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Childhood Cancer in Context: Sociodemographic Factors, Stress, and Psychological Distress Among Mothers and Children

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Abstract

Objective To examine associations between sociodemographic factors (single parenthood, family income, education level, race), stress, and psychological distress among pediatric cancer patients and their mothers. **Methods** Participants completed measures assessing sociodemographic variables, depressive symptoms, posttraumatic stress symptoms, general stress, and cancer-related stress within the first year of the child's (ages 5–17 years) cancer diagnosis or relapse. Mothers ($N = 318$) provided self-reports and parent report of their children; children aged 10–17 years ($N = 151$) completed self-reports. **Results** Each sociodemographic variable demonstrated unique associations with mothers' and children's stress and distress in bivariate analyses. A cumulative sociodemographic risk measure was positively correlated with all stress and distress variables. In regression analyses predicting mothers' and children's distress, independent and cumulative sociodemographic measures were no longer significant when accounting for levels of stress. **Conclusions** Findings highlight the need to consider the ecological context of pediatric cancer, particularly the impact of sociodemographic disadvantage on stress and distress in this population.

Key words: cancer and oncology; depression; disparities; posttraumatic stress; stress.

Pediatric cancer is a prevalent, serious, and potentially life-threatening illness (Ward, DeSantis, Robbins, Kohler, & Jemal, 2014). A child's cancer diagnosis and treatment can present the entire family (Long & Marsland, 2011) with a series of stressors, often involving frequent medical visits, invasive procedures, difficult side effects, and financial expenses. Though many families demonstrate psychological resilience in the face of a child's cancer, a significant body of research suggests that a subset of children and parents are at increased risk for psychological distress, including depressive symptoms (Pai et al., 2007) and posttraumatic stress symptoms (PTSS; Bruce, 2006; Kazak et al., 1997). However, few studies have explicitly examined underlying factors such as sociodemographic variables that may predict which families may be most at risk. The goal of the present study was to examine the associations between sociodemographic factors, cancer-related stressors, general perceived stress, and psychological distress (depressive symptoms and PTSS) to assist the field in effectively targeting and tailoring support to families most in need.

It is essential to consider the broader social-ecological context of families facing pediatric cancer (Kazak, 2001), and sociodemographic factors comprise a potentially important contextual influence in the processes of psychosocial adjustment in this population. As families are coping with illness, many are also affected by significant challenges and chronic stress associated with lower socioeconomic status (SES). As of 2011, 15% of the U.S. population was living below the poverty line. The poverty rate increases for families of female-headed households (47.6%) and for Black families (27.2%; U.S. Census Bureau, 2012), demonstrating that poverty is a societal problem that affects some groups at a disproportionate rate. It is well established that poverty and other factors related to low SES are implicated in increased stress and poorer mental and physical health among adults and children (Chen & Miller, 2013).

There are a myriad of factors that contribute to chronic and acute stress among those living in low-SES environments (Evans, 2004). A substantial body of research suggests that high levels of stress place sociodemographically disadvantaged individuals at increased risk for psychological distress. Among adults, SES and related constructs, including education and race, have been linked to depressive symptoms and greater trauma exposure (Hatch & Dohrenwend, 2007; Hudson, Puterman, Bibbins-Domingo, Matthews, & Adler, 2013). A similar pattern has been observed among children, with research indicating that youths from low-SES families are at greater risk for developing symptoms of depression and PTSS (Koenen, Moffitt, Poulton, Martin, & Caspi, 2007; Lemstra et al., 2008).

When considering the stressors related to a child's cancer diagnosis and treatment, it is important to acknowledge the cumulative load of burdens accrued by families in addition to the cancer diagnosis and to recognize the potential impact of sociodemographic stressors on increased susceptibility to psychological distress. Studies using cumulative risk (CR) models among nonpediatric populations have demonstrated that accumulated SES-related stressors have important consequences for mental and physical health among children and adults (Brody et al., 2013; Doan, Fuller-Rowell, & Evans, 2012). However, in pediatric cancer research, relatively few studies have addressed the potential added burden related to lower SES among some families, or how these accumulating stressors may in turn impact psychological distress. SES and stress may be particularly relevant in this population given the well-documented financial burden of childhood cancer (Bona et al., 2014).

While both mothers and fathers have reported that caregiving and providing emotional support to their ill child and other children in the family is difficult and time-consuming, mothers in particular report it is challenging to care for a child with cancer while also providing care for the rest of the family (Rodriguez et al., 2012; Svavarsdottir, 2005) and have reported higher levels of distress in the first year of diagnosis (Pai et al., 2007). Brown et al. (2008) specifically highlighted the need for research on adjustment and caregiving stress in single parents of medically ill children, as single parents may have less support and assistance available to help meet these demands. However, few studies to date have examined the role of single parenthood as a potential predictor of psychological distress in children with cancer or their parents, and findings from previous studies have been mixed. For example, Dolgin et al. (2007) found that single mothers of children with cancer reported moderately high levels of distress, which remained elevated up to 6 months after diagnosis, whereas other studies suggest that negative effects associated with single motherhood may be accounted for by lower family income (Klassen et al., 2012; Mullins et al., 2011) or education level (Iobst et al., 2009).

