anxiety.

Relatively small sample size limited statistical power for comparisons in the sample of young adults whose parent died from cancer. The analyses conducted comparing this sample to young adults whose parents did not die from cancer were conducted in an exploratory manner because, to our knowledge, they represented potentially important and novel comparisons, and we aimed to generate hypotheses for future evaluation in larger samples. However, these findings should be interpreted with caution pending requiring replication in larger samples. Similarly, although some prior work has demonstrated the importance of child and parent gender in parental cancer samples (e.g., Visser et al., 2005), detailed analyses accounting for respective genders were not possible due to limited power in the present sample.

Summary and conclusions

We found that young adults with a history of parental cancer reported higher state and trait anxiety than controls without a history of parental cancer or other serious illness. Higher anxiety levels correlated with lower social support satisfaction at the time of parental cancer diagnosis and lower current family cohesion. While having a parent die from versus survive cancer did not significantly relate to anxiety, patterns were in the predicted direction for trait anxiety, and parent survival status moderated the relationship between current anxiety levels and posttraumatic growth. Parent survival status also predicted life changes consequent of parental cancer and ratings of personal strength. Thus, the findings highlight the potential long-term effects of parental cancer on emerging adults and the importance of qualifying such effects by parent survival status.

Declaration of interest

The authors have declared no conflicts of interest.

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