Further, although few studies have explicitly examined the impacts of education and race on outcomes in this population, these constructs are also strongly related to SES, have well-documented effects on pediatric cancer survival rates (Ward et al., 2014) and treatment understanding (Gage, 2010), and may affect risk for psychological distress (Hudson et al., 2013; Iobst et al., 2009). In addition, much of the literature to date that does highlight sociodemographic factors among families facing cancer is limited to parents. Although some research suggests that overall levels of distress are higher among parents of pediatric cancer patients versus their children (Patel et al., 2011), given the evidence that a family's sociodemographic disadvantage can have significant effects on children's psychosocial well-being, more attention should be given to these constructs among pediatric cancer patients.

A child's cancer diagnosis and treatment may be introduced on top of ongoing, exogenous stressors such as those described above. Yet, it remains unclear whether and how various sociodemographic factors may independently and/or collectively impact the experience of cancer-related stressors, general stress, or psychological distress among the largely overlooked population of sociodemographically disadvantaged families facing pediatric cancer. Because the factors included in SES composites are often related but not fully overlapping, it has been suggested that it is best to examine SES on multiple levels (Adler et al., 1994; Gallo & Matthews, 2003), including both the individual and collective contributions of the multiple, distinct variables that comprise SES. Thus, building on the seminal work of Adler et al., we used two different methods of representing sociodemographic

disadvantage. First, we examined demographic variables (single-parent status, family income, parental education, and race) separately to determine the independent influence of each of these factors and explore whether certain factors appear to have stronger effects on stress and distress in this population. Second, we aggregated these factors into a single CR variable to examine their potential collective impact (Brody et al., 2013; Doan et al., 2012).

The present research examined the associations of sociodemographic variables with general life stress, cancer-related stress, and psychological distress (represented by depressive symptoms and PTSS) among a sample of pediatric cancer patients and their mothers in the initial weeks and months following diagnosis. We hypothesized that: (1) Individual and cumulative measures of sociodemographic disadvantage would be associated with greater levels of psychological distress, general life stress, and cancer-related stress; and (2) significant associations of sociodemographic variables with psychological distress would no longer be significant after controlling for levels of general stress and cancer-related stress. Exploratory analyses also examined whether cumulative sociodemographic disadvantage would moderate the effects of stress on psychological distress.

Method

Participants

Participants were mothers and children recruited at two pediatric hospitals in the U.S. Eligible families had children who (a) were aged 5–17 years old, (b) had a new cancer diagnosis or recent recurrence of initial cancer diagnosis, (c) were actively receiving treatment through the oncology division, and (d) had no preexisting developmental disability. As the current study was embedded within a larger project examining psychological adjustment and family communication in children with cancer, and included the use of direct observations of parent–child communication when a child has cancer, the minimum age for children was set at 5 years as an estimate of when children would be best able to participate in this type of discussion. All mothers in the present study ($N = 318$) provided reports on themselves and their children; self-reports were also provided by children aged 10–17 years ($N = 151$).

Demographic characteristics of the sample are presented in Table I. There was sufficient range and variability to examine each demographic factor as an independent variable in the data analyses. For all families included in the study, children were on average 10.6 years old ($SD = 3.9$) and 52.8% ($N = 168$) were male. Children had cancer diagnoses of leukemia (36.0%, $N = 114$), lymphoma (24.9%, $N = 79$), brain tumors (8.8%, $N = 28$), and other solid tumor (29.3%, $N = 96$); children with a new cancer diagnosis (vs. recurrence) comprised 91.3% of the sample. For those children who were old enough to provide self-report data (10–17 years old), the sample was on average 13.5 years old ($SD = 2.4$) and 49% ($N = 74$) male. These children had diagnoses of leukemia (31.1%; $N = 47$), lymphoma (34.4%; $N = 52$), brain tumor (5.3%; $N = 8$), and other solid tumor (29.1%; $N = 44$); 91.6% had new cancer diagnoses. The types of diagnoses were not significantly different from incident rates in the clinics from which the sample was recruited.

Table I. Demographic Characteristics of Families in the Overall Sample and Families With Children Who Provided Self-Report Data

	Overall sample ($N = 318$)			Sample with youth self-reports ($N = 151$)		
Characteristic	*M*	*SD*	Range	*M*	*SD*	Range
Age of mother	37.5	7.1	23–59	40.5	6.9	27–59
Age of child	10.6	3.9	5–18	13.5	2.4	10–18
Mothers' years of education	13.9	2.3	7–22	13.8	2.2	9–22
	N	%		*N*	%	
Gender of child						
Female	150	47.2		77	51.0	
Male	168	52.8		74	49.0	
Mothers' marital status						
Married or living with someone	238	72.6		114	75.5	
Single, divorced, separated, or widowed	78	23.8		35	23.2	
Annual family income						
≤$25,000	87	26.5		35	23.5	
$25,001–$50,000	88	26.8		48	32.2	
$50,001–$75,000	48	14.6		23	15.4	
$75,001–$100,000	36	11.0		17	11.4	
≥$100,001	50	15.2		26	17.4	
Mothers' race						
White	270	82.3		134	88.7	
Black	30	9.1		11	7.3	
Other	15	4.6		3	2.0	
Child's race						
White	270	82.3		135	89.4	
Black	31	9.5		13	8.6	
Other	17	5.2		3	2.0	

Note. Numbers do not add up to 100% because some participants chose not to report on certain variables.

Measures

Demographic and Medical Data

Parents provided demographic data on age, race, ethnicity, education level, annual family income, and marital status. Participants also gave consent for research staff to review the child's medical records for information on the diagnosis.

Mothers' and Children's Psychological Distress

Depressive symptoms and PTSS were chosen as common representative indicators of psychological distress among this population and have been the focus of much of the previous research (Bruce, 2006; Pai et al., 2007). Mothers completed the Beck Depression Inventory-II (BDI-II) as a measure of current depressive symptoms (Beck, Steer, & Brown, 1996) that includes 21 items rated on a 4-point scale with higher scores reflecting greater levels of depressive symptoms. Total depressive symptoms on the BDI-II are classified as minimal (0–13), mild (14–19), moderate (20–28), or severe (29–63; Beck et al., 1996). Internal consistency reliability in the current sample was $\alpha = .93$.

Mothers reported on their children's depressive symptoms using the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). Children aged 10–17 years self-reported depressive symptoms using the Youth Self-Report (YSR; Achenbach & Rescorla, 2001). Reliability and validity are well established for both the CBCL and YSR, and normative *T* scores are derived from a nationally representative sample of children and youth. For both the CBCL and YSR, *T* scores from the DSM-Affective Problems scale are presented to provide indices of children's depressive symptoms that coincide with Major Depressive Disorder (Achenbach, Dumenci, & Rescorla, 2003).

Mothers and children aged 10–17 years completed the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) to assess PTSS in reference to the child's cancer diagnosis. The 22 items are rated as to how distressing each symptom was over the past 7 days on a 4-point scale with higher scores reflective of greater distress. The IES-R has been used in previous studies of PTSS in mothers and children following diagnosis (Bruce, 2006; Pai et al., 2007; Phipps, Long, Hudson, & Rai, 2005). Internal consistency for total IES-R scores with the current sample was $\alpha = .94$ for mothers and $\alpha = .90$ for children.

Mothers' General Perceived Stress

Mothers completed the Perceived Stress Scale (PSS; Cohen & Williamson, 1988) as a measure of general stress. The PSS is a widely used instrument that assesses subjective experiences of psychological stress (e.g., how often have you felt difficulties were piling up so high that you could not overcome them). It consists of 10 items for which participants rated on a 4-point scale how often each item was true for them in the past month. Internal consistency for the total PSS score with the current sample was $\alpha = .87$.

Mothers' and Children's Cancer-Related Stressors

To assess cancer-related stressors, participants completed the stressor items from the Responses to Stress Questionnaire-Pediatric Cancer Version (RSQ; Miller et al., 2009; Rodriguez et al., 2012). Mothers provided self-report and parent report of their children, and children aged 10–17 years provided self-report data. The stressor items from the RSQ include a list of cancer-related stressors (11 for mothers' self-reports, 10 for mother report of child and child self-report) and participants rate how stressful each item has been recently on a 4-point scale, with higher total scores on the RSQ reflecting higher levels of cancer-related stress. For mothers, items include stressors related to daily role functioning (e.g., paying bills, having less time for other family members), cancer communication (e.g., talking about cancer, understanding information about cancer and medical treatment), and cancer caregiving (e.g., not being able to help my child feel better). For mother report of child and child self-report, items include stressors related to daily role functioning (e.g., missing school), physical effects of treatment (e.g., feeling sick, changes in personal appearance), and uncertainty about the future. Internal consistencies for the RSQ total stressor scores with the current sample ranged from $\alpha = .83$ to .91.

Procedure

The institutional review boards (IRB) at both sites approved the study protocol. Participants were approached by a member of the research team in the outpatient hematology/oncology clinics or in inpatient rooms. Eligible participants were recruited consecutively. Eighty-seven percent of eligible families were enrolled in the study (i.e., provided informed consent and completed questionnaires). Only participants who completed questionnaires were considered enrolled in the study. Per IRB guidelines, we did not obtain demographic information or reasons for declining from those families who declined to participate in our study.

Mothers completed an informed consent form and children aged 10–17 years completed an assent form. Participants were given questionnaire packets to complete in the hospital or outpatient clinic, or took home to return at a subsequent visit. Families were compensated $50 for completion of the questionnaires. Participants were recruited within 0–10 months of the child's diagnosis or relapse of their original cancer ($M = 1.4$; $SD = 1.2$) and returned questionnaires between 0 and 12.8 months following diagnosis ($M = 2.4$; $SD = 2.0$). Variation in the time at which parents were first approached by the research team was owing to timing of communication of the diagnosis from the medical team to the research team, parents' availability to hear about the study, and parents' need for time to consider the study before consenting. There were no significant differences in enrollment, $t(239) = -0.44$, $p = .66$, or completion time,

$t(239) = -0.40$, $p = .73$, based on the child's first-time diagnosis versus relapse status.

Data Analytic Strategy

Analyses were conducted using SPSS (21st ed.). Descriptive analyses examined mean levels of sociodemographic indicators, general perceived stress, cancer-related stressors, and psychological distress variables. Bivariate analyses were conducted to test the hypotheses that each variable representing sociodemographic disadvantage (single-parent status, lower income, lower education level, race) would be associated with greater levels of psychological distress, general perceived stress, and cancer-related stress for mothers and children. Pearson correlations were used for continuous variables, Spearman correlations were used for ordinal variables, and independent samples *t* tests were used to compare groups on dichotomous variables. Power calculations indicated that there was 80% power and $p < .05$ to detect correlations of $r \geq .16$ and $r \geq .23$ for the samples based on mothers' and children's reports, respectively.

Multiple regression analyses were conducted using a simultaneous block method to examine the relative associations of sociodemographic variables with psychological distress and to test the second hypothesis, that significant sociodemographic effects would no longer be significant after controlling for stress variables. Sociodemographic variables were entered in Step 1a. A new block of analyses (Step 1b) was run with only stress variables entered (general stress and cancer-related stress for mothers; cancer-related stress for children). Step 2 included sociodemographic and relevant stress variables along with mothers' and children's symptoms to control for effects of children's symptoms on mothers' distress and vice versa.

The potential collective impact of sociodemographic risk factors was examined with a CR variable. Each sociodemographic variable was dichotomized such that participants received a score of 0 or 1, indicating lesser or greater risk: mother partnered (0) versus single (1); annual family income > $50,000 (0) versus ≤$50,000 (1); mother education level >12th grade (0) versus ≤12th grade (1); and White (0) versus non-White (1) race.[1] The cutoff for annual family income was chosen to best approximate those above versus below the median U.S. household income of $51,371 according to 2012 U.S. Census data.[2] The education level cutoff was chosen following guidelines set by previous research of CR (Brody et al., 2013; Doan et al., 2012). The CR variable represents the sum of each participant's score across these four dichotomized measures, with CR scores ranging from 0 to 4. Pearson bivariate correlations were used to examine the first hypothesis in reference to CR and a series of regressions following the same method as above were used to examine the second hypothesis in reference to CR.

Exploratory analyses examined whether CR would moderate the association between stress and psychological distress. To test the interactions, CR and each stress variable were centered by subtracting the sample mean from each individual score and both the centered variables and their product terms were included in multiple regression analyses.

Results

Preliminary Analyses

On the sociodemographic CR measure, 32.4% of mothers had zero risk factors; 24.5% had one risk factor, 28.1% had two risk factors, 12.7% had three risk factors, and 2.3% had four risk factors.

Time since diagnosis was not significantly related to any psychological distress or stress variable or CR. Children's new diagnosis versus relapse was also not significantly different on any of these measures. Child age was significantly correlated with mother reports of children's cancer-related stress on the RSQ ($r = .24$, $p < .01$) but was not associated with any other measures of mothers' or children's stress, distress, or CR.

Mothers' mean score on the BDI-II ($M = 15.2$, $SD = 10.5$) was in the mild range of depressive symptom levels (≥14), with 29% of mothers reporting symptoms in the moderate to severe range (scores ≥20; Beck et al., 1996). Mothers' reports of children's affective symptoms on the CBCL indicated 15.9% of scores fell in clinical range ($T \geq 70$); 7.4% of the youths who completed the YSR indicated clinically elevated symptoms ($T \geq 70$). On the IES-R, 39.6% of mothers ($M = 29.3$, $SD = 17.6$) and 24.8% of youth ($M = 23.3$, $SD = 15.3$) scored above the cutoff score of 34, indicating elevated levels of PTSS (Rash, Coffey, Baschnagel, Drobes, & Saladin, 2008). Correlations among measures of stress and distress for mothers and children are presented in Table II.

[1] Although there were six families for whom mother and child race differed, a separate CR variable using child race was highly correlated with the original CR variable ($r = .98$, $p < .001$); thus, only the CR variable that reflects mothers' race was used for these analyses.

[2] All CR analyses were also conducted using annual family income >$25,000 vs. ≤$25,000 to more closely approximate the poverty line for a family of four; patterns of significance for all analyses were the same using this CR cutoff.

Table II. Pearson Correlations Among Measures of Stress and Psychological Distress for Mothers and Children

Measure	1	2	3	4	5	6	7	8	9
1. BDI-II (mother self-report)	–								
2. YSR (child self-report)	.24**	–							
3. CBCL (mother report on child)	.29***	.44***	–						
4. IES-R (mother self-report)	.66***	.23**	.29***	–					
5. IES-R (child self-report)	.26**	.44***	.05	.36***	–				
6. PSS (mother self-report)	.63***	.19*	.23***	.62***	.24*	–			
7. RSQ (mother self-report)	.56***	.20*	.23***	.63***	.25*	.54***	–		
8. RSQ (child self-report)	.16	.18	−.08	.21*	.55***	.14	.37***	–	
9. RSQ (mother report on child)	.13*	.04	.17**	.07	.38***	.05	.21***	.51***	–

Note. *$p < .05$; ** $p < .01$ ***$p < .001$.
$N = 318$ for mother reports; $N = 151$ for child self-reports.
BDI-II = Beck Depression Inventory-II; CBCL = Child Behavior Checklist Affective Problems Scale *T* score; YSR = Youth Self-Report Affective Problems Scale *T* score; PTSS = posttraumatic stress symptoms; IES-R = Impact of Events Scale-Revised; PSS = Perceived Stress Scale (general stress); RSQ = Response to Stress Questionnaire total stressor item score (cancer-related stress).

Table III. Associations of Each Sociodemographic Variable With Stress and Distress for Mothers and Children

Outcome measure	Single mothers *M (SD)*	Partnered mothers *M (SD)*	*t (df)*	*d*	Race: non-White *M (SD)*	Race: White *M (SD)*	*t (df)*	*d*	Family income (ρ)	Mothers' education (*r*)
Depressive symptoms										
BDI-II (mother self-report)	17.4 (11.3)	14.4 (10.2)	2.16* (306)	.28	15.0 (10.1)	15.2 (10.6)	.17 (308)	−.02	−.21**	−.24***
YSR (child self-report)	57.2 (7.6)	54.2 (4.9)	2.47* (143)	.47	55.1 (6.7)	54.8 (6.4)	.14 (145)	.05	−.20*	−.06
CBCL (mother report on child)	57.5 (7.8)	56.1 (6.9)	1.43 (302)	.19	56.1 (6.8)	56.6 (7.2)	−.43 (304)	−.07	−.16**	−.03
PTSS										
IES-R (mother)	33.8 (19.4)	27.8 (16.8)	2.60** (309)	.33	30.4 (17.9)	29.1 (17.6)	−.47 (311)	.07	−.15*	−.17**
IES-R (child self-report)	29.7 (13.8)	21.4 (15.5)	2.39* (101)	.57	29.3 (8.5)	22.5 (15.9)	1.51* (103)	.53	−.17	−.12
Stress										
PSS (mother self-report)	22.2 (6.8)	20.9 (7.1)	1.49 (311)	.19	21.3 (6.7)	21.2 (7.1)	−.07 (313)	.01	−.17**	−.19**
RSQ (mother self-report)	30.5 (6.0)	28.7 (6.9)	2.09* (310)	.28	29.4 (7.3)	29.2 (6.7)	−.24 (312)	.03	−.12*	−.15**
RSQ (child self-report)	28.2 (7.7)	25.7 (8.1)	1.57 (146)	.32	31.2 (5.6)	25.8 (8.1)	2.63* (148)	.78	−.09	−.03
RSQ (mother report on child)	28.3 (6.8)	26.6 (7.0)	1.86 (311)	.25	27.3 (7.6)	27.0 (6.9)	.24 (313)	.04	−.07	−.10

Note. *$p < .05$; **$p < .01$ ***$p < .001$.
M = mean; *SD* = standard deviation; *df* = degrees of freedom.
$N = 318$ for mother reports; $N = 151$ for child self-reports. See Table II for definitions of measure abbreviations.

Independent Associations of Each Sociodemographic Factor With Distress and Stress

Bivariate Analyses

Bivariate analyses examining associations of sociodemographic variables to mothers' and children's stress and distress are presented in Table III. Single mothers reported significantly greater depressive symptoms and PTSS than partnered mothers. Single mothers also reported significantly greater levels of cancer-related stress on the RSQ than partnered mothers; however, single versus partnered mothers did not differ on general perceived stress on the PSS. Mothers' race was not significantly associated with self-reported levels of stress or distress. Annual family income was significantly negatively correlated with all four measures of mothers' psychological distress and stress ($p < .05$), ranging in magnitude from $\rho = .12$ to $\rho = .21$. Mothers' education level was also significantly negatively correlated ($p < .01$) with self-reported depressive symptoms, PTSS, general perceived stress, and cancer-related stress (ranging from $r = -.15$ to $-.24$).

Children of single mothers reported significantly greater affective problems on the YSR and PTSS on the IES-R in comparison with children of partnered mothers. In contrast, mothers' reports of children's affective problems on the CBCL did not differ significantly as a function of mothers' relationship status. There were also no significant differences for mother- or self-reported cancer-related stress among these children. Non-White race was significantly positively associated with children's self-reported PTSS and cancer-related stress. Family income was significantly negatively correlated ($p < .05$) with children's self-reported affective problems on the YSR ($\rho = -.20$) as well as mothers' reports of children's affective problems on the CBCL ($\rho = -.16$). Mothers' education level was not significantly correlated with self-reports or mother reports of children's affective problems, PTSS, or cancer-related stress.

Multiple Regression Analyses

In the model predicting mothers' depressive symptoms (Table IV), family income was a significant predictor in Step 1a. Mothers' general perceived stress and cancer-related stress were significant in Step 1b. In Step 2, each type of stress accounted for significant variance in mothers' depressive symptom levels, whereas no other variables were significant predictors. In the model predicting mothers' PTSS (Table IV) single parenthood was a significant predictor in Step 1a and both types of stress were significant in Step 1b. In Step 2, mothers' general stress and cancer-related stress were the only significant predictors.

No sociodemographic variables emerged as significant predictors in any step of the linear regression for youths' self-reported affective problems (Table IV); youths' self-reported cancer-related stress significantly accounted for variance on this measure in Step 1b but was no longer significant in the final step. In the model predicting children's self-reported PTSS (Table IV), mothers' single-parent status significantly predicted greater levels of children's PTSS in Step 1a, and in Step 1b, youths' self-reported cancer-related stress was a significant predictor. In Step 2, mothers' single-parent status and youth's cancer-related stress each significantly accounted for unique variance in youths' PTSS. Finally, in a model predicting mother reports of children's affective problems on the CBCL (Table IV), sociodemographic factors were not significant. Mothers' reports of youths' cancer-related stress was significant in Step 1b, while both mother reports of youth's cancer-related stress and mothers' self-reported depressive symptoms significantly predicted CBCL scores in the final step.

Associations of Sociodemographic CR With Distress and Stress

In Pearson bivariate correlations, CR was significantly positively correlated ($p < .01$) with mothers' self-reported depressive symptoms, PTSS, general stress, and cancer-related stress ($r = .13$–$.23$). CR was also significantly correlated with children's self-reported affective problems ($r = .16$, $p = .05$), PTSS ($r = .29$, $p < .01$), and cancer-related stress ($r = .28$, $p < .01$) but not

Table IV. Multiple Regression Analyses Predicting Mothers' and Children's Psychological Distress

Predictor	Mothers' BDI-II		Mothers' IES-R		YSR affective problems		Children's IES-R		CBCL affective problems	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1a		.10*		.10*		.05		.10*		.01
Single parenthood	−.07		−.24*		−.16		−.26*		−.06	
Family income	−.28*		−.13		−.14		−.02		−.10	
Mother education	.03		.13		.10		−.01		−.05	
Race	.02		.01		.07		−.16		.06	
Step 1b		.50***		.58***		.04*		.28***		.06***
General stress	.42***		.44***		–		–		–	
Cancer-related stress	.38***		.43***		.20*		53***		.24***	
Step 2		.42***		.51***		.06*		.26***		.08***
Single parenthood	−.04		−.10		−.14		−.21*		−.03	
Family income	−.10		.06		−.10		.02		−.08	
Mother education	.03		.05		.09		.07		.09	
Race	−.02		.07		.08		−.06		.04	
General stress	.39***		.45***		–		–		–	
Cancer-related stress	.36***		.39***		.16		.47***		.17**	
Family member symptoms	.08		.10		.16		.18		.20**	
Step 1a		.06**		.06*		.01		.09**		.01
Cumulative risk	.24**		.25*		.12		.30**		.09	
Step 1b		.50***		.59***		.04*		.28***		.05***
General stress	.42***		.44***		–		–		–	
Cancer-related stress	.38**		.43***		.20*		.53***		.23***	
Step 2		.45***		.54***		.06**		.25***		.08***
Cumulative risk	.06		−.01		.06		.13		.03	
General stress	.40***		.43***		–		–		–	
Cancer-related stress	.37***		.41***		.16		.46***		.17**	
Family member symptoms	.09		.11		.19*		.20*		.20**	

Note. *$p < .05$; **$p < .01$; ***$p < .001$.

$N = 151$ for mother reports; $N = 151$ for child self-reports. Cancer-related stress reflects self-reports for all columns except CBCL for which it reflects mother report on child. Family Member Symptoms = YSR Affective Problems T scores in the regression predicting mothers' BDI-II; child IES-R scores in the regression predicting mothers' IES-R; BDI-II scores in the regression predicting YSR Affective Problems and CBCL Affective Problems; mother IES-R scores in the regression predicting children's IES-R. Regression analyses were also conducted for each mother-reported dependent variable (BDI-II, IES-R, CBCL) without child symptoms in the model to examine effects among the full sample of mothers and results of the final the step of these models were not different from the models presented in the table.

with mothers' reports of their child's affective problems or cancer-related stress.

Multiple regression analyses were used to predict mothers' and children's emotional distress from CR (Step 1a), stress (Step 1b), as well as the relative contributions of these variables while controlling for family members' symptoms (Step 2; see Table IV). In the model predicting mothers' depressive symptoms, CR was a significant predictor in Step 1a but did not remain significant in Step 2 when general stress and cancer-related stress were added to the model. The pattern for the model predicting mothers' PTSS was similar. CR was again a significant predictor when entered on its own, but only general stress and cancer-related stress were significant in Step 2 (Table IV). Consistent with the regression models above, all relevant stress variables were also significant when entered on their own (Step 1b).

In the model for children's self-reported affective problems (Table IV), CR did not account for significant variance at any step; only mothers' depressive symptoms was significant in the final step (Step 2) of the model. CR was also not significant in the model for mother reports of children's affective problems (Table IV), although mother reports of children's cancer-related stress was a significant predictor along with mother's depressive symptoms in Step 2 of this model. In the model predicting children's self-reported PTSS (Table IV), CR was a significant predictor in Step 1a. In the second step of this model, children's self-reported cancer-related stress and mothers' PTSS each accounted for significant variance; CR was not significant when stress and mothers' symptoms were added. Again, in all models children's cancer-related stress was also significant when entered on its own (Step 1b).

Exploratory Analyses

Exploratory analyses examined whether CR would moderate the association between stress and psychological distress. Following the same multiple regression method described above, a regression model was run for each psychological distress outcome that used the centered CR and stress variables and included the interaction terms in Step 2. In each of these models, neither the CR × general stress nor the CR × cancer-related stress interaction terms were significant predictors of mothers' self-reported depressive symptoms or PTSS, children's self-reported affective problems or PTSS, or mothers' reports of their child's affective problems.

Discussion

The goal of this study was to elucidate the impact of sociodemographic factors on stress and psychological distress in pediatric cancer patients and their mothers. This information will be important to the development of effective and sensitive supportive interventions. A subset of parents and children experience increased levels of distress when facing a child's cancer diagnosis (Bruce, 2006; Pai et al., 2007), and sociodemographic factors may be helpful in identifying which families are most at risk. Though it is well documented that social-environmental factors are associated with increased stress exposure and increased psychological distress in the general population, few studies have rigorously examined the potential independent or cumulative impact of specific sociodemographic variables on psychological outcomes among families facing childhood cancer (Brown et al., 2008). The findings in the present study provide some evidence that factors representing sociodemographic disadvantage (i.e., single parenthood, lower family income, lower parental education, non-White race) may exert both independent and collective influence on general perceived stress, cancer-related stressors, and psychological distress in this population.

There was partial support for the hypothesis that sociodemographic disadvantage would place mothers and children at greater risk for stress and psychological distress. At the bivariate level, each sociodemographic indicator was significantly associated with some, but not all, indicators of mothers' and children's stress and distress (see Table III). In linear regressions, sociodemographic risk factors appeared to significantly increase the experience of distress for mothers and children, together accounting for 10% of the variance in mothers' depressive symptoms and mothers' and children's PTSS. Regression models also tested the relative contribution of each sociodemographic variable to mothers' and children's psychological distress as well as the hypothesis that significant associations of sociodemographic variables with psychological distress would no longer be significant after controlling for levels of stress. This hypothesis was largely supported. While lower family income and single parenthood were significant predictors of mothers' depressive symptoms and PTSS, respectively, general- and cancer-related stress were the only significant predictors when added to the models. Among children, no sociodemographic variable accounted for variance above and beyond the effects of the others in predicting affective problems. However, the model for children's PTSS was similar to that for mothers, as single parenthood and children's cancer-related stress were each significant predictors of children's symptoms in the final step.

We also examined the cumulative impact of sociodemographic factors in reference to the first and second hypotheses through an index of CR reflective of accumulating disadvantage across each sociodemographic measure (Brody et al., 2013). CR scores were

correlated with increased symptom levels on all self-reported distress and stress measures for mothers and children. Similar to analyses with independent sociodemographic variables, linear regressions demonstrated that heightened levels of stress largely accounted for statistical variance in psychological distress, beyond the effects of CR.

The results suggest that in the face of a child's cancer, the underlying influence of sociodemographic disadvantage may pose a greater risk for psychological distress among mothers and children coping with the illness and the stressors it presents. Partial support was found for both independent and collective influences of sociodemographic factors, with single parent status and lower income presenting the most consistent independent effects across mothers and children. These results help to clarify mixed findings from previous studies. Prior studies have suggested that single parenthood is related to increased distress primarily through income (Klassen et al., 2012; Mullins et al., 2011) or education (Iobst et al., 2009) but in the current study the effect of single parenthood remained significant after accounting for other sociodemographic variables. Parents of children with chronic illnesses have reported concerns about providing care for the rest of the family (Svavarsdottir, 2005). These concerns may be intensified among single mothers, for whom caring for healthy siblings in addition to their ill child would likely become increasingly difficult. The cumulative measure of these variables also suggests that as mothers experience sociodemographic disadvantage in multiple spheres, risk for psychological distress in the face of pediatric cancer increases for both the mother and her child.

While some research has reported on sociodemographic factors and psychological outcomes in this population, few have attempted to explain how these factors might increase risk for maladjustment when facing childhood cancer. The results of the present study suggest that increased levels of both general stress and cancer-related stress may largely account for psychological distress in this population. Sociodemographic factors each independently and cumulatively predicted certain forms of mothers' and children's distress, but these effects were no longer significant when accounting for levels of general and/or cancer-related stress (in addition to mothers' distress, among children). Thus, among families whose child is diagnosed within the broader contextual stressors created by sociodemographic disadvantage, the cancer-related challenges introduced on top of preexisting, more chronic stressors may be experienced as even more salient and taxing. These findings need to be interpreted with caution, however, as shared method variance between measures of stress and psychological distress (both were collected via self-report) may have partially accounted for the greater effects of stress in the present study. That is, as 30.3% of the total significant effects detected involved this shared-method variance (computed as the proportion of significant effects that involved stress and distress variables from the same reporter), it is possible that self-reported nature of stress variables accounted for variance in the regression models, thus underestimating the relative impact of sociodemographic disadvantage when the stress variables were in the model. Future research should consider decreasing this possibility through the increased use of multimethod assessment tools.

The current study had several limitations that provide direction for future research. The analyses of general stress and cancer-related stress and mothers' and children's distress are cross-sectional; future studies should examine these relationships prospectively over time, particularly focusing on the potential long-term impact on parental and child outcomes following accumulated financial burden and work/daily life disruption owing to cancer treatment. Further, the regression analyses in this study provide initial support for a model in which stress may mediate the relationship between sociodemographic factors and psychological distress in mothers and children. While a rigorous meditational model could not be tested with these cross-sectional data, the results provide direction for future analysis of such a model using a longitudinal design.

The present analyses were limited only to mothers because few single-parent fathers were recruited into the study, which was a variable of primary interest. However, there is evidence that a subgroup of fathers also report heightened distress following their child's cancer diagnosis (Dunn et al., 2012). Therefore, it will be important for future studies to include fathers, as well as other caregivers, to gain a more complete understanding and develop interventions that are relevant to the entire family. While the present study did not examine possible effects of treatment intensity, this construct is also of potential importance. As previous studies have also demonstrated elevated anxiety symptoms in this population (Pai et al., 2007), future research would do well to include anxiety as an additional potential indicator of distress in sociodemographically disadvantaged families facing cancer. Finally, the present sample was largely partnered, White, and had a mean of 13.9 years of education, thus resulting in a relatively low-risk sample; this may in part account for the relatively few significant effects for race in the present study, despite well-documented racial inequalities in socioeconomic position and stress exposure (Hudson et al., 2013). Research on sociodemographic constructs among more diverse samples is needed, and integration of sociodemographic research with studies of cultural influences on health beliefs will be essential for advancement in sensitive clinical

care (see Gray, Szulczewski, Regan, Williams, & Pai, 2014 for a review).

The present research also had several key strengths. First, the sample was relatively large and was recruited close in time to cancer diagnosis or relapse; the sample was also relatively heterogeneous with regard to income and range of education. Second, the study included assessments of both general stress and stress that is specifically related to cancer, as well as multiple participant reports (parent self-reports, parent report of child, and adolescent self-reports) on outcome variables. This research is unique in its focus on the distinct contributions of various sociodemographic factors to the psychosocial sequelae of pediatric cancer, as well as how these variables coalesce to influence psychological outcomes among parents and children.

These findings underscore the need to consider the broader ecological context of families facing pediatric cancer. Sociodemographically disadvantaged families face a constellation of stressors (Evans, 2004) that, in conjunction with the additional stressors accrued by having a child with cancer, may intensify the negative impact on family adjustment. The present study has implications for intervention at both the individual and institutional levels. In addition to highlighting the need for improved supportive services (e.g., programs aimed at reducing financial and logistical burdens for families), the current findings suggest that sociodemographic factors should be considered when implementing screening procedures for psychological distress and that the families in greatest need of direct psychological interventions include those from low-SES backgrounds and those reporting high levels of general stress and cancer-related stress.

Progress has been made toward helping parents and children cope with the stress of pediatric cancer, including interventions to build coping and problem-solving skills near the time of diagnosis (Askins et al., 2009; Stehl et al., 2009); however, further intervention research is needed (Peek & Melnyk, 2010). The current findings suggest the importance of tailoring these interventions to sociodemographically disadvantaged families. Interventions to reduce psychosocial stress in families faced with economic hardship are also emerging (Wadsworth et al., 2011), and randomized clinical trials synthesizing these two lines of research could be most promising in mitigating the impact of childhood cancer on particularly vulnerable families.

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